

## ▼ Automated Essay Scoring

### What is this Notebook about?

- This Notebook contains all raw results and experiments done with the various deep learning models that we got. The whole Notebook may take approximately 5-6 hours. This Notebook contains
- Preprocess data
- Important utility methods to be used later
- Deep Learning Model declaration
- Running bert for individual sets
- Running bert for whole dataset
- Running word2vec for individual sets
- Running word2vec for whole dataset

```
# import important libraries and download data
import os
import pandas as pd
import numpy as np
import nltk
import re
from nltk.corpus import stopwords
from gensim.models import Word2Vec
from sklearn.model_selection import train_test_split
from sklearn.model_selection import KFold
from sklearn.metrics import cohen_kappa_score
import torch
import torch.nn as nn
import torch.nn.functional as F
import torch.optim as optim
import random
import multiprocessing
%matplotlib notebook
import numpy as np
import matplotlib.pyplot as plt
from sklearn.manifold import TSNE
nltk.download('punkt')
nltk.download('stopwords')
nltk.download('wordnet')
! git clone https://github.com/Gaurav-Pande/AES_DL.git && mv AES_DL/data .
! pip install transformers
```



```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Unzipping corpora/wordnet.zip.
Cloning into 'AES_DL'...
remote: Enumerating objects: 24, done.
remote: Counting objects: 100% (24/24), done.
remote: Compressing objects: 100% (20/20), done.
remote: Total 24 (delta 4), reused 13 (delta 0), pack-reused 0
Unpacking objects: 100% (24/24), done.
```

# Declaring some visualization methods to plot accuracy and model diagram

```
def plot_accuracy_curve(history):
    import matplotlib.pyplot as plt
    plt.plot(history.history['loss'])
    plt.plot(history.history['mae'])
    plt.title('Model loss')
    plt.ylabel('Loss')
    plt.xlabel('Epoch')
    plt.legend(['Train', 'Test'], loc='upper left')
    plt.show()
```

```
def plot_acrchitecture(filename, model):
    from keras.utils import plot_model
    plot_model(model, to_file=str(filename) + '.png')
```

# method to split data into sets

```
def split_in_sets(data):
    essay_sets = []
    min_scores = []
    max_scores = []
    for s in range(1,9):
        essay_set = data[data["essay_set"] == s]
        essay_set.dropna(axis=1, inplace=True)
        n, d = essay_set.shape
        set_scores = essay_set["domain1_score"]
        print ("Set", s, ": Essays = ", n , "\t Attributes = ", d)
        min_scores.append(set_scores.min())
        max_scores.append(set_scores.max())
        essay_sets.append(essay_set)
    return (essay_sets, min_scores, max_scores)
```

In the below cell, we can see the data we need to operate. We essentially drops the column, we dont n along with essay text.

```
dataset_path = "./data/training_set_rel3.tsv"
data = pd.read_csv(dataset_path, sep="\t", encoding="ISO-8859-1")
```

```

min_scores = [2, 1, 0, 0, 0, 0, 0, 0]
max_scores = [12, 6, 3, 3, 4, 4, 30, 60]
essay_sets, data_min_scores, data_max_scores = split_in_sets(data)
set1, set2, set3, set4, set5, set6, set7, set8 = tuple(essay_sets)
data.dropna(axis=1, inplace=True)
data.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set1.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set2.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set3.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set4.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set5.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set6.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set7.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
set8.drop(columns=["rater1_domain1", "rater2_domain1"], inplace=True)
sets = [set1, set2, set3, set4, set5, set6, set7, set8]
data.head()

```

```

➦ Set 1 : Essays = 1783   Attributes = 6
Set 2 : Essays = 1800   Attributes = 9
Set 3 : Essays = 1726   Attributes = 6
Set 4 : Essays = 1770   Attributes = 6
Set 5 : Essays = 1805   Attributes = 6
Set 6 : Essays = 1800   Attributes = 6
Set 7 : Essays = 1569   Attributes = 14
Set 8 : Essays = 723    Attributes = 18

```

/usr/local/lib/python3.6/dist-packages/ipykernel\_launcher.py:7: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: <https://pandas.pydata.org/pandas-docs/stable/10min.html>

```

import sys
/usr/local/lib/python3.6/dist-packages/pandas/core/frame.py:3997: SettingWithCopyWarning: A value is trying to be set on a copy of a slice from a DataFrame

```

See the caveats in the documentation: <https://pandas.pydata.org/pandas-docs/stable/10min.html>

	essay_id	essay_set	essay	domain1_score
0	1	1	Dear local newspaper, I think effects computer...	
1	2	1	Dear @CAPS1 @CAPS2, I believe that using compu...	
2	3	1	Dear, @CAPS1 @CAPS2 @CAPS3 More and more peopl...	
3	4	1	Dear Local Newspaper, @CAPS1 I have found that...	
4	5	1	Dear @LOCATION1, I know having computers has a...	

There are named entity tags as you can see above, which can impact our model. so we need to remove them. We will extend our stopwords set later on. But first we need to create all possible ner tags.

```

cap = ['@CAPS'+str(i) for i in range(100)]
loc = ['@LOCATION'+str(i) for i in range(100)]

```

```

org = ['@ORGANIZATION'+str(i) for i in range(100)]
per = ['@PERSON'+str(i) for i in range(100)]
date = ['@DATE'+str(i) for i in range(100)]
time = ['@TIME'+str(i) for i in range(100)]
money = ['@MONEY'+str(i) for i in range(100)]
ner = cap + loc + org + per + date + time + money

```

Some utility functions declarations needed to convert the raw essay to word list.

```

import collections
top10 = collections.defaultdict(int)
def essay_to_wordlist(essay_v, remove_stopwords):
    """Remove the tagged labels and word tokenize the sentence."""
    essay_v = re.sub("[^a-zA-Z]", " ", essay_v)
    words = essay_v.lower().split()
    #top10 = collections.defaultdict(int)
    if remove_stopwords:
        stops = stopwords.words("english")
        stops.extend(ner)
        for word in words:
            if word not in stops:
                # words.append(w)
                top10[word]+=1
        words = [w for w in words if not w in stops]
    return (words)

def essay_to_sentences(essay_v, remove_stopwords):
    """Sentence tokenize the essay and call essay_to_wordlist() for word tokenization
    tokenizer = nltk.data.load('tokenizers/punkt/english.pickle')
    raw_sentences = tokenizer.tokenize(essay_v.strip())
    sentences = []
    for raw_sentence in raw_sentences:
        if len(raw_sentence) > 0:
            sentences.append(essay_to_wordlist(raw_sentence, remove_stopwords))
    return sentences

def makeFeatureVec(words, model, num_features):
    """Make Feature Vector from the words list of an Essay."""
    featureVec = np.zeros((num_features,),dtype="float32")
    num_words = 0.
    index2word_set = set(model.wv.index2word)
    for word in words:
        if word in index2word_set:
            num_words += 1
            featureVec = np.add(featureVec,model[word])
    featureVec = np.divide(featureVec,num_words)
    return featureVec

def getAvgFeatureVecs(essays, model, num_features):
    """Main function to generate the word vectors for word2vec model."""
    counter = 0

```

```

counter = 0
essayFeatureVecs = np.zeros((len(essays), num_features), dtype="float32")
for essay in essays:
    essayFeatureVecs[counter] = makeFeatureVec(essay, model, num_features)
    counter = counter + 1
return essayFeatureVecs

```

Below we declare the model. here the model is of older version. for running the most recent version pl model\_type as well in terms of hyperparameter.

```

from keras.layers import Embedding, Input, LSTM, Dense, Dropout, Lambda, Flatten, Bi
from keras.models import Sequential, Model, load_model, model_from_config
import keras.backend as K

```

```

def get_model(Hidden_dim1=400, Hidden_dim2=128, return_sequences = True, dropout=0.5):
    """Define the model."""
    model = Sequential()
    if bidirectional:
        model.add(Bidirectional(LSTM(Hidden_dim1, return_sequences=return_sequences),
                                LSTM(Hidden_dim2, recurrent_dropout=recurrent_dropout)))
    else:
        model.add(LSTM(Hidden_dim1, dropout=0.4, recurrent_dropout=recurrent_dropout))
        model.add(LSTM(Hidden_dim2, recurrent_dropout=recurrent_dropout))
    model.add(Dropout(dropout))
    model.add(Dense(1, activation=activation))

    model.compile(loss='mean_squared_error', optimizer='rmsprop', metrics=['mae'])
    model.summary()
    return model

```

```

def get_model_CNN(Hidden_dim1=400, Hidden_dim2=128, return_sequences = True, dropout=0.5):
    """Define the model."""
    inputs = Input(shape=(768, 1))
    x = Conv1D(64, 3, strides=1, padding='same', activation='relu')(inputs)
    #Cuts the size of the output in half, maxing over every 2 inputs
    x = MaxPooling1D(pool_size=2)(x)
    x = Conv1D(128, 3, strides=1, padding='same', activation='relu')(x)
    x = GlobalMaxPooling1D()(x)
    outputs = Dense(output_dims, activation='relu')(x)
    model = Model(inputs=inputs, outputs=outputs, name='CNN')
    model.compile(loss='mean_squared_error', optimizer='adam', metrics=['mae', 'mse'])
    model.summary()
    return model

```

📄 Using TensorFlow backend.

Below we will run the model for all sets using BERT

```

## Sets experiment BERT
import time

```

```

import time
import torch
import transformers as ppb
import warnings
warnings.filterwarnings('ignore')
set_count = 1
all_sets_score = []
for s in sets:
    print("\n-----SET {}-----\n".format(set_count))
    X = s
    y = s['domain1_score']
    cv = KFold(n_splits=5, shuffle=True)
    cv_data = cv.split(X)
    results = []
    prediction_list = []
    fold_count = 1
    cuda = torch.device('cuda')
    # For DistilBERT:
    model_class, tokenizer_class, pretrained_weights = (ppb.DistilBertModel, ppb.DistilBertTokenizer,
    ## Want BERT instead of distilBERT? Uncomment the following line:
    ##model_class, tokenizer_class, pretrained_weights = (ppb.BertModel, ppb.BertTokenizer,
    # Load pretrained model/tokenizer
    tokenizer = tokenizer_class.from_pretrained(pretrained_weights)
    model = model_class.from_pretrained(pretrained_weights)
    with torch.cuda.device(cuda):
        for traincv, testcv in cv_data:
            torch.cuda.empty_cache()
            print("\n-----Fold {}-----\n".format(fold_count))
            # get the train and test from the dataset.
            X_train, X_test, y_train, y_test = X.iloc[traincv], X.iloc[testcv], y.iloc[traincv], y.iloc[testcv]
            train_essays = X_train['essay']
            #print("y_train",y_train)
            test_essays = X_test['essay']
            # model = model.cuda()
            #y_train = torch.tensor(y_train, dtype=torch.long)
            sentences = []
            tokenize_sentences = []
            train_bert_embeddings = []
            #bert_embedding = BertEmbedding()
            # for essay in train_essays:
            #     # get all the sentences from the essay
            #     sentences += essay_to_sentences(essay, remove_stopwords = True)
            # sentences = pd.Series(sentences)
            # print(train_essays)
            tokenized_train = train_essays.apply((lambda x: tokenizer.encode(x, add_special_tokens=True)))
            tokenized_test = test_essays.apply((lambda x: tokenizer.encode(x, add_special_tokens=True)))

            ## train
            max_len = 0
            for i in tokenized_train.values:
                if len(i) > max_len:

```

```

        max_len = len(i)
    padded_train = np.array([i + [0]*(max_len-len(i)) for i in tokenized_train.values])

    attention_mask_train = np.where(padded_train != 0, 1, 0)

    train_input_ids = torch.tensor(padded_train)
    train_attention_mask = torch.tensor(attention_mask_train)
    with torch.no_grad():
        last_hidden_states_train = model(train_input_ids, attention_mask=train_atte

    train_features = last_hidden_states_train[0][:,0,:].numpy()

## test
max_len = 0
for i in tokenized_test.values:
    if len(i) > max_len:
        max_len = len(i)
padded_test = np.array([i + [0]*(max_len-len(i)) for i in tokenized_test.values])
attention_mask_test = np.where(padded_test != 0, 1, 0)
test_input_ids = torch.tensor(padded_test)
test_attention_mask = torch.tensor(attention_mask_test)

with torch.no_grad():
    last_hidden_states_test = model(test_input_ids, attention_mask=test_attentic

    test_features = last_hidden_states_test[0][:,0,:].numpy()

train_x,train_y = train_features.shape
test_x,test_y = test_features.shape

trainDataVectors = np.reshape(train_features,(train_x,1,train_y))
testDataVectors = np.reshape(test_features,(test_x,1,test_y))

lstm_model = get_model(bidirectional=False)
lstm_model.fit(trainDataVectors, y_train, batch_size=128, epochs=70)
y_pred = lstm_model.predict(testDataVectors)

y_pred = np.around(y_pred)
#y_pred.dropna()
np.nan_to_num(y_pred)
# evaluate the model
result = cohen_kappa_score(y_test.values,y_pred,weights='quadratic')
print("Kappa Score: {}".format(result))
results.append(result)
fold count +=1

```

```
import tensorflow as tf
tf.keras.backend.clear_session()
```

```
all_sets_score.append(results)
print("Average kappa score value is : {}".format(np.mean(np.asarray(results))))
set_count+=1
# print(features.shape)
```





-----SET 1-----

Downloading: 100%

232k/232k [00:00&lt;00:00, 797kB/s]

Downloading: 100%

546/546 [00:09&lt;00:00, 60.4B/s]

Downloading: 100%

268M/268M [00:08&lt;00:00, 32.1MB/s]

**Streaming output truncated to the last 5000 lines.**

```

1440/1440 [=====] - 0s 69us/step - loss: 0.3962 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4177 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 69us/step - loss: 0.3892 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4168 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4330 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4401 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4151 - mae: 0
Kappa Score: 0.3938867963827608

```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
=====		
lstm_2 (LSTM)	(None, 128)	270848
=====		
dropout_1 (Dropout)	(None, 128)	0
=====		
dense_1 (Dense)	(None, 1)	129
=====		

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1440/1440 [=====] - 1s 411us/step - loss: 2.4532 - mae:

Epoch 2/70

1440/1440 [=====] - 0s 76us/step - loss: 0.7053 - mae: 0

Epoch 3/70

1440/1440 [=====] - 0s 77us/step - loss: 0.6790 - mae: 0

Epoch 4/70

1440/1440 [=====] - 0s 78us/step - loss: 0.6017 - mae: 0

Epoch 5/70

1440/1440 [=====] - 0s 79us/step - loss: 0.6024 - mae: 0

Epoch 6/70

1440/1440 [=====] - 0s 75us/step - loss: 0.5582 - mae: 0

Epoch 7/70

```
Epoch 7/70
1440/1440 [=====] - 0s 73us/step - loss: 0.6188 - mae: 0
Epoch 8/70
1440/1440 [=====] - 0s 74us/step - loss: 0.5804 - mae: 0
Epoch 9/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5478 - mae: 0
Epoch 10/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5900 - mae: 0
Epoch 11/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5119 - mae: 0
Epoch 12/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5253 - mae: 0
Epoch 13/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5085 - mae: 0
Epoch 14/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5648 - mae: 0
Epoch 15/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4929 - mae: 0
Epoch 16/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5297 - mae: 0
Epoch 17/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5046 - mae: 0
Epoch 18/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4848 - mae: 0
Epoch 19/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4915 - mae: 0
Epoch 20/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4697 - mae: 0
Epoch 21/70
1440/1440 [=====] - 0s 73us/step - loss: 0.5395 - mae: 0
Epoch 22/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4640 - mae: 0
Epoch 23/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4751 - mae: 0
Epoch 24/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4722 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 73us/step - loss: 0.5008 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4850 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4556 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4643 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4831 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4735 - mae: 0
Epoch 31/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4578 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4609 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4887 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4876 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4523 - mae: 0
```

```
Epoch 36/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4229 - mae: 0
Epoch 37/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4911 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4583 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4586 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4534 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4476 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4378 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4355 - mae: 0
Epoch 44/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4443 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4493 - mae: 0
Epoch 46/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4615 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 82us/step - loss: 0.4150 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4202 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4410 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4083 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4737 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4169 - mae: 0
Epoch 53/70
1440/1440 [=====] - 0s 80us/step - loss: 0.4290 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4195 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4306 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4351 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4288 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4099 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4270 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4025 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4072 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4589 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4232 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4192 - mae: 0
```

```

Epoch 65/70
1440/1440 [=====] - 0s 66us/step - loss: 0.3882 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4305 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4175 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4029 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4309 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 66us/step - loss: 0.3997 - mae: 0
Kappa Score: 0.4833040421792618
Average kappa score value is : 0.46397644382245506

```

-----SET 3-----

-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
=====		
lstm_2 (LSTM)	(None, 128)	270848
=====		
dropout_1 (Dropout)	(None, 128)	0
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dense_1 (Dense)	(None, 1)	129
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Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```

Epoch 1/70
1380/1380 [=====] - 1s 431us/step - loss: 1.1357 - mae:
Epoch 2/70
1380/1380 [=====] - 0s 65us/step - loss: 0.6097 - mae: 0
Epoch 3/70
1380/1380 [=====] - 0s 66us/step - loss: 0.5860 - mae: 0
Epoch 4/70
1380/1380 [=====] - 0s 64us/step - loss: 0.5005 - mae: 0
Epoch 5/70
1380/1380 [=====] - 0s 64us/step - loss: 0.5827 - mae: 0
Epoch 6/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4716 - mae: 0
Epoch 7/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4704 - mae: 0
Epoch 8/70
1380/1380 [=====] - 0s 66us/step - loss: 0.4699 - mae: 0
Epoch 9/70
1380/1380 [=====] - 0s 73us/step - loss: 0.4579 - mae: 0
Epoch 10/70
1380/1380 [=====] - 0s 73us/step - loss: 0.4721 - mae: 0
Epoch 11/70
1380/1380 [=====] - 0s 63us/step - loss: 0.4815 - mae: 0

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-----
Epoch 12/70
1380/1380 [=====] - 0s 62us/step - loss: 0.4410 - mae: 0
Epoch 13/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4458 - mae: 0
Epoch 14/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4128 - mae: 0
Epoch 15/70
1380/1380 [=====] - 0s 76us/step - loss: 0.4676 - mae: 0
Epoch 16/70
1380/1380 [=====] - 0s 72us/step - loss: 0.4251 - mae: 0
Epoch 17/70
1380/1380 [=====] - 0s 76us/step - loss: 0.4282 - mae: 0
Epoch 18/70
1380/1380 [=====] - 0s 71us/step - loss: 0.4499 - mae: 0
Epoch 19/70
1380/1380 [=====] - 0s 68us/step - loss: 0.4307 - mae: 0
Epoch 20/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4002 - mae: 0
Epoch 21/70
1380/1380 [=====] - 0s 79us/step - loss: 0.4081 - mae: 0
Epoch 22/70
1380/1380 [=====] - 0s 74us/step - loss: 0.4375 - mae: 0
Epoch 23/70
1380/1380 [=====] - 0s 73us/step - loss: 0.3928 - mae: 0
Epoch 24/70
1380/1380 [=====] - 0s 76us/step - loss: 0.4197 - mae: 0
Epoch 25/70
1380/1380 [=====] - 0s 69us/step - loss: 0.3834 - mae: 0
Epoch 26/70
1380/1380 [=====] - 0s 65us/step - loss: 0.4045 - mae: 0
Epoch 27/70
1380/1380 [=====] - 0s 63us/step - loss: 0.3970 - mae: 0
Epoch 28/70
1380/1380 [=====] - 0s 70us/step - loss: 0.3871 - mae: 0
Epoch 29/70
1380/1380 [=====] - 0s 73us/step - loss: 0.4162 - mae: 0
Epoch 30/70
1380/1380 [=====] - 0s 78us/step - loss: 0.4109 - mae: 0
Epoch 31/70
1380/1380 [=====] - 0s 72us/step - loss: 0.3641 - mae: 0
Epoch 32/70
1380/1380 [=====] - 0s 78us/step - loss: 0.3981 - mae: 0
Epoch 33/70
1380/1380 [=====] - 0s 75us/step - loss: 0.3869 - mae: 0
Epoch 34/70
1380/1380 [=====] - 0s 75us/step - loss: 0.3702 - mae: 0
Epoch 35/70
1380/1380 [=====] - 0s 68us/step - loss: 0.3662 - mae: 0
Epoch 36/70
1380/1380 [=====] - 0s 63us/step - loss: 0.3872 - mae: 0
Epoch 37/70
1380/1380 [=====] - 0s 67us/step - loss: 0.3815 - mae: 0
Epoch 38/70
1380/1380 [=====] - 0s 65us/step - loss: 0.3939 - mae: 0
Epoch 39/70
1380/1380 [=====] - 0s 63us/step - loss: 0.3918 - mae: 0
Epoch 40/70
1380/1380 [=====] - 0s 62us/step - loss: 0.3810 - mae: 0
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```

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1380/1380 [=====] - 0s 63us/step - loss: 0.3810 - mae: 0
Epoch 41/70
1380/1380 [=====] - 0s 64us/step - loss: 0.3506 - mae: 0
Epoch 42/70
1380/1380 [=====] - 0s 64us/step - loss: 0.3758 - mae: 0
Epoch 43/70
1380/1380 [=====] - 0s 66us/step - loss: 0.3518 - mae: 0
Epoch 44/70
1380/1380 [=====] - 0s 68us/step - loss: 0.3604 - mae: 0
Epoch 45/70
1380/1380 [=====] - 0s 74us/step - loss: 0.3823 - mae: 0
Epoch 46/70
1380/1380 [=====] - 0s 74us/step - loss: 0.3661 - mae: 0
Epoch 47/70
1380/1380 [=====] - 0s 73us/step - loss: 0.3565 - mae: 0
Epoch 48/70
1380/1380 [=====] - 0s 77us/step - loss: 0.3681 - mae: 0
Epoch 49/70
1380/1380 [=====] - 0s 77us/step - loss: 0.3347 - mae: 0
Epoch 50/70
1380/1380 [=====] - 0s 74us/step - loss: 0.3818 - mae: 0
Epoch 51/70
1380/1380 [=====] - 0s 67us/step - loss: 0.3404 - mae: 0
Epoch 52/70
1380/1380 [=====] - 0s 65us/step - loss: 0.3845 - mae: 0
Epoch 53/70
1380/1380 [=====] - 0s 72us/step - loss: 0.3511 - mae: 0
Epoch 54/70
1380/1380 [=====] - 0s 79us/step - loss: 0.3515 - mae: 0
Epoch 55/70
1380/1380 [=====] - 0s 72us/step - loss: 0.3693 - mae: 0
Epoch 56/70
1380/1380 [=====] - 0s 73us/step - loss: 0.3509 - mae: 0
Epoch 57/70
1380/1380 [=====] - 0s 76us/step - loss: 0.3470 - mae: 0
Epoch 58/70
1380/1380 [=====] - 0s 78us/step - loss: 0.3658 - mae: 0
Epoch 59/70
1380/1380 [=====] - 0s 71us/step - loss: 0.3326 - mae: 0
Epoch 60/70
1380/1380 [=====] - 0s 65us/step - loss: 0.3461 - mae: 0
Epoch 61/70
1380/1380 [=====] - 0s 65us/step - loss: 0.3549 - mae: 0
Epoch 62/70
1380/1380 [=====] - 0s 66us/step - loss: 0.3351 - mae: 0
Epoch 63/70
1380/1380 [=====] - 0s 64us/step - loss: 0.3338 - mae: 0
Epoch 64/70
1380/1380 [=====] - 0s 64us/step - loss: 0.3468 - mae: 0
Epoch 65/70
1380/1380 [=====] - 0s 66us/step - loss: 0.3214 - mae: 0
Epoch 66/70
1380/1380 [=====] - 0s 68us/step - loss: 0.3384 - mae: 0
Epoch 67/70
1380/1380 [=====] - 0s 70us/step - loss: 0.3196 - mae: 0
Epoch 68/70
1380/1380 [=====] - 0s 66us/step - loss: 0.3405 - mae: 0
Epoch 69/70
```

1380/1380 [=====] - 0s 67us/step - loss: 0.3302 - mae: 0  
 Epoch 70/70  
 1380/1380 [=====] - 0s 66us/step - loss: 0.3297 - mae: 0  
 Kappa Score: 0.5076568640737227

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
 Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1381/1381 [=====] - 1s 436us/step - loss: 1.1510 - mae:

Epoch 2/70

1381/1381 [=====] - 0s 66us/step - loss: 0.6031 - mae: 0

Epoch 3/70

1381/1381 [=====] - 0s 70us/step - loss: 0.5567 - mae: 0

Epoch 4/70

1381/1381 [=====] - 0s 72us/step - loss: 0.5276 - mae: 0

Epoch 5/70

1381/1381 [=====] - 0s 76us/step - loss: 0.5936 - mae: 0

Epoch 6/70

1381/1381 [=====] - 0s 75us/step - loss: 0.5331 - mae: 0

Epoch 7/70

1381/1381 [=====] - 0s 78us/step - loss: 0.4807 - mae: 0

Epoch 8/70

1381/1381 [=====] - 0s 72us/step - loss: 0.4847 - mae: 0

Epoch 9/70

1381/1381 [=====] - 0s 75us/step - loss: 0.4248 - mae: 0

Epoch 10/70

1381/1381 [=====] - 0s 73us/step - loss: 0.5048 - mae: 0

Epoch 11/70

1381/1381 [=====] - 0s 66us/step - loss: 0.4724 - mae: 0

Epoch 12/70

1381/1381 [=====] - 0s 66us/step - loss: 0.4282 - mae: 0

Epoch 13/70

1381/1381 [=====] - 0s 71us/step - loss: 0.4690 - mae: 0

Epoch 14/70

1381/1381 [=====] - 0s 78us/step - loss: 0.4348 - mae: 0

Epoch 15/70

1381/1381 [=====] - 0s 77us/step - loss: 0.4503 - mae: 0

Epoch 16/70

1381/1381 [=====] - 0s 74us/step - loss: 0.4517 - mae: 0

Epoch 17/70

1381/1381 [=====] - 0s 73us/step - loss: 0.4427 - mae: 0

Epoch 18/70

```
1381/1381 [=====] - 0s 74us/step - loss: 0.4117 - mae: 0
Epoch 19/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3931 - mae: 0
Epoch 20/70
1381/1381 [=====] - 0s 79us/step - loss: 0.4546 - mae: 0
Epoch 21/70
1381/1381 [=====] - 0s 76us/step - loss: 0.4197 - mae: 0
Epoch 22/70
1381/1381 [=====] - 0s 79us/step - loss: 0.4276 - mae: 0
Epoch 23/70
1381/1381 [=====] - 0s 76us/step - loss: 0.4079 - mae: 0
Epoch 24/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3998 - mae: 0
Epoch 25/70
1381/1381 [=====] - 0s 72us/step - loss: 0.4213 - mae: 0
Epoch 26/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3994 - mae: 0
Epoch 27/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3890 - mae: 0
Epoch 28/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3996 - mae: 0
Epoch 29/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3787 - mae: 0
Epoch 30/70
1381/1381 [=====] - 0s 68us/step - loss: 0.3972 - mae: 0
Epoch 31/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4107 - mae: 0
Epoch 32/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3708 - mae: 0
Epoch 33/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4109 - mae: 0
Epoch 34/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4073 - mae: 0
Epoch 35/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3854 - mae: 0
Epoch 36/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3602 - mae: 0
Epoch 37/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3857 - mae: 0
Epoch 38/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4003 - mae: 0
Epoch 39/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3621 - mae: 0
Epoch 40/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3751 - mae: 0
Epoch 41/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3898 - mae: 0
Epoch 42/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3784 - mae: 0
Epoch 43/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3510 - mae: 0
Epoch 44/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3828 - mae: 0
Epoch 45/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3431 - mae: 0
Epoch 46/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3934 - mae: 0
Epoch 47/70
```



```

Epoch 47/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3582 - mae: 0
Epoch 48/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3656 - mae: 0
Epoch 49/70
1381/1381 [=====] - 0s 68us/step - loss: 0.3636 - mae: 0
Epoch 50/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3515 - mae: 0
Epoch 51/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3756 - mae: 0
Epoch 52/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3737 - mae: 0
Epoch 53/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3724 - mae: 0
Epoch 54/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3472 - mae: 0
Epoch 55/70
1381/1381 [=====] - 0s 77us/step - loss: 0.3729 - mae: 0
Epoch 56/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3447 - mae: 0
Epoch 57/70
1381/1381 [=====] - 0s 77us/step - loss: 0.3563 - mae: 0
Epoch 58/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3651 - mae: 0
Epoch 59/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3456 - mae: 0
Epoch 60/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3576 - mae: 0
Epoch 61/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3555 - mae: 0
Epoch 62/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3669 - mae: 0
Epoch 63/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3549 - mae: 0
Epoch 64/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3509 - mae: 0
Epoch 65/70
1381/1381 [=====] - 0s 80us/step - loss: 0.3606 - mae: 0
Epoch 66/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3353 - mae: 0
Epoch 67/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3472 - mae: 0
Epoch 68/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3315 - mae: 0
Epoch 69/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3307 - mae: 0
Epoch 70/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3437 - mae: 0
Kappa Score: 0.5787545787545787

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400

lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1381/1381 [=====] - 1s 471us/step - loss: 1.1389 - mae:

Epoch 2/70

1381/1381 [=====] - 0s 74us/step - loss: 0.6423 - mae: 0

Epoch 3/70

1381/1381 [=====] - 0s 72us/step - loss: 0.4868 - mae: 0

Epoch 4/70

1381/1381 [=====] - 0s 72us/step - loss: 0.6228 - mae: 0

Epoch 5/70

1381/1381 [=====] - 0s 71us/step - loss: 0.5641 - mae: 0

Epoch 6/70

1381/1381 [=====] - 0s 73us/step - loss: 0.4524 - mae: 0

Epoch 7/70

1381/1381 [=====] - 0s 74us/step - loss: 0.5636 - mae: 0

Epoch 8/70

1381/1381 [=====] - 0s 69us/step - loss: 0.4802 - mae: 0

Epoch 9/70

1381/1381 [=====] - 0s 63us/step - loss: 0.4587 - mae: 0

Epoch 10/70

1381/1381 [=====] - 0s 66us/step - loss: 0.4953 - mae: 0

Epoch 11/70

1381/1381 [=====] - 0s 64us/step - loss: 0.4919 - mae: 0

Epoch 12/70

1381/1381 [=====] - 0s 64us/step - loss: 0.4755 - mae: 0

Epoch 13/70

1381/1381 [=====] - 0s 63us/step - loss: 0.4279 - mae: 0

Epoch 14/70

1381/1381 [=====] - 0s 63us/step - loss: 0.4492 - mae: 0

Epoch 15/70

1381/1381 [=====] - 0s 64us/step - loss: 0.4324 - mae: 0

Epoch 16/70

1381/1381 [=====] - 0s 63us/step - loss: 0.4679 - mae: 0

Epoch 17/70

1381/1381 [=====] - 0s 66us/step - loss: 0.4521 - mae: 0

Epoch 18/70

1381/1381 [=====] - 0s 74us/step - loss: 0.4409 - mae: 0

Epoch 19/70

1381/1381 [=====] - 0s 71us/step - loss: 0.4524 - mae: 0

Epoch 20/70

1381/1381 [=====] - 0s 68us/step - loss: 0.4393 - mae: 0

Epoch 21/70

1381/1381 [=====] - 0s 66us/step - loss: 0.4501 - mae: 0

Epoch 22/70

1381/1381 [=====] - 0s 64us/step - loss: 0.4151 - mae: 0

Epoch 23/70

1381/1381 [=====] - 0s 74us/step - loss: 0.4448 - mae: 0

Epoch 24/70

1381/1381 [=====] - 0s 67us/step - loss: 0.4507 - mae: 0

```
Epoch 25/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4189 - mae: 0
Epoch 26/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4205 - mae: 0
Epoch 27/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4390 - mae: 0
Epoch 28/70
1381/1381 [=====] - 0s 73us/step - loss: 0.4128 - mae: 0
Epoch 29/70
1381/1381 [=====] - 0s 71us/step - loss: 0.4101 - mae: 0
Epoch 30/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3946 - mae: 0
Epoch 31/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3981 - mae: 0
Epoch 32/70
1381/1381 [=====] - 0s 62us/step - loss: 0.3852 - mae: 0
Epoch 33/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4246 - mae: 0
Epoch 34/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3937 - mae: 0
Epoch 35/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3708 - mae: 0
Epoch 36/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3975 - mae: 0
Epoch 37/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3974 - mae: 0
Epoch 38/70
1381/1381 [=====] - 0s 68us/step - loss: 0.4341 - mae: 0
Epoch 39/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3989 - mae: 0
Epoch 40/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3927 - mae: 0
Epoch 41/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3807 - mae: 0
Epoch 42/70
1381/1381 [=====] - 0s 65us/step - loss: 0.4094 - mae: 0
Epoch 43/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3760 - mae: 0
Epoch 44/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3903 - mae: 0
Epoch 45/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3672 - mae: 0
Epoch 46/70
1381/1381 [=====] - 0s 65us/step - loss: 0.4013 - mae: 0
Epoch 47/70
1381/1381 [=====] - 0s 61us/step - loss: 0.3689 - mae: 0
Epoch 48/70
1381/1381 [=====] - 0s 62us/step - loss: 0.3725 - mae: 0
Epoch 49/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3842 - mae: 0
Epoch 50/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3661 - mae: 0
Epoch 51/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3725 - mae: 0
Epoch 52/70
1381/1381 [=====] - 0s 68us/step - loss: 0.3693 - mae: 0
Epoch 53/70
1381/1381 [=====] - 0s 71us/step - loss: 0.3871 - mae: 0
```

```
Epoch 54/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3619 - mae: 0
Epoch 55/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3941 - mae: 0
Epoch 56/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3502 - mae: 0
Epoch 57/70
1381/1381 [=====] - 0s 62us/step - loss: 0.3644 - mae: 0
Epoch 58/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3701 - mae: 0
Epoch 59/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3472 - mae: 0
Epoch 60/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3805 - mae: 0
Epoch 61/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3673 - mae: 0
Epoch 62/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3700 - mae: 0
Epoch 63/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3436 - mae: 0
Epoch 64/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3441 - mae: 0
Epoch 65/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3569 - mae: 0
Epoch 66/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3341 - mae: 0
Epoch 67/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3724 - mae: 0
Epoch 68/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3254 - mae: 0
Epoch 69/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3503 - mae: 0
Epoch 70/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3669 - mae: 0
Kappa Score: 0.6441930270145463
```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
-----		
lstm_2 (LSTM)	(None, 128)	270848
-----		
dropout_1 (Dropout)	(None, 128)	0
-----		
dense_1 (Dense)	(None, 1)	129
=====		
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```
Epoch 1/70
1381/1381 [=====] - 1s 491us/step - loss: 1.1985 - mae:
Epoch 2/70
1381/1381 [=====] - 0s 64us/step - loss: 0.6261 - mae: 0
```

```
1381/1381 [=====] - 0s 64us/step - loss: 0.6361 - mae: 0
Epoch 3/70
1381/1381 [=====] - 0s 65us/step - loss: 0.5140 - mae: 0
Epoch 4/70
1381/1381 [=====] - 0s 63us/step - loss: 0.5300 - mae: 0
Epoch 5/70
1381/1381 [=====] - 0s 63us/step - loss: 0.5187 - mae: 0
Epoch 6/70
1381/1381 [=====] - 0s 66us/step - loss: 0.5214 - mae: 0
Epoch 7/70
1381/1381 [=====] - 0s 66us/step - loss: 0.5118 - mae: 0
Epoch 8/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4997 - mae: 0
Epoch 9/70
1381/1381 [=====] - 0s 77us/step - loss: 0.4768 - mae: 0
Epoch 10/70
1381/1381 [=====] - 0s 74us/step - loss: 0.4451 - mae: 0
Epoch 11/70
1381/1381 [=====] - 0s 67us/step - loss: 0.4069 - mae: 0
Epoch 12/70
1381/1381 [=====] - 0s 66us/step - loss: 0.5092 - mae: 0
Epoch 13/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4456 - mae: 0
Epoch 14/70
1381/1381 [=====] - 0s 65us/step - loss: 0.4608 - mae: 0
Epoch 15/70
1381/1381 [=====] - 0s 63us/step - loss: 0.4609 - mae: 0
Epoch 16/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4157 - mae: 0
Epoch 17/70
1381/1381 [=====] - 0s 69us/step - loss: 0.4340 - mae: 0
Epoch 18/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4673 - mae: 0
Epoch 19/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4117 - mae: 0
Epoch 20/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3969 - mae: 0
Epoch 21/70
1381/1381 [=====] - 0s 65us/step - loss: 0.4155 - mae: 0
Epoch 22/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4352 - mae: 0
Epoch 23/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4288 - mae: 0
Epoch 24/70
1381/1381 [=====] - 0s 69us/step - loss: 0.4076 - mae: 0
Epoch 25/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3734 - mae: 0
Epoch 26/70
1381/1381 [=====] - 0s 68us/step - loss: 0.4312 - mae: 0
Epoch 27/70
1381/1381 [=====] - 0s 69us/step - loss: 0.4233 - mae: 0
Epoch 28/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3960 - mae: 0
Epoch 29/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3744 - mae: 0
Epoch 30/70
1381/1381 [=====] - 0s 74us/step - loss: 0.4008 - mae: 0
Epoch 31/70
```

```
1381/1381 [=====] - 0s 76us/step - loss: 0.4253 - mae: 0
Epoch 32/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3682 - mae: 0
Epoch 33/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3912 - mae: 0
Epoch 34/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3938 - mae: 0
Epoch 35/70
1381/1381 [=====] - 0s 75us/step - loss: 0.3984 - mae: 0
Epoch 36/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3789 - mae: 0
Epoch 37/70
1381/1381 [=====] - 0s 80us/step - loss: 0.3862 - mae: 0
Epoch 38/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3633 - mae: 0
Epoch 39/70
1381/1381 [=====] - 0s 68us/step - loss: 0.4036 - mae: 0
Epoch 40/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3689 - mae: 0
Epoch 41/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4055 - mae: 0
Epoch 42/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3922 - mae: 0
Epoch 43/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3825 - mae: 0
Epoch 44/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3641 - mae: 0
Epoch 45/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3623 - mae: 0
Epoch 46/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3788 - mae: 0
Epoch 47/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3939 - mae: 0
Epoch 48/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3664 - mae: 0
Epoch 49/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3476 - mae: 0
Epoch 50/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3817 - mae: 0
Epoch 51/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3704 - mae: 0
Epoch 52/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3600 - mae: 0
Epoch 53/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3799 - mae: 0
Epoch 54/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3487 - mae: 0
Epoch 55/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3623 - mae: 0
Epoch 56/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3482 - mae: 0
Epoch 57/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3432 - mae: 0
Epoch 58/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3703 - mae: 0
Epoch 59/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3574 - mae: 0
Epoch 60/70
```

```

1381/1381 [=====] - 0s 69us/step - loss: 0.3354 - mae: 0
Epoch 61/70
1381/1381 [=====] - 0s 71us/step - loss: 0.3501 - mae: 0
Epoch 62/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3695 - mae: 0
Epoch 63/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3451 - mae: 0
Epoch 64/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3691 - mae: 0
Epoch 65/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3552 - mae: 0
Epoch 66/70
1381/1381 [=====] - 0s 75us/step - loss: 0.3275 - mae: 0
Epoch 67/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3544 - mae: 0
Epoch 68/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3418 - mae: 0
Epoch 69/70
1381/1381 [=====] - 0s 71us/step - loss: 0.3413 - mae: 0
Epoch 70/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3500 - mae: 0
Kappa Score: 0.561771061878289

```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```

Epoch 1/70
1381/1381 [=====] - 1s 449us/step - loss: 1.0719 - mae:
Epoch 2/70
1381/1381 [=====] - 0s 72us/step - loss: 0.6386 - mae: 0
Epoch 3/70
1381/1381 [=====] - 0s 75us/step - loss: 0.5810 - mae: 0
Epoch 4/70
1381/1381 [=====] - 0s 72us/step - loss: 0.5838 - mae: 0
Epoch 5/70
1381/1381 [=====] - 0s 71us/step - loss: 0.5303 - mae: 0
Epoch 6/70
1381/1381 [=====] - 0s 65us/step - loss: 0.4960 - mae: 0
Epoch 7/70
1381/1381 [=====] - 0s 67us/step - loss: 0.5378 - mae: 0
Epoch 8/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4740 - mae: 0
Epoch 9/70

```

```
Epoch 9/70
1381/1381 [=====] - 0s 65us/step - loss: 0.5069 - mae: 0
Epoch 10/70
1381/1381 [=====] - 0s 64us/step - loss: 0.5017 - mae: 0
Epoch 11/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4879 - mae: 0
Epoch 12/70
1381/1381 [=====] - 0s 67us/step - loss: 0.4661 - mae: 0
Epoch 13/70
1381/1381 [=====] - 0s 63us/step - loss: 0.4576 - mae: 0
Epoch 14/70
1381/1381 [=====] - 0s 63us/step - loss: 0.4750 - mae: 0
Epoch 15/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4796 - mae: 0
Epoch 16/70
1381/1381 [=====] - 0s 68us/step - loss: 0.4271 - mae: 0
Epoch 17/70
1381/1381 [=====] - 0s 70us/step - loss: 0.4301 - mae: 0
Epoch 18/70
1381/1381 [=====] - 0s 70us/step - loss: 0.4422 - mae: 0
Epoch 19/70
1381/1381 [=====] - 0s 72us/step - loss: 0.4738 - mae: 0
Epoch 20/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3820 - mae: 0
Epoch 21/70
1381/1381 [=====] - 0s 73us/step - loss: 0.4450 - mae: 0
Epoch 22/70
1381/1381 [=====] - 0s 66us/step - loss: 0.4351 - mae: 0
Epoch 23/70
1381/1381 [=====] - 0s 67us/step - loss: 0.4276 - mae: 0
Epoch 24/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4331 - mae: 0
Epoch 25/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4320 - mae: 0
Epoch 26/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4078 - mae: 0
Epoch 27/70
1381/1381 [=====] - 0s 64us/step - loss: 0.4256 - mae: 0
Epoch 28/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3838 - mae: 0
Epoch 29/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4146 - mae: 0
Epoch 30/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3712 - mae: 0
Epoch 31/70
1381/1381 [=====] - 0s 78us/step - loss: 0.4441 - mae: 0
Epoch 32/70
1381/1381 [=====] - 0s 67us/step - loss: 0.4178 - mae: 0
Epoch 33/70
1381/1381 [=====] - 0s 80us/step - loss: 0.4053 - mae: 0
Epoch 34/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3759 - mae: 0
Epoch 35/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4320 - mae: 0
Epoch 36/70
1381/1381 [=====] - 0s 77us/step - loss: 0.3750 - mae: 0
Epoch 37/70
1381/1381 [=====] - 0s 75us/step - loss: 0.4042 - mae: 0
```



```
Epoch 38/70
1381/1381 [=====] - 0s 74us/step - loss: 0.4142 - mae: 0
Epoch 39/70
1381/1381 [=====] - 0s 71us/step - loss: 0.4038 - mae: 0
Epoch 40/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3881 - mae: 0
Epoch 41/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3925 - mae: 0
Epoch 42/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3995 - mae: 0
Epoch 43/70
1381/1381 [=====] - 0s 72us/step - loss: 0.3817 - mae: 0
Epoch 44/70
1381/1381 [=====] - 0s 76us/step - loss: 0.3603 - mae: 0
Epoch 45/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3638 - mae: 0
Epoch 46/70
1381/1381 [=====] - 0s 69us/step - loss: 0.3812 - mae: 0
Epoch 47/70
1381/1381 [=====] - 0s 66us/step - loss: 0.3805 - mae: 0
Epoch 48/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3866 - mae: 0
Epoch 49/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3705 - mae: 0
Epoch 50/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3754 - mae: 0
Epoch 51/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3731 - mae: 0
Epoch 52/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3668 - mae: 0
Epoch 53/70
1381/1381 [=====] - 0s 69us/step - loss: 0.4112 - mae: 0
Epoch 54/70
1381/1381 [=====] - 0s 67us/step - loss: 0.3606 - mae: 0
Epoch 55/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3629 - mae: 0
Epoch 56/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3682 - mae: 0
Epoch 57/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3893 - mae: 0
Epoch 58/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3694 - mae: 0
Epoch 59/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3685 - mae: 0
Epoch 60/70
1381/1381 [=====] - 0s 65us/step - loss: 0.3464 - mae: 0
Epoch 61/70
1381/1381 [=====] - 0s 68us/step - loss: 0.3786 - mae: 0
Epoch 62/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3534 - mae: 0
Epoch 63/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3656 - mae: 0
Epoch 64/70
1381/1381 [=====] - 0s 63us/step - loss: 0.3477 - mae: 0
Epoch 65/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3601 - mae: 0
Epoch 66/70
1381/1381 [=====] - 0s 77us/step - loss: 0.3758 - mae: 0
```

```

Epoch 67/70
1381/1381 [=====] - 0s 74us/step - loss: 0.3518 - mae: 0
Epoch 68/70
1381/1381 [=====] - 0s 64us/step - loss: 0.3452 - mae: 0
Epoch 69/70
1381/1381 [=====] - 0s 70us/step - loss: 0.3374 - mae: 0
Epoch 70/70
1381/1381 [=====] - 0s 73us/step - loss: 0.3440 - mae: 0
Kappa Score: 0.6056760482401757
Average kappa score value is : 0.5796103159922625

```

```
-----SET 4-----
```

```
-----Fold 1-----
```

```
Model: "sequential_1"
```

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

```

=====
Total params: 2,141,377
Trainable params: 2,141,377
Non-trainable params: 0

```

```

Epoch 1/70
1416/1416 [=====] - 1s 427us/step - loss: 1.0936 - mae:
Epoch 2/70
1416/1416 [=====] - 0s 75us/step - loss: 0.6977 - mae: 0
Epoch 3/70
1416/1416 [=====] - 0s 77us/step - loss: 0.5461 - mae: 0
Epoch 4/70
1416/1416 [=====] - 0s 79us/step - loss: 0.5454 - mae: 0
Epoch 5/70
1416/1416 [=====] - 0s 69us/step - loss: 0.5306 - mae: 0
Epoch 6/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4832 - mae: 0
Epoch 7/70
1416/1416 [=====] - 0s 69us/step - loss: 0.4951 - mae: 0
Epoch 8/70
1416/1416 [=====] - 0s 68us/step - loss: 0.4344 - mae: 0
Epoch 9/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4060 - mae: 0
Epoch 10/70
1416/1416 [=====] - 0s 76us/step - loss: 0.4803 - mae: 0
Epoch 11/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4337 - mae: 0
Epoch 12/70
1416/1416 [=====] - 0s 79us/step - loss: 0.4231 - mae: 0
Epoch 13/70
1416/1416 [=====] - 0s 77us/step - loss: 0.4247 - mae: 0

```

```
Epoch 14/70
1416/1416 [=====] - 0s 73us/step - loss: 0.4139 - mae: 0
Epoch 15/70
1416/1416 [=====] - 0s 66us/step - loss: 0.4147 - mae: 0
Epoch 16/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4271 - mae: 0
Epoch 17/70
1416/1416 [=====] - 0s 69us/step - loss: 0.4076 - mae: 0
Epoch 18/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4141 - mae: 0
Epoch 19/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3917 - mae: 0
Epoch 20/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4176 - mae: 0
Epoch 21/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4104 - mae: 0
Epoch 22/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3820 - mae: 0
Epoch 23/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3850 - mae: 0
Epoch 24/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3966 - mae: 0
Epoch 25/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3448 - mae: 0
Epoch 26/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3865 - mae: 0
Epoch 27/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3722 - mae: 0
Epoch 28/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3646 - mae: 0
Epoch 29/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3533 - mae: 0
Epoch 30/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3448 - mae: 0
Epoch 31/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3802 - mae: 0
Epoch 32/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3743 - mae: 0
Epoch 33/70
1416/1416 [=====] - 0s 81us/step - loss: 0.3545 - mae: 0
Epoch 34/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3512 - mae: 0
Epoch 35/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3331 - mae: 0
Epoch 36/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3663 - mae: 0
Epoch 37/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3499 - mae: 0
Epoch 38/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3188 - mae: 0
Epoch 39/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3394 - mae: 0
Epoch 40/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3255 - mae: 0
Epoch 41/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3350 - mae: 0
Epoch 42/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3150 - mae: 0
```

```
1416/1416 [=====] - 0s 71us/step - loss: 0.3152 - mae: 0
Epoch 43/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3419 - mae: 0
Epoch 44/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3391 - mae: 0
Epoch 45/70
1416/1416 [=====] - 0s 74us/step - loss: 0.3255 - mae: 0
Epoch 46/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3182 - mae: 0
Epoch 47/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3227 - mae: 0
Epoch 48/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3156 - mae: 0
Epoch 49/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3191 - mae: 0
Epoch 50/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3197 - mae: 0
Epoch 51/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3021 - mae: 0
Epoch 52/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3234 - mae: 0
Epoch 53/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3258 - mae: 0
Epoch 54/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3181 - mae: 0
Epoch 55/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3016 - mae: 0
Epoch 56/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3068 - mae: 0
Epoch 57/70
1416/1416 [=====] - 0s 79us/step - loss: 0.2999 - mae: 0
Epoch 58/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3047 - mae: 0
Epoch 59/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3180 - mae: 0
Epoch 60/70
1416/1416 [=====] - 0s 75us/step - loss: 0.2975 - mae: 0
Epoch 61/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3157 - mae: 0
Epoch 62/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3175 - mae: 0
Epoch 63/70
1416/1416 [=====] - 0s 67us/step - loss: 0.2903 - mae: 0
Epoch 64/70
1416/1416 [=====] - 0s 74us/step - loss: 0.2938 - mae: 0
Epoch 65/70
1416/1416 [=====] - 0s 81us/step - loss: 0.3140 - mae: 0
Epoch 66/70
1416/1416 [=====] - 0s 74us/step - loss: 0.2723 - mae: 0
Epoch 67/70
1416/1416 [=====] - 0s 71us/step - loss: 0.2987 - mae: 0
Epoch 68/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3097 - mae: 0
Epoch 69/70
1416/1416 [=====] - 0s 69us/step - loss: 0.2803 - mae: 0
Epoch 70/70
1416/1416 [=====] - 0s 69us/step - loss: 0.2922 - mae: 0
Kappa Score: 0.7314800578123559
```

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1416/1416 [=====] - 1s 480us/step - loss: 1.2048 - mae:

Epoch 2/70

1416/1416 [=====] - 0s 68us/step - loss: 0.6980 - mae: 0

Epoch 3/70

1416/1416 [=====] - 0s 68us/step - loss: 0.6154 - mae: 0

Epoch 4/70

1416/1416 [=====] - 0s 75us/step - loss: 0.5490 - mae: 0

Epoch 5/70

1416/1416 [=====] - 0s 70us/step - loss: 0.5238 - mae: 0

Epoch 6/70

1416/1416 [=====] - 0s 68us/step - loss: 0.4810 - mae: 0

Epoch 7/70

1416/1416 [=====] - 0s 67us/step - loss: 0.5257 - mae: 0

Epoch 8/70

1416/1416 [=====] - 0s 69us/step - loss: 0.4712 - mae: 0

Epoch 9/70

1416/1416 [=====] - 0s 67us/step - loss: 0.4447 - mae: 0

Epoch 10/70

1416/1416 [=====] - 0s 75us/step - loss: 0.4839 - mae: 0

Epoch 11/70

1416/1416 [=====] - 0s 80us/step - loss: 0.4584 - mae: 0

Epoch 12/70

1416/1416 [=====] - 0s 78us/step - loss: 0.4758 - mae: 0

Epoch 13/70

1416/1416 [=====] - 0s 82us/step - loss: 0.4548 - mae: 0

Epoch 14/70

1416/1416 [=====] - 0s 79us/step - loss: 0.4315 - mae: 0

Epoch 15/70

1416/1416 [=====] - 0s 76us/step - loss: 0.3993 - mae: 0

Epoch 16/70

1416/1416 [=====] - 0s 67us/step - loss: 0.4135 - mae: 0

Epoch 17/70

1416/1416 [=====] - 0s 67us/step - loss: 0.4048 - mae: 0

Epoch 18/70

1416/1416 [=====] - 0s 69us/step - loss: 0.3840 - mae: 0

Epoch 19/70

1416/1416 [=====] - 0s 72us/step - loss: 0.4131 - mae: 0

Epoch 20/70

```
1416/1416 [=====] - 0s 79us/step - loss: 0.3965 - mae: 0
Epoch 21/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3908 - mae: 0
Epoch 22/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3979 - mae: 0
Epoch 23/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3902 - mae: 0
Epoch 24/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3935 - mae: 0
Epoch 25/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3753 - mae: 0
Epoch 26/70
1416/1416 [=====] - 0s 82us/step - loss: 0.3747 - mae: 0
Epoch 27/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3785 - mae: 0
Epoch 28/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3861 - mae: 0
Epoch 29/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3441 - mae: 0
Epoch 30/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3665 - mae: 0
Epoch 31/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3958 - mae: 0
Epoch 32/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3432 - mae: 0
Epoch 33/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3413 - mae: 0
Epoch 34/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3834 - mae: 0
Epoch 35/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3654 - mae: 0
Epoch 36/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3452 - mae: 0
Epoch 37/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3544 - mae: 0
Epoch 38/70
1416/1416 [=====] - 0s 66us/step - loss: 0.3706 - mae: 0
Epoch 39/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3437 - mae: 0
Epoch 40/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3375 - mae: 0
Epoch 41/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3602 - mae: 0
Epoch 42/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3335 - mae: 0
Epoch 43/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3429 - mae: 0
Epoch 44/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3230 - mae: 0
Epoch 45/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3492 - mae: 0
Epoch 46/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3330 - mae: 0
Epoch 47/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3188 - mae: 0
Epoch 48/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3285 - mae: 0
Epoch 49/70
```

```

Epoch 49/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3428 - mae: 0
Epoch 50/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3101 - mae: 0
Epoch 51/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3505 - mae: 0
Epoch 52/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3066 - mae: 0
Epoch 53/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3398 - mae: 0
Epoch 54/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3078 - mae: 0
Epoch 55/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3222 - mae: 0
Epoch 56/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3126 - mae: 0
Epoch 57/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3100 - mae: 0
Epoch 58/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3067 - mae: 0
Epoch 59/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3193 - mae: 0
Epoch 60/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3085 - mae: 0
Epoch 61/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3196 - mae: 0
Epoch 62/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3078 - mae: 0
Epoch 63/70
1416/1416 [=====] - 0s 71us/step - loss: 0.2852 - mae: 0
Epoch 64/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3082 - mae: 0
Epoch 65/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3082 - mae: 0
Epoch 66/70
1416/1416 [=====] - 0s 75us/step - loss: 0.2924 - mae: 0
Epoch 67/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3235 - mae: 0
Epoch 68/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3183 - mae: 0
Epoch 69/70
1416/1416 [=====] - 0s 68us/step - loss: 0.2955 - mae: 0
Epoch 70/70
1416/1416 [=====] - 0s 65us/step - loss: 0.3299 - mae: 0
Kappa Score: 0.7998145916380829

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0

```
dense_1 (Dense)                (None, 1)                129
=====
Total params: 2,141,377
Trainable params: 2,141,377
Non-trainable params: 0
```

---

```
Epoch 1/70
1416/1416 [=====] - 1s 465us/step - loss: 1.1559 - mae:
Epoch 2/70
1416/1416 [=====] - 0s 67us/step - loss: 0.6935 - mae: 0
Epoch 3/70
1416/1416 [=====] - 0s 70us/step - loss: 0.5591 - mae: 0
Epoch 4/70
1416/1416 [=====] - 0s 70us/step - loss: 0.5701 - mae: 0
Epoch 5/70
1416/1416 [=====] - 0s 66us/step - loss: 0.5225 - mae: 0
Epoch 6/70
1416/1416 [=====] - 0s 67us/step - loss: 0.5103 - mae: 0
Epoch 7/70
1416/1416 [=====] - 0s 68us/step - loss: 0.5100 - mae: 0
Epoch 8/70
1416/1416 [=====] - 0s 77us/step - loss: 0.4530 - mae: 0
Epoch 9/70
1416/1416 [=====] - 0s 79us/step - loss: 0.4598 - mae: 0
Epoch 10/70
1416/1416 [=====] - 0s 75us/step - loss: 0.4818 - mae: 0
Epoch 11/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4233 - mae: 0
Epoch 12/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4505 - mae: 0
Epoch 13/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3817 - mae: 0
Epoch 14/70
1416/1416 [=====] - 0s 69us/step - loss: 0.4407 - mae: 0
Epoch 15/70
1416/1416 [=====] - 0s 82us/step - loss: 0.4129 - mae: 0
Epoch 16/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3542 - mae: 0
Epoch 17/70
1416/1416 [=====] - 0s 75us/step - loss: 0.4394 - mae: 0
Epoch 18/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3517 - mae: 0
Epoch 19/70
1416/1416 [=====] - 0s 77us/step - loss: 0.4258 - mae: 0
Epoch 20/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3909 - mae: 0
Epoch 21/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3882 - mae: 0
Epoch 22/70
1416/1416 [=====] - 0s 81us/step - loss: 0.3898 - mae: 0
Epoch 23/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3786 - mae: 0
Epoch 24/70
1416/1416 [=====] - 0s 67us/step - loss: 0.4024 - mae: 0
Epoch 25/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3387 - mae: 0
Epoch 26/70
1416/1416 [=====] - 0s 84us/step - loss: 0.3543 - mae: 0
```



```
Epoch 27/70
1416/1416 [=====] - 0s 83us/step - loss: 0.3957 - mae: 0
Epoch 28/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3580 - mae: 0
Epoch 29/70
1416/1416 [=====] - 0s 66us/step - loss: 0.3556 - mae: 0
Epoch 30/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3339 - mae: 0
Epoch 31/70
1416/1416 [=====] - 0s 82us/step - loss: 0.3571 - mae: 0
Epoch 32/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3619 - mae: 0
Epoch 33/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3831 - mae: 0
Epoch 34/70
1416/1416 [=====] - 0s 66us/step - loss: 0.3251 - mae: 0
Epoch 35/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3594 - mae: 0
Epoch 36/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3495 - mae: 0
Epoch 37/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3356 - mae: 0
Epoch 38/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3460 - mae: 0
Epoch 39/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3162 - mae: 0
Epoch 40/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3276 - mae: 0
Epoch 41/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3562 - mae: 0
Epoch 42/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3247 - mae: 0
Epoch 43/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3399 - mae: 0
Epoch 44/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3410 - mae: 0
Epoch 45/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3149 - mae: 0
Epoch 46/70
1416/1416 [=====] - 0s 82us/step - loss: 0.3515 - mae: 0
Epoch 47/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3156 - mae: 0
Epoch 48/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3271 - mae: 0
Epoch 49/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3264 - mae: 0
Epoch 50/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3194 - mae: 0
Epoch 51/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3393 - mae: 0
Epoch 52/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3262 - mae: 0
Epoch 53/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3390 - mae: 0
Epoch 54/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3370 - mae: 0
Epoch 55/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3146 - mae: 0
```

```
4/22/2020 AES.ipynb - Colaboratory
1416/1416 [=====] - 0s 69us/step - loss: 0.3140 - mae: 0
Epoch 56/70
1416/1416 [=====] - 0s 70us/step - loss: 0.2990 - mae: 0
Epoch 57/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3126 - mae: 0
Epoch 58/70
1416/1416 [=====] - 0s 66us/step - loss: 0.3222 - mae: 0
Epoch 59/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3078 - mae: 0
Epoch 60/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3148 - mae: 0
Epoch 61/70
1416/1416 [=====] - 0s 78us/step - loss: 0.2865 - mae: 0
Epoch 62/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3203 - mae: 0
Epoch 63/70
1416/1416 [=====] - 0s 75us/step - loss: 0.2942 - mae: 0
Epoch 64/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3234 - mae: 0
Epoch 65/70
1416/1416 [=====] - 0s 80us/step - loss: 0.3145 - mae: 0
Epoch 66/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3178 - mae: 0
Epoch 67/70
1416/1416 [=====] - 0s 68us/step - loss: 0.2815 - mae: 0
Epoch 68/70
1416/1416 [=====] - 0s 66us/step - loss: 0.2777 - mae: 0
Epoch 69/70
1416/1416 [=====] - 0s 69us/step - loss: 0.2926 - mae: 0
Epoch 70/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3228 - mae: 0
Kappa Score: 0.6580811332904057
```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
=====		
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```
Epoch 1/70
1416/1416 [=====] - 1s 439us/step - loss: 1.1869 - mae:
Epoch 2/70
1416/1416 [=====] - 0s 72us/step - loss: 0.6860 - mae: 0
Epoch 3/70
1416/1416 [=====] - 0s 72us/step - loss: 0.6262 - mae: 0
Epoch 4/70
```

```
1416/1416 [=====] - 0s 68us/step - loss: 0.5805 - mae: 0
Epoch 5/70
1416/1416 [=====] - 0s 73us/step - loss: 0.5549 - mae: 0
Epoch 6/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4893 - mae: 0
Epoch 7/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4768 - mae: 0
Epoch 8/70
1416/1416 [=====] - 0s 69us/step - loss: 0.4726 - mae: 0
Epoch 9/70
1416/1416 [=====] - 0s 73us/step - loss: 0.4327 - mae: 0
Epoch 10/70
1416/1416 [=====] - 0s 68us/step - loss: 0.4811 - mae: 0
Epoch 11/70
1416/1416 [=====] - 0s 73us/step - loss: 0.4470 - mae: 0
Epoch 12/70
1416/1416 [=====] - 0s 81us/step - loss: 0.4386 - mae: 0
Epoch 13/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4488 - mae: 0
Epoch 14/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4314 - mae: 0
Epoch 15/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4113 - mae: 0
Epoch 16/70
1416/1416 [=====] - 0s 72us/step - loss: 0.4206 - mae: 0
Epoch 17/70
1416/1416 [=====] - 0s 75us/step - loss: 0.4254 - mae: 0
Epoch 18/70
1416/1416 [=====] - 0s 82us/step - loss: 0.4277 - mae: 0
Epoch 19/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3901 - mae: 0
Epoch 20/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3876 - mae: 0
Epoch 21/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4023 - mae: 0
Epoch 22/70
1416/1416 [=====] - 0s 68us/step - loss: 0.4026 - mae: 0
Epoch 23/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3558 - mae: 0
Epoch 24/70
1416/1416 [=====] - 0s 70us/step - loss: 0.4104 - mae: 0
Epoch 25/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3806 - mae: 0
Epoch 26/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3715 - mae: 0
Epoch 27/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3649 - mae: 0
Epoch 28/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3773 - mae: 0
Epoch 29/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3796 - mae: 0
Epoch 30/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3661 - mae: 0
Epoch 31/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3673 - mae: 0
Epoch 32/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3531 - mae: 0
Epoch 33/70
```

```
1416/1416 [=====] - 0s 68us/step - loss: 0.3552 - mae: 0
Epoch 34/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3606 - mae: 0
Epoch 35/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3558 - mae: 0
Epoch 36/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3515 - mae: 0
Epoch 37/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3353 - mae: 0
Epoch 38/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3589 - mae: 0
Epoch 39/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3552 - mae: 0
Epoch 40/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3107 - mae: 0
Epoch 41/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3572 - mae: 0
Epoch 42/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3230 - mae: 0
Epoch 43/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3456 - mae: 0
Epoch 44/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3070 - mae: 0
Epoch 45/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3255 - mae: 0
Epoch 46/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3443 - mae: 0
Epoch 47/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3511 - mae: 0
Epoch 48/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3052 - mae: 0
Epoch 49/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3206 - mae: 0
Epoch 50/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3092 - mae: 0
Epoch 51/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3222 - mae: 0
Epoch 52/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3125 - mae: 0
Epoch 53/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3184 - mae: 0
Epoch 54/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3220 - mae: 0
Epoch 55/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3429 - mae: 0
Epoch 56/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3132 - mae: 0
Epoch 57/70
1416/1416 [=====] - 0s 68us/step - loss: 0.2986 - mae: 0
Epoch 58/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3153 - mae: 0
Epoch 59/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3142 - mae: 0
Epoch 60/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3038 - mae: 0
Epoch 61/70
1416/1416 [=====] - 0s 69us/step - loss: 0.2958 - mae: 0
Epoch 62/70
```

```
Epoch 62/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3047 - mae: 0
Epoch 63/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3190 - mae: 0
Epoch 64/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3104 - mae: 0
Epoch 65/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3232 - mae: 0
Epoch 66/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3116 - mae: 0
Epoch 67/70
1416/1416 [=====] - 0s 76us/step - loss: 0.2919 - mae: 0
Epoch 68/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3064 - mae: 0
Epoch 69/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3281 - mae: 0
Epoch 70/70
1416/1416 [=====] - 0s 68us/step - loss: 0.2873 - mae: 0
Kappa Score: 0.6382319250724344
```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
-----		
lstm_2 (LSTM)	(None, 128)	270848
-----		
dropout_1 (Dropout)	(None, 128)	0
-----		
dense_1 (Dense)	(None, 1)	129
=====		

Total params: 2,141,377  
Trainable params: 2,141,377  
Non-trainable params: 0

```
Epoch 1/70
1416/1416 [=====] - 1s 440us/step - loss: 1.1782 - mae:
Epoch 2/70
1416/1416 [=====] - 0s 78us/step - loss: 0.7184 - mae: 0
Epoch 3/70
1416/1416 [=====] - 0s 78us/step - loss: 0.5898 - mae: 0
Epoch 4/70
1416/1416 [=====] - 0s 77us/step - loss: 0.5147 - mae: 0
Epoch 5/70
1416/1416 [=====] - 0s 79us/step - loss: 0.5616 - mae: 0
Epoch 6/70
1416/1416 [=====] - 0s 79us/step - loss: 0.5038 - mae: 0
Epoch 7/70
1416/1416 [=====] - 0s 82us/step - loss: 0.5309 - mae: 0
Epoch 8/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4507 - mae: 0
Epoch 9/70
1416/1416 [=====] - 0s 82us/step - loss: 0.4233 - mae: 0
Epoch 10/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4810 - mae: 0
Epoch 11/70
```

```
Epoch 11/70
1416/1416 [=====] - 0s 80us/step - loss: 0.4213 - mae: 0
Epoch 12/70
1416/1416 [=====] - 0s 67us/step - loss: 0.4326 - mae: 0
Epoch 13/70
1416/1416 [=====] - 0s 72us/step - loss: 0.4382 - mae: 0
Epoch 14/70
1416/1416 [=====] - 0s 76us/step - loss: 0.4005 - mae: 0
Epoch 15/70
1416/1416 [=====] - 0s 74us/step - loss: 0.4262 - mae: 0
Epoch 16/70
1416/1416 [=====] - 0s 71us/step - loss: 0.4043 - mae: 0
Epoch 17/70
1416/1416 [=====] - 0s 79us/step - loss: 0.4187 - mae: 0
Epoch 18/70
1416/1416 [=====] - 0s 77us/step - loss: 0.4133 - mae: 0
Epoch 19/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3680 - mae: 0
Epoch 20/70
1416/1416 [=====] - 0s 76us/step - loss: 0.4099 - mae: 0
Epoch 21/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3849 - mae: 0
Epoch 22/70
1416/1416 [=====] - 0s 76us/step - loss: 0.4160 - mae: 0
Epoch 23/70
1416/1416 [=====] - 0s 79us/step - loss: 0.4045 - mae: 0
Epoch 24/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3723 - mae: 0
Epoch 25/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3558 - mae: 0
Epoch 26/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3934 - mae: 0
Epoch 27/70
1416/1416 [=====] - 0s 81us/step - loss: 0.3599 - mae: 0
Epoch 28/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3672 - mae: 0
Epoch 29/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3891 - mae: 0
Epoch 30/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3515 - mae: 0
Epoch 31/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3598 - mae: 0
Epoch 32/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3619 - mae: 0
Epoch 33/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3387 - mae: 0
Epoch 34/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3699 - mae: 0
Epoch 35/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3363 - mae: 0
Epoch 36/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3610 - mae: 0
Epoch 37/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3605 - mae: 0
Epoch 38/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3349 - mae: 0
Epoch 39/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3719 - mae: 0
```

```
Epoch 40/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3252 - mae: 0
Epoch 41/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3383 - mae: 0
Epoch 42/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3449 - mae: 0
Epoch 43/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3356 - mae: 0
Epoch 44/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3230 - mae: 0
Epoch 45/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3330 - mae: 0
Epoch 46/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3377 - mae: 0
Epoch 47/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3210 - mae: 0
Epoch 48/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3234 - mae: 0
Epoch 49/70
1416/1416 [=====] - 0s 78us/step - loss: 0.3293 - mae: 0
Epoch 50/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3084 - mae: 0
Epoch 51/70
1416/1416 [=====] - 0s 76us/step - loss: 0.3232 - mae: 0
Epoch 52/70
1416/1416 [=====] - 0s 82us/step - loss: 0.2882 - mae: 0
Epoch 53/70
1416/1416 [=====] - 0s 73us/step - loss: 0.3335 - mae: 0
Epoch 54/70
1416/1416 [=====] - 0s 72us/step - loss: 0.3238 - mae: 0
Epoch 55/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3053 - mae: 0
Epoch 56/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3157 - mae: 0
Epoch 57/70
1416/1416 [=====] - 0s 71us/step - loss: 0.2934 - mae: 0
Epoch 58/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3103 - mae: 0
Epoch 59/70
1416/1416 [=====] - 0s 70us/step - loss: 0.3163 - mae: 0
Epoch 60/70
1416/1416 [=====] - 0s 68us/step - loss: 0.3199 - mae: 0
Epoch 61/70
1416/1416 [=====] - 0s 67us/step - loss: 0.3082 - mae: 0
Epoch 62/70
1416/1416 [=====] - 0s 71us/step - loss: 0.3097 - mae: 0
Epoch 63/70
1416/1416 [=====] - 0s 69us/step - loss: 0.3045 - mae: 0
Epoch 64/70
1416/1416 [=====] - 0s 82us/step - loss: 0.3090 - mae: 0
Epoch 65/70
1416/1416 [=====] - 0s 79us/step - loss: 0.3039 - mae: 0
Epoch 66/70
1416/1416 [=====] - 0s 75us/step - loss: 0.3349 - mae: 0
Epoch 67/70
1416/1416 [=====] - 0s 77us/step - loss: 0.2893 - mae: 0
Epoch 68/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3302 - mae: 0
```

```

Epoch 69/70
1416/1416 [=====] - 0s 77us/step - loss: 0.3031 - mae: 0
Epoch 70/70
1416/1416 [=====] - 0s 76us/step - loss: 0.2932 - mae: 0
Kappa Score: 0.5746447995278048
Average kappa score value is : 0.6804505014682167

```

-----SET 5-----

-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

```

Total params: 2,141,377
Trainable params: 2,141,377
Non-trainable params: 0

```

```

Epoch 1/70
1444/1444 [=====] - 1s 419us/step - loss: 1.6185 - mae:
Epoch 2/70
1444/1444 [=====] - 0s 79us/step - loss: 0.8345 - mae: 0
Epoch 3/70
1444/1444 [=====] - 0s 73us/step - loss: 0.7023 - mae: 0
Epoch 4/70
1444/1444 [=====] - 0s 74us/step - loss: 0.7408 - mae: 0
Epoch 5/70
1444/1444 [=====] - 0s 76us/step - loss: 0.6357 - mae: 0
Epoch 6/70
1444/1444 [=====] - 0s 66us/step - loss: 0.6176 - mae: 0
Epoch 7/70
1444/1444 [=====] - 0s 70us/step - loss: 0.6075 - mae: 0
Epoch 8/70
1444/1444 [=====] - 0s 76us/step - loss: 0.5655 - mae: 0
Epoch 9/70
1444/1444 [=====] - 0s 75us/step - loss: 0.6344 - mae: 0
Epoch 10/70
1444/1444 [=====] - 0s 75us/step - loss: 0.5151 - mae: 0
Epoch 11/70
1444/1444 [=====] - 0s 76us/step - loss: 0.5086 - mae: 0
Epoch 12/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5204 - mae: 0
Epoch 13/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5483 - mae: 0
Epoch 14/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5616 - mae: 0
Epoch 15/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5207 - mae: 0

```



```
1444/1444 [-----] - 0s 65us/step - loss: 0.5207 - mae: 0
Epoch 16/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4975 - mae: 0
Epoch 17/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5396 - mae: 0
Epoch 18/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4965 - mae: 0
Epoch 19/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5213 - mae: 0
Epoch 20/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4953 - mae: 0
Epoch 21/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5036 - mae: 0
Epoch 22/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5368 - mae: 0
Epoch 23/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4519 - mae: 0
Epoch 24/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4679 - mae: 0
Epoch 25/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4841 - mae: 0
Epoch 26/70
1444/1444 [=====] - 0s 63us/step - loss: 0.4767 - mae: 0
Epoch 27/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4527 - mae: 0
Epoch 28/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4884 - mae: 0
Epoch 29/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4445 - mae: 0
Epoch 30/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4837 - mae: 0
Epoch 31/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4742 - mae: 0
Epoch 32/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4575 - mae: 0
Epoch 33/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4528 - mae: 0
Epoch 34/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4357 - mae: 0
Epoch 35/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4388 - mae: 0
Epoch 36/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4951 - mae: 0
Epoch 37/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4256 - mae: 0
Epoch 38/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4536 - mae: 0
Epoch 39/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4268 - mae: 0
Epoch 40/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4360 - mae: 0
Epoch 41/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3825 - mae: 0
Epoch 42/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4332 - mae: 0
Epoch 43/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4281 - mae: 0
Epoch 44/70
```

```
1444/1444 [=====] - 0s 66us/step - loss: 0.4428 - mae: 0
Epoch 45/70
1444/1444 [=====] - 0s 75us/step - loss: 0.4457 - mae: 0
Epoch 46/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4212 - mae: 0
Epoch 47/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4218 - mae: 0
Epoch 48/70
1444/1444 [=====] - 0s 73us/step - loss: 0.4268 - mae: 0
Epoch 49/70
1444/1444 [=====] - 0s 78us/step - loss: 0.4038 - mae: 0
Epoch 50/70
1444/1444 [=====] - 0s 78us/step - loss: 0.4289 - mae: 0
Epoch 51/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4332 - mae: 0
Epoch 52/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4217 - mae: 0
Epoch 53/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3982 - mae: 0
Epoch 54/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4157 - mae: 0
Epoch 55/70
1444/1444 [=====] - 0s 76us/step - loss: 0.3915 - mae: 0
Epoch 56/70
1444/1444 [=====] - 0s 75us/step - loss: 0.4209 - mae: 0
Epoch 57/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3990 - mae: 0
Epoch 58/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3839 - mae: 0
Epoch 59/70
1444/1444 [=====] - 0s 73us/step - loss: 0.4224 - mae: 0
Epoch 60/70
1444/1444 [=====] - 0s 75us/step - loss: 0.3875 - mae: 0
Epoch 61/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4056 - mae: 0
Epoch 62/70
1444/1444 [=====] - 0s 78us/step - loss: 0.3967 - mae: 0
Epoch 63/70
1444/1444 [=====] - 0s 77us/step - loss: 0.3838 - mae: 0
Epoch 64/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3855 - mae: 0
Epoch 65/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4103 - mae: 0
Epoch 66/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3879 - mae: 0
Epoch 67/70
1444/1444 [=====] - 0s 79us/step - loss: 0.3971 - mae: 0
Epoch 68/70
1444/1444 [=====] - 0s 77us/step - loss: 0.3894 - mae: 0
Epoch 69/70
1444/1444 [=====] - 0s 75us/step - loss: 0.3918 - mae: 0
Epoch 70/70
1444/1444 [=====] - 0s 76us/step - loss: 0.3839 - mae: 0
Kappa Score: 0.6933783710802677
```

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```

Epoch 1/70
1444/1444 [=====] - 1s 494us/step - loss: 1.5998 - mae:
Epoch 2/70
1444/1444 [=====] - 0s 67us/step - loss: 0.8876 - mae: 0
Epoch 3/70
1444/1444 [=====] - 0s 76us/step - loss: 0.7534 - mae: 0
Epoch 4/70
1444/1444 [=====] - 0s 75us/step - loss: 0.6277 - mae: 0
Epoch 5/70
1444/1444 [=====] - 0s 77us/step - loss: 0.6519 - mae: 0
Epoch 6/70
1444/1444 [=====] - 0s 80us/step - loss: 0.6526 - mae: 0
Epoch 7/70
1444/1444 [=====] - 0s 73us/step - loss: 0.6683 - mae: 0
Epoch 8/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5968 - mae: 0
Epoch 9/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5959 - mae: 0
Epoch 10/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5823 - mae: 0
Epoch 11/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5876 - mae: 0
Epoch 12/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5680 - mae: 0
Epoch 13/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5169 - mae: 0
Epoch 14/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5230 - mae: 0
Epoch 15/70
1444/1444 [=====] - 0s 68us/step - loss: 0.5789 - mae: 0
Epoch 16/70
1444/1444 [=====] - 0s 68us/step - loss: 0.5045 - mae: 0
Epoch 17/70
1444/1444 [=====] - 0s 78us/step - loss: 0.5049 - mae: 0
Epoch 18/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5451 - mae: 0
Epoch 19/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5160 - mae: 0
Epoch 20/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5133 - mae: 0
Epoch 21/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5349 - mae: 0
Epoch 22/70

```

```
Epoch 22/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4909 - mae: 0
Epoch 23/70
1444/1444 [=====] - 0s 73us/step - loss: 0.5087 - mae: 0
Epoch 24/70
1444/1444 [=====] - 0s 82us/step - loss: 0.4860 - mae: 0
Epoch 25/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4909 - mae: 0
Epoch 26/70
1444/1444 [=====] - 0s 77us/step - loss: 0.5131 - mae: 0
Epoch 27/70
1444/1444 [=====] - 0s 72us/step - loss: 0.4661 - mae: 0
Epoch 28/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4304 - mae: 0
Epoch 29/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5233 - mae: 0
Epoch 30/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4494 - mae: 0
Epoch 31/70
1444/1444 [=====] - 0s 71us/step - loss: 0.4961 - mae: 0
Epoch 32/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4700 - mae: 0
Epoch 33/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4554 - mae: 0
Epoch 34/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4591 - mae: 0
Epoch 35/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4544 - mae: 0
Epoch 36/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4549 - mae: 0
Epoch 37/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3963 - mae: 0
Epoch 38/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4570 - mae: 0
Epoch 39/70
1444/1444 [=====] - 0s 81us/step - loss: 0.4629 - mae: 0
Epoch 40/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4439 - mae: 0
Epoch 41/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4226 - mae: 0
Epoch 42/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4253 - mae: 0
Epoch 43/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4177 - mae: 0
Epoch 44/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4501 - mae: 0
Epoch 45/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4473 - mae: 0
Epoch 46/70
1444/1444 [=====] - 0s 75us/step - loss: 0.3994 - mae: 0
Epoch 47/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4431 - mae: 0
Epoch 48/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4280 - mae: 0
Epoch 49/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3980 - mae: 0
Epoch 50/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4238 - mae: 0
```

```

Epoch 51/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4217 - mae: 0
Epoch 52/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4120 - mae: 0
Epoch 53/70
1444/1444 [=====] - 0s 73us/step - loss: 0.4088 - mae: 0
Epoch 54/70
1444/1444 [=====] - 0s 72us/step - loss: 0.4314 - mae: 0
Epoch 55/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3971 - mae: 0
Epoch 56/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4109 - mae: 0
Epoch 57/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4182 - mae: 0
Epoch 58/70
1444/1444 [=====] - 0s 65us/step - loss: 0.3889 - mae: 0
Epoch 59/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4093 - mae: 0
Epoch 60/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3857 - mae: 0
Epoch 61/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4173 - mae: 0
Epoch 62/70
1444/1444 [=====] - 0s 65us/step - loss: 0.3796 - mae: 0
Epoch 63/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4088 - mae: 0
Epoch 64/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3734 - mae: 0
Epoch 65/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3549 - mae: 0
Epoch 66/70
1444/1444 [=====] - 0s 71us/step - loss: 0.3980 - mae: 0
Epoch 67/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4207 - mae: 0
Epoch 68/70
1444/1444 [=====] - 0s 64us/step - loss: 0.3733 - mae: 0
Epoch 69/70
1444/1444 [=====] - 0s 70us/step - loss: 0.3926 - mae: 0
Epoch 70/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3935 - mae: 0
Kappa Score: 0.6087588364245424

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

---

Epoch 1/70  
1444/1444 [=====] - 1s 469us/step - loss: 1.5884 - mae:  
Epoch 2/70  
1444/1444 [=====] - 0s 75us/step - loss: 0.8978 - mae: 0  
Epoch 3/70  
1444/1444 [=====] - 0s 78us/step - loss: 0.7304 - mae: 0  
Epoch 4/70  
1444/1444 [=====] - 0s 75us/step - loss: 0.6795 - mae: 0  
Epoch 5/70  
1444/1444 [=====] - 0s 74us/step - loss: 0.6228 - mae: 0  
Epoch 6/70  
1444/1444 [=====] - 0s 73us/step - loss: 0.6229 - mae: 0  
Epoch 7/70  
1444/1444 [=====] - 0s 74us/step - loss: 0.6136 - mae: 0  
Epoch 8/70  
1444/1444 [=====] - 0s 76us/step - loss: 0.6073 - mae: 0  
Epoch 9/70  
1444/1444 [=====] - 0s 72us/step - loss: 0.5804 - mae: 0  
Epoch 10/70  
1444/1444 [=====] - 0s 73us/step - loss: 0.5579 - mae: 0  
Epoch 11/70  
1444/1444 [=====] - 0s 65us/step - loss: 0.5769 - mae: 0  
Epoch 12/70  
1444/1444 [=====] - 0s 63us/step - loss: 0.5636 - mae: 0  
Epoch 13/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.4643 - mae: 0  
Epoch 14/70  
1444/1444 [=====] - 0s 73us/step - loss: 0.5784 - mae: 0  
Epoch 15/70  
1444/1444 [=====] - 0s 76us/step - loss: 0.5781 - mae: 0  
Epoch 16/70  
1444/1444 [=====] - 0s 67us/step - loss: 0.5009 - mae: 0  
Epoch 17/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.5090 - mae: 0  
Epoch 18/70  
1444/1444 [=====] - 0s 67us/step - loss: 0.5447 - mae: 0  
Epoch 19/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.4682 - mae: 0  
Epoch 20/70  
1444/1444 [=====] - 0s 67us/step - loss: 0.5260 - mae: 0  
Epoch 21/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.5234 - mae: 0  
Epoch 22/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.4515 - mae: 0  
Epoch 23/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.4590 - mae: 0  
Epoch 24/70  
1444/1444 [=====] - 0s 73us/step - loss: 0.4775 - mae: 0  
Epoch 25/70  
1444/1444 [=====] - 0s 68us/step - loss: 0.5512 - mae: 0  
Epoch 26/70  
1444/1444 [=====] - 0s 68us/step - loss: 0.4777 - mae: 0  
Epoch 27/70  
1444/1444 [=====] - 0s 66us/step - loss: 0.5030 - mae: 0  
Epoch 28/70  
1444/1444 [=====] - 0s 67us/step - loss: 0.4750 - mae: 0

```
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Epoch 29/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4667 - mae: 0
Epoch 30/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4930 - mae: 0
Epoch 31/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4390 - mae: 0
Epoch 32/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4512 - mae: 0
Epoch 33/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4915 - mae: 0
Epoch 34/70
1444/1444 [=====] - 0s 71us/step - loss: 0.4457 - mae: 0
Epoch 35/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4773 - mae: 0
Epoch 36/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4547 - mae: 0
Epoch 37/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4440 - mae: 0
Epoch 38/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4292 - mae: 0
Epoch 39/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4403 - mae: 0
Epoch 40/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4766 - mae: 0
Epoch 41/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4493 - mae: 0
Epoch 42/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4096 - mae: 0
Epoch 43/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4612 - mae: 0
Epoch 44/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3983 - mae: 0
Epoch 45/70
1444/1444 [=====] - 0s 65us/step - loss: 0.3989 - mae: 0
Epoch 46/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4239 - mae: 0
Epoch 47/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4166 - mae: 0
Epoch 48/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4272 - mae: 0
Epoch 49/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4179 - mae: 0
Epoch 50/70
1444/1444 [=====] - 0s 81us/step - loss: 0.4413 - mae: 0
Epoch 51/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4064 - mae: 0
Epoch 52/70
1444/1444 [=====] - 0s 79us/step - loss: 0.4462 - mae: 0
Epoch 53/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4071 - mae: 0
Epoch 54/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4157 - mae: 0
Epoch 55/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4106 - mae: 0
Epoch 56/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4064 - mae: 0
Epoch 57/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4110 - mae: 0
-----
```

```
4/22/2020 AES.ipynb - Colaboratory
1444/1444 [=====] - 0s 66us/step - loss: 0.4110 - mae: 0
Epoch 58/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3987 - mae: 0
Epoch 59/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4159 - mae: 0
Epoch 60/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3906 - mae: 0
Epoch 61/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4099 - mae: 0
Epoch 62/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4026 - mae: 0
Epoch 63/70
1444/1444 [=====] - 0s 65us/step - loss: 0.3769 - mae: 0
Epoch 64/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3980 - mae: 0
Epoch 65/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3737 - mae: 0
Epoch 66/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4106 - mae: 0
Epoch 67/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3639 - mae: 0
Epoch 68/70
1444/1444 [=====] - 0s 78us/step - loss: 0.4057 - mae: 0
Epoch 69/70
1444/1444 [=====] - 0s 73us/step - loss: 0.3532 - mae: 0
Epoch 70/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3842 - mae: 0
Kappa Score: 0.6934291772363426
```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377  
Trainable params: 2,141,377  
Non-trainable params: 0

```
Epoch 1/70
1444/1444 [=====] - 1s 434us/step - loss: 1.6703 - mae:
Epoch 2/70
1444/1444 [=====] - 0s 67us/step - loss: 0.8221 - mae: 0
Epoch 3/70
1444/1444 [=====] - 0s 65us/step - loss: 0.6967 - mae: 0
Epoch 4/70
1444/1444 [=====] - 0s 68us/step - loss: 0.6918 - mae: 0
Epoch 5/70
1444/1444 [=====] - 0s 69us/step - loss: 0.6415 - mae: 0
Epoch 6/70
```



```
1444/1444 [=====] - 0s 69us/step - loss: 0.6670 - mae: 0
Epoch 7/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5403 - mae: 0
Epoch 8/70
1444/1444 [=====] - 0s 68us/step - loss: 0.6697 - mae: 0
Epoch 9/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5605 - mae: 0
Epoch 10/70
1444/1444 [=====] - 0s 74us/step - loss: 0.5864 - mae: 0
Epoch 11/70
1444/1444 [=====] - 0s 75us/step - loss: 0.5543 - mae: 0
Epoch 12/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5549 - mae: 0
Epoch 13/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5678 - mae: 0
Epoch 14/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5238 - mae: 0
Epoch 15/70
1444/1444 [=====] - 0s 70us/step - loss: 0.5380 - mae: 0
Epoch 16/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4995 - mae: 0
Epoch 17/70
1444/1444 [=====] - 0s 70us/step - loss: 0.5608 - mae: 0
Epoch 18/70
1444/1444 [=====] - 0s 79us/step - loss: 0.4930 - mae: 0
Epoch 19/70
1444/1444 [=====] - 0s 77us/step - loss: 0.5231 - mae: 0
Epoch 20/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5012 - mae: 0
Epoch 21/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5089 - mae: 0
Epoch 22/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4758 - mae: 0
Epoch 23/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5118 - mae: 0
Epoch 24/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4911 - mae: 0
Epoch 25/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4316 - mae: 0
Epoch 26/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4800 - mae: 0
Epoch 27/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4945 - mae: 0
Epoch 28/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4881 - mae: 0
Epoch 29/70
1444/1444 [=====] - 0s 68us/step - loss: 0.5105 - mae: 0
Epoch 30/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4461 - mae: 0
Epoch 31/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4709 - mae: 0
Epoch 32/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5176 - mae: 0
Epoch 33/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4278 - mae: 0
Epoch 34/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4929 - mae: 0
Epoch 35/70
```

```
1444/1444 [=====] - 0s 67us/step - loss: 0.4694 - mae: 0
Epoch 36/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4643 - mae: 0
Epoch 37/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4111 - mae: 0
Epoch 38/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4669 - mae: 0
Epoch 39/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4487 - mae: 0
Epoch 40/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4631 - mae: 0
Epoch 41/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4632 - mae: 0
Epoch 42/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4604 - mae: 0
Epoch 43/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4139 - mae: 0
Epoch 44/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4259 - mae: 0
Epoch 45/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4369 - mae: 0
Epoch 46/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4470 - mae: 0
Epoch 47/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4100 - mae: 0
Epoch 48/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4408 - mae: 0
Epoch 49/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4294 - mae: 0
Epoch 50/70
1444/1444 [=====] - 0s 79us/step - loss: 0.4298 - mae: 0
Epoch 51/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4322 - mae: 0
Epoch 52/70
1444/1444 [=====] - 0s 71us/step - loss: 0.3943 - mae: 0
Epoch 53/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4041 - mae: 0
Epoch 54/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4388 - mae: 0
Epoch 55/70
1444/1444 [=====] - 0s 71us/step - loss: 0.4269 - mae: 0
Epoch 56/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4036 - mae: 0
Epoch 57/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4243 - mae: 0
Epoch 58/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3892 - mae: 0
Epoch 59/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4282 - mae: 0
Epoch 60/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4377 - mae: 0
Epoch 61/70
1444/1444 [=====] - 0s 70us/step - loss: 0.3942 - mae: 0
Epoch 62/70
1444/1444 [=====] - 0s 78us/step - loss: 0.3866 - mae: 0
Epoch 63/70
1444/1444 [=====] - 0s 79us/step - loss: 0.4452 - mae: 0
Epoch 64/70
```

```

Epoch 64/70
1444/1444 [=====] - 0s 79us/step - loss: 0.3773 - mae: 0
Epoch 65/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4421 - mae: 0
Epoch 66/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3945 - mae: 0
Epoch 67/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3891 - mae: 0
Epoch 68/70
1444/1444 [=====] - 0s 70us/step - loss: 0.4217 - mae: 0
Epoch 69/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4102 - mae: 0
Epoch 70/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3659 - mae: 0
Kappa Score: 0.665618772279451

```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```

Epoch 1/70
1444/1444 [=====] - 1s 435us/step - loss: 1.5369 - mae:
Epoch 2/70
1444/1444 [=====] - 0s 66us/step - loss: 0.8730 - mae: 0
Epoch 3/70
1444/1444 [=====] - 0s 66us/step - loss: 0.6932 - mae: 0
Epoch 4/70
1444/1444 [=====] - 0s 66us/step - loss: 0.6735 - mae: 0
Epoch 5/70
1444/1444 [=====] - 0s 65us/step - loss: 0.6560 - mae: 0
Epoch 6/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5748 - mae: 0
Epoch 7/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5406 - mae: 0
Epoch 8/70
1444/1444 [=====] - 0s 66us/step - loss: 0.6459 - mae: 0
Epoch 9/70
1444/1444 [=====] - 0s 66us/step - loss: 0.6309 - mae: 0
Epoch 10/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5780 - mae: 0
Epoch 11/70
1444/1444 [=====] - 0s 69us/step - loss: 0.5850 - mae: 0
Epoch 12/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4904 - mae: 0

```

```
Epoch 13/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5445 - mae: 0
Epoch 14/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5206 - mae: 0
Epoch 15/70
1444/1444 [=====] - 0s 65us/step - loss: 0.5690 - mae: 0
Epoch 16/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5000 - mae: 0
Epoch 17/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5285 - mae: 0
Epoch 18/70
1444/1444 [=====] - 0s 72us/step - loss: 0.4534 - mae: 0
Epoch 19/70
1444/1444 [=====] - 0s 74us/step - loss: 0.5165 - mae: 0
Epoch 20/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4826 - mae: 0
Epoch 21/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4576 - mae: 0
Epoch 22/70
1444/1444 [=====] - 0s 66us/step - loss: 0.5100 - mae: 0
Epoch 23/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4960 - mae: 0
Epoch 24/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4533 - mae: 0
Epoch 25/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4792 - mae: 0
Epoch 26/70
1444/1444 [=====] - 0s 67us/step - loss: 0.5160 - mae: 0
Epoch 27/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4212 - mae: 0
Epoch 28/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4830 - mae: 0
Epoch 29/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4585 - mae: 0
Epoch 30/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4581 - mae: 0
Epoch 31/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4443 - mae: 0
Epoch 32/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4494 - mae: 0
Epoch 33/70
1444/1444 [=====] - 0s 68us/step - loss: 0.4493 - mae: 0
Epoch 34/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4706 - mae: 0
Epoch 35/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4151 - mae: 0
Epoch 36/70
1444/1444 [=====] - 0s 72us/step - loss: 0.3907 - mae: 0
Epoch 37/70
1444/1444 [=====] - 0s 76us/step - loss: 0.4714 - mae: 0
Epoch 38/70
1444/1444 [=====] - 0s 66us/step - loss: 0.4286 - mae: 0
Epoch 39/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4211 - mae: 0
Epoch 40/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4325 - mae: 0
Epoch 41/70
1444/1444 [=====] - 0s 77us/step - loss: 0.3809 - mae: 0
```

```
Epoch 42/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4522 - mae: 0
Epoch 43/70
1444/1444 [=====] - 0s 72us/step - loss: 0.4252 - mae: 0
Epoch 44/70
1444/1444 [=====] - 0s 77us/step - loss: 0.4368 - mae: 0
Epoch 45/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4256 - mae: 0
Epoch 46/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4298 - mae: 0
Epoch 47/70
1444/1444 [=====] - 0s 80us/step - loss: 0.3924 - mae: 0
Epoch 48/70
1444/1444 [=====] - 0s 69us/step - loss: 0.4056 - mae: 0
Epoch 49/70
1444/1444 [=====] - 0s 65us/step - loss: 0.4297 - mae: 0
Epoch 50/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4005 - mae: 0
Epoch 51/70
1444/1444 [=====] - 0s 64us/step - loss: 0.4591 - mae: 0
Epoch 52/70
1444/1444 [=====] - 0s 73us/step - loss: 0.4037 - mae: 0
Epoch 53/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3821 - mae: 0
Epoch 54/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3788 - mae: 0
Epoch 55/70
1444/1444 [=====] - 0s 67us/step - loss: 0.4217 - mae: 0
Epoch 56/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3905 - mae: 0
Epoch 57/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3807 - mae: 0
Epoch 58/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3631 - mae: 0
Epoch 59/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4399 - mae: 0
Epoch 60/70
1444/1444 [=====] - 0s 74us/step - loss: 0.4170 - mae: 0
Epoch 61/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3811 - mae: 0
Epoch 62/70
1444/1444 [=====] - 0s 68us/step - loss: 0.3871 - mae: 0
Epoch 63/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3944 - mae: 0
Epoch 64/70
1444/1444 [=====] - 0s 74us/step - loss: 0.3806 - mae: 0
Epoch 65/70
1444/1444 [=====] - 0s 75us/step - loss: 0.3943 - mae: 0
Epoch 66/70
1444/1444 [=====] - 0s 78us/step - loss: 0.3717 - mae: 0
Epoch 67/70
1444/1444 [=====] - 0s 69us/step - loss: 0.3459 - mae: 0
Epoch 68/70
1444/1444 [=====] - 0s 67us/step - loss: 0.3655 - mae: 0
Epoch 69/70
1444/1444 [=====] - 0s 65us/step - loss: 0.3900 - mae: 0
Epoch 70/70
1444/1444 [=====] - 0s 66us/step - loss: 0.3825 - mae: 0
```

Kappa Score: 0.6964304383201741  
Average kappa score value is : 0.6715231190681556

-----SET 6-----

-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
-----		
lstm_2 (LSTM)	(None, 128)	270848
-----		
dropout_1 (Dropout)	(None, 128)	0
-----		
dense_1 (Dense)	(None, 1)	129
=====		

Total params: 2,141,377  
Trainable params: 2,141,377  
Non-trainable params: 0

Epoch 1/70  
1440/1440 [=====] - 1s 413us/step - loss: 1.9167 - mae:  
Epoch 2/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.9728 - mae: 0  
Epoch 3/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.8070 - mae: 0  
Epoch 4/70  
1440/1440 [=====] - 0s 68us/step - loss: 0.8265 - mae: 0  
Epoch 5/70  
1440/1440 [=====] - 0s 68us/step - loss: 0.7076 - mae: 0  
Epoch 6/70  
1440/1440 [=====] - 0s 69us/step - loss: 0.6581 - mae: 0  
Epoch 7/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.6826 - mae: 0  
Epoch 8/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.7191 - mae: 0  
Epoch 9/70  
1440/1440 [=====] - 0s 69us/step - loss: 0.5635 - mae: 0  
Epoch 10/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.6231 - mae: 0  
Epoch 11/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.6181 - mae: 0  
Epoch 12/70  
1440/1440 [=====] - 0s 77us/step - loss: 0.6323 - mae: 0  
Epoch 13/70  
1440/1440 [=====] - 0s 76us/step - loss: 0.5381 - mae: 0  
Epoch 14/70  
1440/1440 [=====] - 0s 68us/step - loss: 0.6461 - mae: 0  
Epoch 15/70  
1440/1440 [=====] - 0s 68us/step - loss: 0.6049 - mae: 0  
Epoch 16/70  
1440/1440 [=====] - 0s 69us/step - loss: 0.6026 - mae: 0  
Epoch 17/70  
1440/1440 [=====] - 0s 67us/step - loss: 0.5324 - mae: 0

```
1440/1440 [=====] - 0s 67us/step - loss: 0.5324 - mae: 0
Epoch 18/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5345 - mae: 0
Epoch 19/70
1440/1440 [=====] - 0s 71us/step - loss: 0.5339 - mae: 0
Epoch 20/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5622 - mae: 0
Epoch 21/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5326 - mae: 0
Epoch 22/70
1440/1440 [=====] - 0s 70us/step - loss: 0.5701 - mae: 0
Epoch 23/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5001 - mae: 0
Epoch 24/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5591 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5023 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5381 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5200 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5441 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4793 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5488 - mae: 0
Epoch 31/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5213 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5259 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4667 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 72us/step - loss: 0.5101 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4945 - mae: 0
Epoch 36/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4973 - mae: 0
Epoch 37/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4714 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5244 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4992 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5017 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4591 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 72us/step - loss: 0.4691 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 84us/step - loss: 0.4522 - mae: 0
Epoch 44/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4718 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4890 - mae: 0
Epoch 46/70
```

```

1440/1440 [=====] - 0s 79us/step - loss: 0.4581 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4927 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4906 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4812 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4343 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4933 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4331 - mae: 0
Epoch 53/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4883 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4664 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4508 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4631 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4796 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 66us/step - loss: 0.3963 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 80us/step - loss: 0.4614 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 83us/step - loss: 0.4587 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4209 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 82us/step - loss: 0.4468 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4423 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4678 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4231 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4283 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4302 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4240 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4180 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4129 - mae: 0
Kappa Score: 0.6857393800475567

```

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400



lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1440/1440 [=====] - 1s 421us/step - loss: 1.9563 - mae:

Epoch 2/70

1440/1440 [=====] - 0s 66us/step - loss: 0.9236 - mae: 0

Epoch 3/70

1440/1440 [=====] - 0s 67us/step - loss: 0.9131 - mae: 0

Epoch 4/70

1440/1440 [=====] - 0s 66us/step - loss: 0.7889 - mae: 0

Epoch 5/70

1440/1440 [=====] - 0s 65us/step - loss: 0.7651 - mae: 0

Epoch 6/70

1440/1440 [=====] - 0s 66us/step - loss: 0.7024 - mae: 0

Epoch 7/70

1440/1440 [=====] - 0s 66us/step - loss: 0.6710 - mae: 0

Epoch 8/70

1440/1440 [=====] - 0s 67us/step - loss: 0.6853 - mae: 0

Epoch 9/70

1440/1440 [=====] - 0s 72us/step - loss: 0.7290 - mae: 0

Epoch 10/70

1440/1440 [=====] - 0s 68us/step - loss: 0.5984 - mae: 0

Epoch 11/70

1440/1440 [=====] - 0s 70us/step - loss: 0.6319 - mae: 0

Epoch 12/70

1440/1440 [=====] - 0s 76us/step - loss: 0.6572 - mae: 0

Epoch 13/70

1440/1440 [=====] - 0s 78us/step - loss: 0.5260 - mae: 0

Epoch 14/70

1440/1440 [=====] - 0s 80us/step - loss: 0.6318 - mae: 0

Epoch 15/70

1440/1440 [=====] - 0s 76us/step - loss: 0.5630 - mae: 0

Epoch 16/70

1440/1440 [=====] - 0s 72us/step - loss: 0.6010 - mae: 0

Epoch 17/70

1440/1440 [=====] - 0s 73us/step - loss: 0.5768 - mae: 0

Epoch 18/70

1440/1440 [=====] - 0s 70us/step - loss: 0.5828 - mae: 0

Epoch 19/70

1440/1440 [=====] - 0s 70us/step - loss: 0.4947 - mae: 0

Epoch 20/70

1440/1440 [=====] - 0s 69us/step - loss: 0.5894 - mae: 0

Epoch 21/70

1440/1440 [=====] - 0s 68us/step - loss: 0.5526 - mae: 0

Epoch 22/70

1440/1440 [=====] - 0s 68us/step - loss: 0.5793 - mae: 0

Epoch 23/70

1440/1440 [=====] - 0s 67us/step - loss: 0.5226 - mae: 0

Epoch 24/70

```
Epoch 24/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4895 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 77us/step - loss: 0.5710 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 77us/step - loss: 0.5162 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5465 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 71us/step - loss: 0.5175 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5444 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4731 - mae: 0
Epoch 31/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5352 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5177 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 73us/step - loss: 0.5144 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4708 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4876 - mae: 0
Epoch 36/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4595 - mae: 0
Epoch 37/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5069 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5146 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4786 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4949 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5391 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4581 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5151 - mae: 0
Epoch 44/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4997 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5100 - mae: 0
Epoch 46/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4494 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4821 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4535 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4985 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4874 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4737 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4706 - mae: 0
```

```

Epoch 53/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4537 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4610 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4453 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4581 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4630 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4569 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 72us/step - loss: 0.4317 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4475 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4388 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4313 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4438 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4341 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4281 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4471 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4236 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4053 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4241 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4168 - mae: 0
Kappa Score: 0.6057003078945127

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
=====		

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

```
1440/1440 [=====] - 1s 398us/step - loss: 1.9279 - mae:
```

```
Epoch 2/70
1440/1440 [=====] - 0s 66us/step - loss: 0.9733 - mae: 0
Epoch 3/70
1440/1440 [=====] - 0s 68us/step - loss: 0.7812 - mae: 0
Epoch 4/70
1440/1440 [=====] - 0s 67us/step - loss: 0.7563 - mae: 0
Epoch 5/70
1440/1440 [=====] - 0s 67us/step - loss: 0.7681 - mae: 0
Epoch 6/70
1440/1440 [=====] - 0s 69us/step - loss: 0.7265 - mae: 0
Epoch 7/70
1440/1440 [=====] - 0s 66us/step - loss: 0.6326 - mae: 0
Epoch 8/70
1440/1440 [=====] - 0s 67us/step - loss: 0.6826 - mae: 0
Epoch 9/70
1440/1440 [=====] - 0s 66us/step - loss: 0.6859 - mae: 0
Epoch 10/70
1440/1440 [=====] - 0s 65us/step - loss: 0.6209 - mae: 0
Epoch 11/70
1440/1440 [=====] - 0s 66us/step - loss: 0.6509 - mae: 0
Epoch 12/70
1440/1440 [=====] - 0s 74us/step - loss: 0.6064 - mae: 0
Epoch 13/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5614 - mae: 0
Epoch 14/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5540 - mae: 0
Epoch 15/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5798 - mae: 0
Epoch 16/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5843 - mae: 0
Epoch 17/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5912 - mae: 0
Epoch 18/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5116 - mae: 0
Epoch 19/70
1440/1440 [=====] - 0s 66us/step - loss: 0.6416 - mae: 0
Epoch 20/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5729 - mae: 0
Epoch 21/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5424 - mae: 0
Epoch 22/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5406 - mae: 0
Epoch 23/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5319 - mae: 0
Epoch 24/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5333 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5449 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 71us/step - loss: 0.5393 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 64us/step - loss: 0.5222 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 72us/step - loss: 0.5045 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 72us/step - loss: 0.4763 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 74us/step - loss: 0.5163 - mae: 0
```

```
Epoch 31/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4978 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4915 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5602 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5184 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4811 - mae: 0
Epoch 36/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5061 - mae: 0
Epoch 37/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5009 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 64us/step - loss: 0.5056 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4782 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 65us/step - loss: 0.5190 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 64us/step - loss: 0.4630 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4781 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4675 - mae: 0
Epoch 44/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4942 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4725 - mae: 0
Epoch 46/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5203 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4537 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4948 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4646 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4800 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4421 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4869 - mae: 0
Epoch 53/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4794 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4264 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4763 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4563 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4553 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4417 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4250 - mae: 0
```

```
4/22/2020 AES.ipynb - Colaboratory
1440/1440 [=====] - 0s 66us/step - loss: 0.4350 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4666 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4409 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4648 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4465 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4308 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4421 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 72us/step - loss: 0.4265 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4603 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4336 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 65us/step - loss: 0.4052 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4337 - mae: 0
Kappa Score: 0.7090864455150827
```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377  
Trainable params: 2,141,377  
Non-trainable params: 0

```
Epoch 1/70
1440/1440 [=====] - 1s 459us/step - loss: 2.0574 - mae:
Epoch 2/70
1440/1440 [=====] - 0s 70us/step - loss: 0.9603 - mae: 0
Epoch 3/70
1440/1440 [=====] - 0s 80us/step - loss: 0.8848 - mae: 0
Epoch 4/70
1440/1440 [=====] - 0s 71us/step - loss: 0.8010 - mae: 0
Epoch 5/70
1440/1440 [=====] - 0s 67us/step - loss: 0.7444 - mae: 0
Epoch 6/70
1440/1440 [=====] - 0s 67us/step - loss: 0.7017 - mae: 0
Epoch 7/70
1440/1440 [=====] - 0s 69us/step - loss: 0.6630 - mae: 0
Epoch 8/70
```

```
1440/1440 [=====] - 0s 69us/step - loss: 0.6828 - mae: 0
Epoch 9/70
1440/1440 [=====] - 0s 68us/step - loss: 0.6471 - mae: 0
Epoch 10/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5927 - mae: 0
Epoch 11/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5700 - mae: 0
Epoch 12/70
1440/1440 [=====] - 0s 77us/step - loss: 0.6620 - mae: 0
Epoch 13/70
1440/1440 [=====] - 0s 81us/step - loss: 0.6321 - mae: 0
Epoch 14/70
1440/1440 [=====] - 0s 76us/step - loss: 0.6042 - mae: 0
Epoch 15/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5967 - mae: 0
Epoch 16/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5629 - mae: 0
Epoch 17/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5838 - mae: 0
Epoch 18/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4991 - mae: 0
Epoch 19/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5923 - mae: 0
Epoch 20/70
1440/1440 [=====] - 0s 74us/step - loss: 0.5860 - mae: 0
Epoch 21/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5838 - mae: 0
Epoch 22/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5853 - mae: 0
Epoch 23/70
1440/1440 [=====] - 0s 74us/step - loss: 0.5837 - mae: 0
Epoch 24/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5760 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4771 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5705 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 64us/step - loss: 0.5080 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5116 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 80us/step - loss: 0.5633 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5297 - mae: 0
Epoch 31/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5322 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4962 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5630 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4733 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4633 - mae: 0
Epoch 36/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5707 - mae: 0
Epoch 37/70
```

```
1440/1440 [=====] - 0s 75us/step - loss: 0.5023 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4943 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4970 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4827 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4984 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4897 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4740 - mae: 0
Epoch 44/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5001 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4973 - mae: 0
Epoch 46/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4764 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4857 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4875 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 77us/step - loss: 0.5081 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 73us/step - loss: 0.4190 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4676 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4574 - mae: 0
Epoch 53/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4616 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4827 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4579 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4559 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4891 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4653 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4327 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4748 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4554 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4627 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4634 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4355 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4042 - mae: 0
Epoch 66/70
```



```

Epoch 66/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4763 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 78us/step - loss: 0.3879 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4521 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4478 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4642 - mae: 0
Kappa Score: 0.6625103906899419

```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```

Epoch 1/70
1440/1440 [=====] - 1s 530us/step - loss: 1.8073 - mae:
Epoch 2/70
1440/1440 [=====] - 0s 67us/step - loss: 0.9269 - mae: 0
Epoch 3/70
1440/1440 [=====] - 0s 66us/step - loss: 0.8229 - mae: 0
Epoch 4/70
1440/1440 [=====] - 0s 69us/step - loss: 0.7314 - mae: 0
Epoch 5/70
1440/1440 [=====] - 0s 67us/step - loss: 0.7168 - mae: 0
Epoch 6/70
1440/1440 [=====] - 0s 70us/step - loss: 0.6643 - mae: 0
Epoch 7/70
1440/1440 [=====] - 0s 67us/step - loss: 0.6343 - mae: 0
Epoch 8/70
1440/1440 [=====] - 0s 68us/step - loss: 0.6261 - mae: 0
Epoch 9/70
1440/1440 [=====] - 0s 67us/step - loss: 0.6268 - mae: 0
Epoch 10/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5982 - mae: 0
Epoch 11/70
1440/1440 [=====] - 0s 67us/step - loss: 0.5164 - mae: 0
Epoch 12/70
1440/1440 [=====] - 0s 69us/step - loss: 0.6063 - mae: 0
Epoch 13/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5755 - mae: 0
Epoch 14/70
1440/1440 [=====] - 0s 70us/step - loss: 0.5333 - mae: 0

```

```
Epoch 15/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5756 - mae: 0
Epoch 16/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5678 - mae: 0
Epoch 17/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5335 - mae: 0
Epoch 18/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5287 - mae: 0
Epoch 19/70
1440/1440 [=====] - 0s 76us/step - loss: 0.5154 - mae: 0
Epoch 20/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5324 - mae: 0
Epoch 21/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5242 - mae: 0
Epoch 22/70
1440/1440 [=====] - 0s 78us/step - loss: 0.5225 - mae: 0
Epoch 23/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5339 - mae: 0
Epoch 24/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4991 - mae: 0
Epoch 25/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5649 - mae: 0
Epoch 26/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4852 - mae: 0
Epoch 27/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4894 - mae: 0
Epoch 28/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5361 - mae: 0
Epoch 29/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4603 - mae: 0
Epoch 30/70
1440/1440 [=====] - 0s 79us/step - loss: 0.5313 - mae: 0
Epoch 31/70
1440/1440 [=====] - 0s 79us/step - loss: 0.4666 - mae: 0
Epoch 32/70
1440/1440 [=====] - 0s 72us/step - loss: 0.4941 - mae: 0
Epoch 33/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4671 - mae: 0
Epoch 34/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4784 - mae: 0
Epoch 35/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4530 - mae: 0
Epoch 36/70
1440/1440 [=====] - 0s 74us/step - loss: 0.4909 - mae: 0
Epoch 37/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4776 - mae: 0
Epoch 38/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4896 - mae: 0
Epoch 39/70
1440/1440 [=====] - 0s 69us/step - loss: 0.4239 - mae: 0
Epoch 40/70
1440/1440 [=====] - 0s 66us/step - loss: 0.5053 - mae: 0
Epoch 41/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4254 - mae: 0
Epoch 42/70
1440/1440 [=====] - 0s 75us/step - loss: 0.5082 - mae: 0
Epoch 43/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4182 - mae: 0
```

```
Epoch 44/70
1440/1440 [=====] - 0s 69us/step - loss: 0.5079 - mae: 0
Epoch 45/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4038 - mae: 0
Epoch 46/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4788 - mae: 0
Epoch 47/70
1440/1440 [=====] - 0s 66us/step - loss: 0.4329 - mae: 0
Epoch 48/70
1440/1440 [=====] - 0s 68us/step - loss: 0.5049 - mae: 0
Epoch 49/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4519 - mae: 0
Epoch 50/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4414 - mae: 0
Epoch 51/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4545 - mae: 0
Epoch 52/70
1440/1440 [=====] - 0s 81us/step - loss: 0.4478 - mae: 0
Epoch 53/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4124 - mae: 0
Epoch 54/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4310 - mae: 0
Epoch 55/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4639 - mae: 0
Epoch 56/70
1440/1440 [=====] - 0s 76us/step - loss: 0.4740 - mae: 0
Epoch 57/70
1440/1440 [=====] - 0s 77us/step - loss: 0.4417 - mae: 0
Epoch 58/70
1440/1440 [=====] - 0s 78us/step - loss: 0.4202 - mae: 0
Epoch 59/70
1440/1440 [=====] - 0s 80us/step - loss: 0.4228 - mae: 0
Epoch 60/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4259 - mae: 0
Epoch 61/70
1440/1440 [=====] - 0s 75us/step - loss: 0.4136 - mae: 0
Epoch 62/70
1440/1440 [=====] - 0s 71us/step - loss: 0.4510 - mae: 0
Epoch 63/70
1440/1440 [=====] - 0s 68us/step - loss: 0.4024 - mae: 0
Epoch 64/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4613 - mae: 0
Epoch 65/70
1440/1440 [=====] - 0s 68us/step - loss: 0.3891 - mae: 0
Epoch 66/70
1440/1440 [=====] - 0s 67us/step - loss: 0.3917 - mae: 0
Epoch 67/70
1440/1440 [=====] - 0s 70us/step - loss: 0.4340 - mae: 0
Epoch 68/70
1440/1440 [=====] - 0s 70us/step - loss: 0.3878 - mae: 0
Epoch 69/70
1440/1440 [=====] - 0s 67us/step - loss: 0.4516 - mae: 0
Epoch 70/70
1440/1440 [=====] - 0s 67us/step - loss: 0.3961 - mae: 0
Kappa Score: 0.6580027359781122
Average kappa score value is : 0.6642078520250413
```

-----SET 7-----

-----SE1 ,-----

-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

1255/1255 [=====] - 1s 584us/step - loss: 119.8352 - mae:

Epoch 2/70

1255/1255 [=====] - 0s 69us/step - loss: 31.1742 - mae:

Epoch 3/70

1255/1255 [=====] - 0s 63us/step - loss: 26.3740 - mae:

Epoch 4/70

1255/1255 [=====] - 0s 60us/step - loss: 23.5624 - mae:

Epoch 5/70

1255/1255 [=====] - 0s 75us/step - loss: 23.6078 - mae:

Epoch 6/70

1255/1255 [=====] - 0s 73us/step - loss: 21.6928 - mae:

Epoch 7/70

1255/1255 [=====] - 0s 77us/step - loss: 18.8747 - mae:

Epoch 8/70

1255/1255 [=====] - 0s 75us/step - loss: 16.9239 - mae:

Epoch 9/70

1255/1255 [=====] - 0s 75us/step - loss: 14.9936 - mae:

Epoch 10/70

1255/1255 [=====] - 0s 68us/step - loss: 14.9867 - mae:

Epoch 11/70

1255/1255 [=====] - 0s 76us/step - loss: 12.9364 - mae:

Epoch 12/70

1255/1255 [=====] - 0s 74us/step - loss: 13.2860 - mae:

Epoch 13/70

1255/1255 [=====] - 0s 76us/step - loss: 14.2480 - mae:

Epoch 14/70

1255/1255 [=====] - 0s 75us/step - loss: 13.4642 - mae:

Epoch 15/70

1255/1255 [=====] - 0s 70us/step - loss: 12.4670 - mae:

Epoch 16/70

1255/1255 [=====] - 0s 65us/step - loss: 13.1930 - mae:

Epoch 17/70

1255/1255 [=====] - 0s 66us/step - loss: 11.6395 - mae:

Epoch 18/70

1255/1255 [=====] - 0s 68us/step - loss: 11.7125 - mae:

Epoch 19/70

```
1255/1255 [=====] - 0s 65us/step - loss: 11.2577 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 63us/step - loss: 12.5569 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 64us/step - loss: 11.3507 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 63us/step - loss: 11.9496 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 66us/step - loss: 11.4097 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 64us/step - loss: 12.0124 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 65us/step - loss: 10.9341 - mae:
Epoch 26/70
1255/1255 [=====] - 0s 66us/step - loss: 12.3832 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 68us/step - loss: 11.9293 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 64us/step - loss: 10.6575 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 64us/step - loss: 11.7611 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 70us/step - loss: 11.2030 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 74us/step - loss: 11.5951 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 74us/step - loss: 10.1369 - mae:
Epoch 33/70
1255/1255 [=====] - 0s 66us/step - loss: 11.3124 - mae:
Epoch 34/70
1255/1255 [=====] - 0s 68us/step - loss: 11.4495 - mae:
Epoch 35/70
1255/1255 [=====] - 0s 63us/step - loss: 9.8523 - mae: 2
Epoch 36/70
1255/1255 [=====] - 0s 66us/step - loss: 11.7636 - mae:
Epoch 37/70
1255/1255 [=====] - 0s 76us/step - loss: 11.4415 - mae:
Epoch 38/70
1255/1255 [=====] - 0s 70us/step - loss: 10.7261 - mae:
Epoch 39/70
1255/1255 [=====] - 0s 65us/step - loss: 10.9647 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 65us/step - loss: 11.2255 - mae:
Epoch 41/70
1255/1255 [=====] - 0s 68us/step - loss: 10.9597 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 66us/step - loss: 10.4400 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 64us/step - loss: 10.4549 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 63us/step - loss: 10.4113 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 65us/step - loss: 10.5984 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 65us/step - loss: 11.2817 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 63us/step - loss: 11.2570 - mae:
Epoch 48/70
```

```

1255/1255 [=====] - 0s 68us/step - loss: 10.6532 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 75us/step - loss: 10.2568 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 78us/step - loss: 10.3835 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 64us/step - loss: 10.2112 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 63us/step - loss: 10.8716 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 67us/step - loss: 10.3427 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 63us/step - loss: 10.1442 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 67us/step - loss: 10.1968 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 61us/step - loss: 10.4400 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 65us/step - loss: 10.1946 - mae:
Epoch 58/70
1255/1255 [=====] - 0s 61us/step - loss: 10.1763 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 63us/step - loss: 10.2245 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 71us/step - loss: 9.8006 - mae: 2
Epoch 61/70
1255/1255 [=====] - 0s 75us/step - loss: 10.2802 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 66us/step - loss: 9.5271 - mae: 2
Epoch 63/70
1255/1255 [=====] - 0s 65us/step - loss: 10.2229 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 76us/step - loss: 9.9609 - mae: 2
Epoch 65/70
1255/1255 [=====] - 0s 79us/step - loss: 10.1668 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 73us/step - loss: 10.0213 - mae:
Epoch 67/70
1255/1255 [=====] - 0s 63us/step - loss: 10.1374 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 63us/step - loss: 9.8420 - mae: 2
Epoch 69/70
1255/1255 [=====] - 0s 66us/step - loss: 10.0045 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 62us/step - loss: 9.6534 - mae: 2
Kappa Score: 0.8067079692955195

```

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0

```

dense_1 (Dense)          (None, 1)          129
=====
Total params: 2,141,377
Trainable params: 2,141,377
Non-trainable params: 0

```

```

Epoch 1/70
1255/1255 [=====] - 1s 542us/step - loss: 122.3258 - mae:
Epoch 2/70
1255/1255 [=====] - 0s 80us/step - loss: 36.2908 - mae:
Epoch 3/70
1255/1255 [=====] - 0s 81us/step - loss: 29.2969 - mae:
Epoch 4/70
1255/1255 [=====] - 0s 84us/step - loss: 26.1923 - mae:
Epoch 5/70
1255/1255 [=====] - 0s 82us/step - loss: 24.0122 - mae:
Epoch 6/70
1255/1255 [=====] - 0s 80us/step - loss: 23.5338 - mae:
Epoch 7/70
1255/1255 [=====] - 0s 82us/step - loss: 22.7367 - mae:
Epoch 8/70
1255/1255 [=====] - 0s 79us/step - loss: 18.2874 - mae:
Epoch 9/70
1255/1255 [=====] - 0s 76us/step - loss: 15.5608 - mae:
Epoch 10/70
1255/1255 [=====] - 0s 71us/step - loss: 15.9877 - mae:
Epoch 11/70
1255/1255 [=====] - 0s 71us/step - loss: 14.8481 - mae:
Epoch 12/70
1255/1255 [=====] - 0s 71us/step - loss: 13.7763 - mae:
Epoch 13/70
1255/1255 [=====] - 0s 79us/step - loss: 13.4226 - mae:
Epoch 14/70
1255/1255 [=====] - 0s 86us/step - loss: 12.8186 - mae:
Epoch 15/70
1255/1255 [=====] - 0s 79us/step - loss: 12.6979 - mae:
Epoch 16/70
1255/1255 [=====] - 0s 78us/step - loss: 12.8163 - mae:
Epoch 17/70
1255/1255 [=====] - 0s 77us/step - loss: 12.0921 - mae:
Epoch 18/70
1255/1255 [=====] - 0s 69us/step - loss: 12.8982 - mae:
Epoch 19/70
1255/1255 [=====] - 0s 68us/step - loss: 11.9053 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 68us/step - loss: 12.6069 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 65us/step - loss: 12.0781 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 73us/step - loss: 11.8401 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 69us/step - loss: 11.1159 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 70us/step - loss: 11.5686 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 82us/step - loss: 11.0547 - mae:

```

```
Epoch 26/70
1255/1255 [=====] - 0s 80us/step - loss: 12.1937 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 83us/step - loss: 11.1888 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 82us/step - loss: 10.6638 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 79us/step - loss: 11.4235 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 77us/step - loss: 11.1353 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 69us/step - loss: 11.3632 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 67us/step - loss: 10.1513 - mae:
Epoch 33/70
1255/1255 [=====] - 0s 66us/step - loss: 11.1176 - mae:
Epoch 34/70
1255/1255 [=====] - 0s 67us/step - loss: 10.3055 - mae:
Epoch 35/70
1255/1255 [=====] - 0s 68us/step - loss: 10.9348 - mae:
Epoch 36/70
1255/1255 [=====] - 0s 73us/step - loss: 11.2387 - mae:
Epoch 37/70
1255/1255 [=====] - 0s 73us/step - loss: 11.0127 - mae:
Epoch 38/70
1255/1255 [=====] - 0s 78us/step - loss: 10.7964 - mae:
Epoch 39/70
1255/1255 [=====] - 0s 80us/step - loss: 11.1679 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 68us/step - loss: 9.8597 - mae: 2
Epoch 41/70
1255/1255 [=====] - 0s 69us/step - loss: 11.1551 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 68us/step - loss: 10.3198 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 70us/step - loss: 10.4553 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 69us/step - loss: 10.4845 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 68us/step - loss: 10.9274 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 68us/step - loss: 9.8694 - mae: 2
Epoch 47/70
1255/1255 [=====] - 0s 72us/step - loss: 10.0212 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 68us/step - loss: 9.8044 - mae: 2
Epoch 49/70
1255/1255 [=====] - 0s 81us/step - loss: 9.9738 - mae: 2
Epoch 50/70
1255/1255 [=====] - 0s 75us/step - loss: 9.9304 - mae: 2
Epoch 51/70
1255/1255 [=====] - 0s 82us/step - loss: 10.2889 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 81us/step - loss: 10.6114 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 82us/step - loss: 10.5180 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 80us/step - loss: 9.9903 - mae: 2
```



```

Epoch 55/70
1255/1255 [=====] - 0s 82us/step - loss: 10.3169 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 85us/step - loss: 10.3337 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 70us/step - loss: 9.4976 - mae: 2
Epoch 58/70
1255/1255 [=====] - 0s 74us/step - loss: 10.6253 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 79us/step - loss: 10.2180 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 75us/step - loss: 9.6077 - mae: 2
Epoch 61/70
1255/1255 [=====] - 0s 78us/step - loss: 10.4454 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 84us/step - loss: 9.6292 - mae: 2
Epoch 63/70
1255/1255 [=====] - 0s 81us/step - loss: 10.3309 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 76us/step - loss: 9.6510 - mae: 2
Epoch 65/70
1255/1255 [=====] - 0s 83us/step - loss: 8.8665 - mae: 2
Epoch 66/70
1255/1255 [=====] - 0s 85us/step - loss: 10.7213 - mae:
Epoch 67/70
1255/1255 [=====] - 0s 77us/step - loss: 10.1620 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 70us/step - loss: 10.1954 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 69us/step - loss: 9.7867 - mae: 2
Epoch 70/70
1255/1255 [=====] - 0s 73us/step - loss: 10.2484 - mae:
Kappa Score: 0.7508025238508402

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```

Epoch 1/70
1255/1255 [=====] - 1s 488us/step - loss: 118.2116 - mae:
Epoch 2/70
1255/1255 [=====] - 0s 68us/step - loss: 31.7684 - mae:
Epoch 3/70
1255/1255 [=====] - 0s 74us/step - loss: 26.5884 - mae:

```

```
Epoch 4/70
1255/1255 [=====] - 0s 77us/step - loss: 24.5197 - mae:
Epoch 5/70
1255/1255 [=====] - 0s 77us/step - loss: 23.4826 - mae:
Epoch 6/70
1255/1255 [=====] - 0s 75us/step - loss: 22.0104 - mae:
Epoch 7/70
1255/1255 [=====] - 0s 78us/step - loss: 18.6316 - mae:
Epoch 8/70
1255/1255 [=====] - 0s 78us/step - loss: 15.9959 - mae:
Epoch 9/70
1255/1255 [=====] - 0s 77us/step - loss: 14.5561 - mae:
Epoch 10/70
1255/1255 [=====] - 0s 76us/step - loss: 13.7284 - mae:
Epoch 11/70
1255/1255 [=====] - 0s 71us/step - loss: 14.1117 - mae:
Epoch 12/70
1255/1255 [=====] - 0s 68us/step - loss: 12.5311 - mae:
Epoch 13/70
1255/1255 [=====] - 0s 68us/step - loss: 12.7680 - mae:
Epoch 14/70
1255/1255 [=====] - 0s 72us/step - loss: 11.3595 - mae:
Epoch 15/70
1255/1255 [=====] - 0s 76us/step - loss: 12.2203 - mae:
Epoch 16/70
1255/1255 [=====] - 0s 68us/step - loss: 12.0712 - mae:
Epoch 17/70
1255/1255 [=====] - 0s 75us/step - loss: 11.5178 - mae:
Epoch 18/70
1255/1255 [=====] - 0s 81us/step - loss: 12.3611 - mae:
Epoch 19/70
1255/1255 [=====] - 0s 78us/step - loss: 11.6509 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 79us/step - loss: 10.9055 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 83us/step - loss: 11.2860 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 76us/step - loss: 11.5446 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 76us/step - loss: 11.3557 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 76us/step - loss: 10.9279 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 74us/step - loss: 11.0229 - mae:
Epoch 26/70
1255/1255 [=====] - 0s 76us/step - loss: 10.7421 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 79us/step - loss: 11.2843 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 82us/step - loss: 11.5406 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 80us/step - loss: 10.6931 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 68us/step - loss: 10.7538 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 67us/step - loss: 10.0346 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 67us/step - loss: 11.0575 - mae:
```

```
1255/1255 [-----] - 0s 67us/step - loss: 11.0575 - mae:  
Epoch 33/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.9590 - mae:  
Epoch 34/70  
1255/1255 [=====] - 0s 69us/step - loss: 10.7153 - mae:  
Epoch 35/70  
1255/1255 [=====] - 0s 71us/step - loss: 10.7060 - mae:  
Epoch 36/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.8423 - mae:  
Epoch 37/70  
1255/1255 [=====] - 0s 70us/step - loss: 10.5269 - mae:  
Epoch 38/70  
1255/1255 [=====] - 0s 65us/step - loss: 9.6355 - mae: 2  
Epoch 39/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.5889 - mae:  
Epoch 40/70  
1255/1255 [=====] - 0s 71us/step - loss: 10.3531 - mae:  
Epoch 41/70  
1255/1255 [=====] - 0s 70us/step - loss: 10.8564 - mae:  
Epoch 42/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.3905 - mae:  
Epoch 43/70  
1255/1255 [=====] - 0s 66us/step - loss: 10.3912 - mae:  
Epoch 44/70  
1255/1255 [=====] - 0s 70us/step - loss: 10.9745 - mae:  
Epoch 45/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.7384 - mae:  
Epoch 46/70  
1255/1255 [=====] - 0s 79us/step - loss: 10.2978 - mae:  
Epoch 47/70  
1255/1255 [=====] - 0s 76us/step - loss: 10.3138 - mae:  
Epoch 48/70  
1255/1255 [=====] - 0s 71us/step - loss: 10.3774 - mae:  
Epoch 49/70  
1255/1255 [=====] - 0s 66us/step - loss: 10.0517 - mae:  
Epoch 50/70  
1255/1255 [=====] - 0s 67us/step - loss: 10.7217 - mae:  
Epoch 51/70  
1255/1255 [=====] - 0s 69us/step - loss: 10.0622 - mae:  
Epoch 52/70  
1255/1255 [=====] - 0s 65us/step - loss: 9.3523 - mae: 2  
Epoch 53/70  
1255/1255 [=====] - 0s 67us/step - loss: 9.5771 - mae: 2  
Epoch 54/70  
1255/1255 [=====] - 0s 73us/step - loss: 10.8767 - mae:  
Epoch 55/70  
1255/1255 [=====] - 0s 67us/step - loss: 10.1617 - mae:  
Epoch 56/70  
1255/1255 [=====] - 0s 76us/step - loss: 9.8804 - mae: 2  
Epoch 57/70  
1255/1255 [=====] - 0s 70us/step - loss: 9.4429 - mae: 2  
Epoch 58/70  
1255/1255 [=====] - 0s 66us/step - loss: 9.9537 - mae: 2  
Epoch 59/70  
1255/1255 [=====] - 0s 72us/step - loss: 9.5451 - mae: 2  
Epoch 60/70  
1255/1255 [=====] - 0s 66us/step - loss: 10.2694 - mae:  
Epoch 61/70
```

```

1255/1255 [=====] - 0s 68us/step - loss: 9.5500 - mae: 2
Epoch 62/70
1255/1255 [=====] - 0s 69us/step - loss: 9.6755 - mae: 2
Epoch 63/70
1255/1255 [=====] - 0s 69us/step - loss: 9.5785 - mae: 2
Epoch 64/70
1255/1255 [=====] - 0s 67us/step - loss: 9.5163 - mae: 2
Epoch 65/70
1255/1255 [=====] - 0s 65us/step - loss: 9.6911 - mae: 2
Epoch 66/70
1255/1255 [=====] - 0s 71us/step - loss: 9.6194 - mae: 2
Epoch 67/70
1255/1255 [=====] - 0s 69us/step - loss: 9.2167 - mae: 2
Epoch 68/70
1255/1255 [=====] - 0s 67us/step - loss: 10.0748 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 70us/step - loss: 10.2913 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 72us/step - loss: 9.2647 - mae: 2
Kappa Score: 0.715215633554471

```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```

Epoch 1/70
1255/1255 [=====] - 1s 513us/step - loss: 120.5470 - mae:
Epoch 2/70
1255/1255 [=====] - 0s 66us/step - loss: 32.3792 - mae:
Epoch 3/70
1255/1255 [=====] - 0s 64us/step - loss: 27.0247 - mae:
Epoch 4/70
1255/1255 [=====] - 0s 66us/step - loss: 25.1903 - mae:
Epoch 5/70
1255/1255 [=====] - 0s 67us/step - loss: 24.2235 - mae:
Epoch 6/70
1255/1255 [=====] - 0s 65us/step - loss: 22.8311 - mae:
Epoch 7/70
1255/1255 [=====] - 0s 63us/step - loss: 18.2073 - mae:
Epoch 8/70
1255/1255 [=====] - 0s 65us/step - loss: 15.7559 - mae:
Epoch 9/70
1255/1255 [=====] - 0s 75us/step - loss: 15.6804 - mae:
Epoch 10/70

```

```
1255/1255 [=====] - 0s 74us/step - loss: 13.6825 - mae:  
Epoch 11/70  
1255/1255 [=====] - 0s 67us/step - loss: 15.5999 - mae:  
Epoch 12/70  
1255/1255 [=====] - 0s 75us/step - loss: 13.1932 - mae:  
Epoch 13/70  
1255/1255 [=====] - 0s 75us/step - loss: 13.7199 - mae:  
Epoch 14/70  
1255/1255 [=====] - 0s 77us/step - loss: 12.3051 - mae:  
Epoch 15/70  
1255/1255 [=====] - 0s 74us/step - loss: 12.6991 - mae:  
Epoch 16/70  
1255/1255 [=====] - 0s 76us/step - loss: 12.0973 - mae:  
Epoch 17/70  
1255/1255 [=====] - 0s 75us/step - loss: 12.3877 - mae:  
Epoch 18/70  
1255/1255 [=====] - 0s 77us/step - loss: 12.3798 - mae:  
Epoch 19/70  
1255/1255 [=====] - 0s 77us/step - loss: 12.8182 - mae:  
Epoch 20/70  
1255/1255 [=====] - 0s 77us/step - loss: 12.4551 - mae:  
Epoch 21/70  
1255/1255 [=====] - 0s 67us/step - loss: 11.9130 - mae:  
Epoch 22/70  
1255/1255 [=====] - 0s 67us/step - loss: 12.1462 - mae:  
Epoch 23/70  
1255/1255 [=====] - 0s 69us/step - loss: 12.5336 - mae:  
Epoch 24/70  
1255/1255 [=====] - 0s 68us/step - loss: 11.2026 - mae:  
Epoch 25/70  
1255/1255 [=====] - 0s 68us/step - loss: 11.4179 - mae:  
Epoch 26/70  
1255/1255 [=====] - 0s 68us/step - loss: 12.2619 - mae:  
Epoch 27/70  
1255/1255 [=====] - 0s 71us/step - loss: 11.7801 - mae:  
Epoch 28/70  
1255/1255 [=====] - 0s 65us/step - loss: 11.4708 - mae:  
Epoch 29/70  
1255/1255 [=====] - 0s 67us/step - loss: 11.6845 - mae:  
Epoch 30/70  
1255/1255 [=====] - 0s 65us/step - loss: 11.9308 - mae:  
Epoch 31/70  
1255/1255 [=====] - 0s 68us/step - loss: 10.6781 - mae:  
Epoch 32/70  
1255/1255 [=====] - 0s 69us/step - loss: 10.7988 - mae:  
Epoch 33/70  
1255/1255 [=====] - 0s 70us/step - loss: 11.8476 - mae:  
Epoch 34/70  
1255/1255 [=====] - 0s 69us/step - loss: 11.4928 - mae:  
Epoch 35/70  
1255/1255 [=====] - 0s 69us/step - loss: 11.4012 - mae:  
Epoch 36/70  
1255/1255 [=====] - 0s 80us/step - loss: 11.4559 - mae:  
Epoch 37/70  
1255/1255 [=====] - 0s 78us/step - loss: 11.8057 - mae:  
Epoch 38/70  
1255/1255 [=====] - 0s 65us/step - loss: 11.2629 - mae:  
Epoch 39/70
```

```
Epoch 39/70
1255/1255 [=====] - 0s 65us/step - loss: 10.8826 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 66us/step - loss: 10.8900 - mae:
Epoch 41/70
1255/1255 [=====] - 0s 65us/step - loss: 11.2802 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 71us/step - loss: 11.1460 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 70us/step - loss: 10.8959 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 65us/step - loss: 10.6186 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 67us/step - loss: 10.3116 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 64us/step - loss: 10.9320 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 66us/step - loss: 10.3306 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 72us/step - loss: 10.8267 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 74us/step - loss: 10.3413 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 66us/step - loss: 10.8505 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 65us/step - loss: 10.4069 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 65us/step - loss: 10.3058 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 67us/step - loss: 10.7018 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 65us/step - loss: 10.9317 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 67us/step - loss: 11.1280 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 68us/step - loss: 10.4562 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 68us/step - loss: 9.6702 - mae: 2
Epoch 58/70
1255/1255 [=====] - 0s 68us/step - loss: 10.2296 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 65us/step - loss: 10.2107 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 69us/step - loss: 10.8328 - mae:
Epoch 61/70
1255/1255 [=====] - 0s 65us/step - loss: 9.8415 - mae: 2
Epoch 62/70
1255/1255 [=====] - 0s 67us/step - loss: 10.6541 - mae:
Epoch 63/70
1255/1255 [=====] - 0s 66us/step - loss: 9.6958 - mae: 2
Epoch 64/70
1255/1255 [=====] - 0s 67us/step - loss: 10.4751 - mae:
Epoch 65/70
1255/1255 [=====] - 0s 65us/step - loss: 10.9198 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 66us/step - loss: 9.8882 - mae: 2
Epoch 67/70
1255/1255 [=====] - 0s 71us/step - loss: 10.4713 - mae:
Epoch 68/70
```

```
Epoch 68/70
1255/1255 [=====] - 0s 66us/step - loss: 10.3502 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 70us/step - loss: 10.3773 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 66us/step - loss: 9.3277 - mae: 2
Kappa Score: 0.7856609525978588
```

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```
Epoch 1/70
1256/1256 [=====] - 1s 511us/step - loss: 123.9791 - mae:
Epoch 2/70
1256/1256 [=====] - 0s 78us/step - loss: 36.9694 - mae:
Epoch 3/70
1256/1256 [=====] - 0s 72us/step - loss: 30.0427 - mae:
Epoch 4/70
1256/1256 [=====] - 0s 72us/step - loss: 26.4765 - mae:
Epoch 5/70
1256/1256 [=====] - 0s 71us/step - loss: 24.1898 - mae:
Epoch 6/70
1256/1256 [=====] - 0s 68us/step - loss: 22.5885 - mae:
Epoch 7/70
1256/1256 [=====] - 0s 73us/step - loss: 22.8447 - mae:
Epoch 8/70
1256/1256 [=====] - 0s 82us/step - loss: 19.5259 - mae:
Epoch 9/70
1256/1256 [=====] - 0s 78us/step - loss: 16.6694 - mae:
Epoch 10/70
1256/1256 [=====] - 0s 68us/step - loss: 15.0477 - mae:
Epoch 11/70
1256/1256 [=====] - 0s 80us/step - loss: 14.0390 - mae:
Epoch 12/70
1256/1256 [=====] - 0s 77us/step - loss: 14.0328 - mae:
Epoch 13/70
1256/1256 [=====] - 0s 81us/step - loss: 13.4119 - mae:
Epoch 14/70
1256/1256 [=====] - 0s 73us/step - loss: 12.9782 - mae:
Epoch 15/70
1256/1256 [=====] - 0s 73us/step - loss: 12.2287 - mae:
Epoch 16/70
1256/1256 [=====] - 0s 72us/step - loss: 11.8134 - mae:
```

```
Epoch 17/70
1256/1256 [=====] - 0s 75us/step - loss: 12.4823 - mae:
Epoch 18/70
1256/1256 [=====] - 0s 69us/step - loss: 11.8523 - mae:
Epoch 19/70
1256/1256 [=====] - 0s 78us/step - loss: 12.4380 - mae:
Epoch 20/70
1256/1256 [=====] - 0s 70us/step - loss: 11.6652 - mae:
Epoch 21/70
1256/1256 [=====] - 0s 69us/step - loss: 12.1074 - mae:
Epoch 22/70
1256/1256 [=====] - 0s 69us/step - loss: 10.5669 - mae:
Epoch 23/70
1256/1256 [=====] - 0s 67us/step - loss: 11.9853 - mae:
Epoch 24/70
1256/1256 [=====] - 0s 73us/step - loss: 11.2697 - mae:
Epoch 25/70
1256/1256 [=====] - 0s 67us/step - loss: 11.1908 - mae:
Epoch 26/70
1256/1256 [=====] - 0s 71us/step - loss: 11.0290 - mae:
Epoch 27/70
1256/1256 [=====] - 0s 70us/step - loss: 10.4710 - mae:
Epoch 28/70
1256/1256 [=====] - 0s 69us/step - loss: 11.6692 - mae:
Epoch 29/70
1256/1256 [=====] - 0s 72us/step - loss: 10.9792 - mae:
Epoch 30/70
1256/1256 [=====] - 0s 70us/step - loss: 10.9803 - mae:
Epoch 31/70
1256/1256 [=====] - 0s 74us/step - loss: 11.4561 - mae:
Epoch 32/70
1256/1256 [=====] - 0s 83us/step - loss: 10.7015 - mae:
Epoch 33/70
1256/1256 [=====] - 0s 77us/step - loss: 10.7815 - mae:
Epoch 34/70
1256/1256 [=====] - 0s 75us/step - loss: 10.5361 - mae:
Epoch 35/70
1256/1256 [=====] - 0s 72us/step - loss: 11.0998 - mae:
Epoch 36/70
1256/1256 [=====] - 0s 71us/step - loss: 9.8690 - mae: 2
Epoch 37/70
1256/1256 [=====] - 0s 70us/step - loss: 10.7730 - mae:
Epoch 38/70
1256/1256 [=====] - 0s 69us/step - loss: 10.9858 - mae:
Epoch 39/70
1256/1256 [=====] - 0s 67us/step - loss: 10.6896 - mae:
Epoch 40/70
1256/1256 [=====] - 0s 71us/step - loss: 9.5667 - mae: 2
Epoch 41/70
1256/1256 [=====] - 0s 70us/step - loss: 10.7784 - mae:
Epoch 42/70
1256/1256 [=====] - 0s 72us/step - loss: 10.1795 - mae:
Epoch 43/70
1256/1256 [=====] - 0s 70us/step - loss: 10.9661 - mae:
Epoch 44/70
1256/1256 [=====] - 0s 73us/step - loss: 9.7141 - mae: 2
Epoch 45/70
1256/1256 [=====] - 0s 72us/step - loss: 10.3775 - mae:
```



```
-----
Epoch 46/70
1256/1256 [=====] - 0s 74us/step - loss: 10.4005 - mae:
Epoch 47/70
1256/1256 [=====] - 0s 78us/step - loss: 9.9103 - mae: 2
Epoch 48/70
1256/1256 [=====] - 0s 72us/step - loss: 9.8760 - mae: 2
Epoch 49/70
1256/1256 [=====] - 0s 71us/step - loss: 10.3644 - mae:
Epoch 50/70
1256/1256 [=====] - 0s 71us/step - loss: 9.8180 - mae: 2
Epoch 51/70
1256/1256 [=====] - 0s 74us/step - loss: 9.6545 - mae: 2
Epoch 52/70
1256/1256 [=====] - 0s 70us/step - loss: 11.2074 - mae:
Epoch 53/70
1256/1256 [=====] - 0s 70us/step - loss: 9.2935 - mae: 2
Epoch 54/70
1256/1256 [=====] - 0s 68us/step - loss: 10.4158 - mae:
Epoch 55/70
1256/1256 [=====] - 0s 74us/step - loss: 9.3656 - mae: 2
Epoch 56/70
1256/1256 [=====] - 0s 69us/step - loss: 10.6444 - mae:
Epoch 57/70
1256/1256 [=====] - 0s 74us/step - loss: 9.8392 - mae: 2
Epoch 58/70
1256/1256 [=====] - 0s 72us/step - loss: 9.2188 - mae: 2
Epoch 59/70
1256/1256 [=====] - 0s 74us/step - loss: 9.3746 - mae: 2
Epoch 60/70
1256/1256 [=====] - 0s 71us/step - loss: 10.4037 - mae:
Epoch 61/70
1256/1256 [=====] - 0s 81us/step - loss: 10.3713 - mae:
Epoch 62/70
1256/1256 [=====] - 0s 83us/step - loss: 9.7605 - mae: 2
Epoch 63/70
1256/1256 [=====] - 0s 81us/step - loss: 9.3059 - mae: 2
Epoch 64/70
1256/1256 [=====] - 0s 74us/step - loss: 9.4068 - mae: 2
Epoch 65/70
1256/1256 [=====] - 0s 71us/step - loss: 9.8772 - mae: 2
Epoch 66/70
1256/1256 [=====] - 0s 75us/step - loss: 9.4577 - mae: 2
Epoch 67/70
1256/1256 [=====] - 0s 72us/step - loss: 9.5477 - mae: 2
Epoch 68/70
1256/1256 [=====] - 0s 69us/step - loss: 9.6781 - mae: 2
Epoch 69/70
1256/1256 [=====] - 0s 70us/step - loss: 9.2454 - mae: 2
Epoch 70/70
1256/1256 [=====] - 0s 70us/step - loss: 8.7877 - mae: 2
Kappa Score: 0.7610392764301905
Average kappa score value is : 0.763885271145776
```

-----SET 8-----

-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2,141,377		
Trainable params: 2,141,377		
Non-trainable params: 0		

```

Epoch 1/70
578/578 [=====] - 1s 1ms/step - loss: 1187.5452 - mae: 3
Epoch 2/70
578/578 [=====] - 0s 79us/step - loss: 717.5685 - mae: 2
Epoch 3/70
578/578 [=====] - 0s 84us/step - loss: 633.2339 - mae: 2
Epoch 4/70
578/578 [=====] - 0s 86us/step - loss: 591.4566 - mae: 2
Epoch 5/70
578/578 [=====] - 0s 88us/step - loss: 570.6636 - mae: 2
Epoch 6/70
578/578 [=====] - 0s 85us/step - loss: 540.7582 - mae: 2
Epoch 7/70
578/578 [=====] - 0s 74us/step - loss: 517.6905 - mae: 2
Epoch 8/70
578/578 [=====] - 0s 74us/step - loss: 498.4713 - mae: 2
Epoch 9/70
578/578 [=====] - 0s 74us/step - loss: 474.2727 - mae: 2
Epoch 10/70
578/578 [=====] - 0s 75us/step - loss: 458.7611 - mae: 2
Epoch 11/70
578/578 [=====] - 0s 75us/step - loss: 436.6621 - mae: 2
Epoch 12/70
578/578 [=====] - 0s 75us/step - loss: 413.0862 - mae: 1
Epoch 13/70
578/578 [=====] - 0s 77us/step - loss: 399.9571 - mae: 1
Epoch 14/70
578/578 [=====] - 0s 75us/step - loss: 384.3374 - mae: 1
Epoch 15/70
578/578 [=====] - 0s 73us/step - loss: 363.6440 - mae: 1
Epoch 16/70
578/578 [=====] - 0s 74us/step - loss: 345.2199 - mae: 1
Epoch 17/70
578/578 [=====] - 0s 78us/step - loss: 330.1179 - mae: 1
Epoch 18/70
578/578 [=====] - 0s 74us/step - loss: 315.9423 - mae: 1
Epoch 19/70
578/578 [=====] - 0s 74us/step - loss: 300.3896 - mae: 1
Epoch 20/70
578/578 [=====] - 0s 72us/step - loss: 285.5897 - mae: 1
Epoch 21/70

```

```
578/578 [=====] - 0s 81us/step - loss: 274.4107 - mae: 1
Epoch 22/70
578/578 [=====] - 0s 86us/step - loss: 260.0008 - mae: 1
Epoch 23/70
578/578 [=====] - 0s 88us/step - loss: 246.0485 - mae: 1
Epoch 24/70
578/578 [=====] - 0s 85us/step - loss: 231.7262 - mae: 1
Epoch 25/70
578/578 [=====] - 0s 87us/step - loss: 216.2569 - mae: 1
Epoch 26/70
578/578 [=====] - 0s 90us/step - loss: 206.5264 - mae: 1
Epoch 27/70
578/578 [=====] - 0s 90us/step - loss: 197.6952 - mae: 1
Epoch 28/70
578/578 [=====] - 0s 85us/step - loss: 182.0413 - mae: 1
Epoch 29/70
578/578 [=====] - 0s 81us/step - loss: 176.5163 - mae: 1
Epoch 30/70
578/578 [=====] - 0s 83us/step - loss: 163.8100 - mae: 1
Epoch 31/70
578/578 [=====] - 0s 90us/step - loss: 157.7389 - mae: 1
Epoch 32/70
578/578 [=====] - 0s 85us/step - loss: 144.6552 - mae: 1
Epoch 33/70
578/578 [=====] - 0s 85us/step - loss: 137.3375 - mae: 1
Epoch 34/70
578/578 [=====] - 0s 84us/step - loss: 127.0632 - mae: 9
Epoch 35/70
578/578 [=====] - 0s 81us/step - loss: 120.8728 - mae: 9
Epoch 36/70
578/578 [=====] - 0s 78us/step - loss: 111.5857 - mae: 9
Epoch 37/70
578/578 [=====] - 0s 76us/step - loss: 103.2005 - mae: 8
Epoch 38/70
578/578 [=====] - 0s 75us/step - loss: 95.8411 - mae: 8.
Epoch 39/70
578/578 [=====] - 0s 76us/step - loss: 90.6404 - mae: 7.
Epoch 40/70
578/578 [=====] - 0s 71us/step - loss: 83.8553 - mae: 7.
Epoch 41/70
578/578 [=====] - 0s 78us/step - loss: 79.9295 - mae: 7.
Epoch 42/70
578/578 [=====] - 0s 75us/step - loss: 77.8982 - mae: 7.
Epoch 43/70
578/578 [=====] - 0s 76us/step - loss: 67.2922 - mae: 6.
Epoch 44/70
578/578 [=====] - 0s 89us/step - loss: 64.4301 - mae: 6.
Epoch 45/70
578/578 [=====] - 0s 83us/step - loss: 59.8432 - mae: 6.
Epoch 46/70
578/578 [=====] - 0s 84us/step - loss: 58.6137 - mae: 6.
Epoch 47/70
578/578 [=====] - 0s 85us/step - loss: 53.8345 - mae: 5.
Epoch 48/70
578/578 [=====] - 0s 73us/step - loss: 52.7718 - mae: 5.
Epoch 49/70
578/578 [=====] - 0s 76us/step - loss: 51.4073 - mae: 5.
Epoch 50/70
```

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4/22/2020 AES.ipynb - Colaboratory
578/578 [=====] - 0s 80us/step - loss: 48.3079 - mae: 5.
Epoch 51/70
578/578 [=====] - 0s 77us/step - loss: 50.0370 - mae: 5.
Epoch 52/70
578/578 [=====] - 0s 76us/step - loss: 48.0324 - mae: 5.
Epoch 53/70
578/578 [=====] - 0s 83us/step - loss: 46.5156 - mae: 5.
Epoch 54/70
578/578 [=====] - 0s 89us/step - loss: 43.5837 - mae: 5.
Epoch 55/70
578/578 [=====] - 0s 86us/step - loss: 44.4083 - mae: 5.
Epoch 56/70
578/578 [=====] - 0s 87us/step - loss: 41.6020 - mae: 5.
Epoch 57/70
578/578 [=====] - 0s 76us/step - loss: 43.4771 - mae: 5.
Epoch 58/70
578/578 [=====] - 0s 75us/step - loss: 40.9194 - mae: 4.
Epoch 59/70
578/578 [=====] - 0s 75us/step - loss: 38.5028 - mae: 4.
Epoch 60/70
578/578 [=====] - 0s 82us/step - loss: 43.7287 - mae: 5.
Epoch 61/70
578/578 [=====] - 0s 89us/step - loss: 43.3867 - mae: 5.
Epoch 62/70
578/578 [=====] - 0s 95us/step - loss: 40.8326 - mae: 5.
Epoch 63/70
578/578 [=====] - 0s 81us/step - loss: 40.3433 - mae: 5.
Epoch 64/70
578/578 [=====] - 0s 82us/step - loss: 42.4680 - mae: 5.
Epoch 65/70
578/578 [=====] - 0s 78us/step - loss: 40.8462 - mae: 5.
Epoch 66/70
578/578 [=====] - 0s 73us/step - loss: 39.7901 - mae: 5.
Epoch 67/70
578/578 [=====] - 0s 74us/step - loss: 40.8556 - mae: 5.
Epoch 68/70
578/578 [=====] - 0s 82us/step - loss: 42.3022 - mae: 5.
Epoch 69/70
578/578 [=====] - 0s 91us/step - loss: 40.9853 - mae: 5.
Epoch 70/70
578/578 [=====] - 0s 81us/step - loss: 42.9814 - mae: 5.
Kappa Score: 0.0

-----Fold 2-----

Model: "sequential_1"
```

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129
Total params: 2 141 377		

total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

---

Epoch 1/70

578/578 [=====] - 1s 1ms/step - loss: 1191.1715 - mae: 3

Epoch 2/70

578/578 [=====] - 0s 77us/step - loss: 735.6563 - mae: 2

Epoch 3/70

578/578 [=====] - 0s 72us/step - loss: 636.1225 - mae: 2

Epoch 4/70

578/578 [=====] - 0s 74us/step - loss: 601.7304 - mae: 2

Epoch 5/70

578/578 [=====] - 0s 81us/step - loss: 575.5276 - mae: 2

Epoch 6/70

578/578 [=====] - 0s 76us/step - loss: 555.2905 - mae: 2

Epoch 7/70

578/578 [=====] - 0s 73us/step - loss: 524.2730 - mae: 2

Epoch 8/70

578/578 [=====] - 0s 71us/step - loss: 505.2588 - mae: 2

Epoch 9/70

578/578 [=====] - 0s 73us/step - loss: 483.7300 - mae: 2

Epoch 10/70

578/578 [=====] - 0s 85us/step - loss: 460.8423 - mae: 2

Epoch 11/70

578/578 [=====] - 0s 84us/step - loss: 439.5149 - mae: 2

Epoch 12/70

578/578 [=====] - 0s 86us/step - loss: 427.4323 - mae: 1

Epoch 13/70

578/578 [=====] - 0s 91us/step - loss: 412.3145 - mae: 1

Epoch 14/70

578/578 [=====] - 0s 88us/step - loss: 389.5568 - mae: 1

Epoch 15/70

578/578 [=====] - 0s 83us/step - loss: 368.7847 - mae: 1

Epoch 16/70

578/578 [=====] - 0s 89us/step - loss: 356.5981 - mae: 1

Epoch 17/70

578/578 [=====] - 0s 85us/step - loss: 337.2283 - mae: 1

Epoch 18/70

578/578 [=====] - 0s 79us/step - loss: 323.3888 - mae: 1

Epoch 19/70

578/578 [=====] - 0s 88us/step - loss: 305.6258 - mae: 1

Epoch 20/70

578/578 [=====] - 0s 92us/step - loss: 293.2276 - mae: 1

Epoch 21/70

578/578 [=====] - 0s 91us/step - loss: 279.3617 - mae: 1

Epoch 22/70

578/578 [=====] - 0s 79us/step - loss: 261.3748 - mae: 1

Epoch 23/70

578/578 [=====] - 0s 85us/step - loss: 248.0516 - mae: 1

Epoch 24/70

578/578 [=====] - 0s 89us/step - loss: 238.9140 - mae: 1

Epoch 25/70

578/578 [=====] - 0s 81us/step - loss: 223.1234 - mae: 1

Epoch 26/70

578/578 [=====] - 0s 87us/step - loss: 214.2530 - mae: 1

Epoch 27/70

578/578 [=====] - 0s 83us/step - loss: 200.2504 - mae: 1

```
Epoch 28/70
578/578 [=====] - 0s 83us/step - loss: 189.1510 - mae: 1
Epoch 29/70
578/578 [=====] - 0s 87us/step - loss: 176.1230 - mae: 1
Epoch 30/70
578/578 [=====] - 0s 88us/step - loss: 164.4684 - mae: 1
Epoch 31/70
578/578 [=====] - 0s 85us/step - loss: 156.2079 - mae: 1
Epoch 32/70
578/578 [=====] - 0s 83us/step - loss: 145.1245 - mae: 1
Epoch 33/70
578/578 [=====] - 0s 82us/step - loss: 136.4743 - mae: 1
Epoch 34/70
578/578 [=====] - 0s 86us/step - loss: 127.3889 - mae: 9
Epoch 35/70
578/578 [=====] - 0s 89us/step - loss: 121.2654 - mae: 9
Epoch 36/70
578/578 [=====] - 0s 89us/step - loss: 118.6858 - mae: 9
Epoch 37/70
578/578 [=====] - 0s 93us/step - loss: 106.7896 - mae: 8
Epoch 38/70
578/578 [=====] - 0s 84us/step - loss: 99.3831 - mae: 8.
Epoch 39/70
578/578 [=====] - 0s 91us/step - loss: 94.3261 - mae: 8.
Epoch 40/70
578/578 [=====] - 0s 77us/step - loss: 83.7236 - mae: 7.
Epoch 41/70
578/578 [=====] - 0s 81us/step - loss: 84.6207 - mae: 7.
Epoch 42/70
578/578 [=====] - 0s 91us/step - loss: 77.3888 - mae: 7.
Epoch 43/70
578/578 [=====] - 0s 82us/step - loss: 74.5202 - mae: 7.
Epoch 44/70
578/578 [=====] - 0s 92us/step - loss: 69.0443 - mae: 6.
Epoch 45/70
578/578 [=====] - 0s 72us/step - loss: 65.5198 - mae: 6.
Epoch 46/70
578/578 [=====] - 0s 70us/step - loss: 59.3141 - mae: 6.
Epoch 47/70
578/578 [=====] - 0s 75us/step - loss: 60.3908 - mae: 6.
Epoch 48/70
578/578 [=====] - 0s 74us/step - loss: 52.1887 - mae: 5.
Epoch 49/70
578/578 [=====] - 0s 73us/step - loss: 53.4858 - mae: 5.
Epoch 50/70
578/578 [=====] - 0s 77us/step - loss: 48.2988 - mae: 5.
Epoch 51/70
578/578 [=====] - 0s 83us/step - loss: 45.4348 - mae: 5.
Epoch 52/70
578/578 [=====] - 0s 80us/step - loss: 46.2300 - mae: 5.
Epoch 53/70
578/578 [=====] - 0s 86us/step - loss: 46.4040 - mae: 5.
Epoch 54/70
578/578 [=====] - 0s 90us/step - loss: 42.7702 - mae: 5.
Epoch 55/70
578/578 [=====] - 0s 92us/step - loss: 42.0158 - mae: 5.
Epoch 56/70
578/578 [=====] - 0s 76us/step - loss: 46.6887 - mae: 5.
```

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Epoch 57/70
578/578 [=====] - 0s 88us/step - loss: 39.5137 - mae: 4.
Epoch 58/70
578/578 [=====] - 0s 81us/step - loss: 44.1608 - mae: 5.
Epoch 59/70
578/578 [=====] - 0s 87us/step - loss: 41.9627 - mae: 5.
Epoch 60/70
578/578 [=====] - 0s 92us/step - loss: 46.0998 - mae: 5.
Epoch 61/70
578/578 [=====] - 0s 87us/step - loss: 43.6904 - mae: 5.
Epoch 62/70
578/578 [=====] - 0s 84us/step - loss: 39.8369 - mae: 5.
Epoch 63/70
578/578 [=====] - 0s 87us/step - loss: 42.5370 - mae: 5.
Epoch 64/70
578/578 [=====] - 0s 88us/step - loss: 42.6706 - mae: 5.
Epoch 65/70
578/578 [=====] - 0s 93us/step - loss: 42.5500 - mae: 5.
Epoch 66/70
578/578 [=====] - 0s 82us/step - loss: 43.5266 - mae: 5.
Epoch 67/70
578/578 [=====] - 0s 89us/step - loss: 44.1343 - mae: 5.
Epoch 68/70
578/578 [=====] - 0s 85us/step - loss: 41.9848 - mae: 5.
Epoch 69/70
578/578 [=====] - 0s 87us/step - loss: 44.8816 - mae: 5.
Epoch 70/70
578/578 [=====] - 0s 86us/step - loss: 40.4007 - mae: 5.
Kappa Score: 0.0

```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```

Epoch 1/70
578/578 [=====] - 1s 1ms/step - loss: 1202.0039 - mae: 3
Epoch 2/70
578/578 [=====] - 0s 88us/step - loss: 711.8186 - mae: 2
Epoch 3/70
578/578 [=====] - 0s 79us/step - loss: 612.0590 - mae: 2
Epoch 4/70
578/578 [=====] - 0s 84us/step - loss: 580.5466 - mae: 2
Epoch 5/70
578/578 [=====] - 0s 80us/step - loss: 550.9424 - mae: 2

```

```
Epoch 6/70
578/578 [=====] - 0s 83us/step - loss: 529.1214 - mae: 2
Epoch 7/70
578/578 [=====] - 0s 74us/step - loss: 500.9095 - mae: 2
Epoch 8/70
578/578 [=====] - 0s 74us/step - loss: 481.9394 - mae: 2
Epoch 9/70
578/578 [=====] - 0s 72us/step - loss: 467.8004 - mae: 2
Epoch 10/70
578/578 [=====] - 0s 75us/step - loss: 443.5226 - mae: 2
Epoch 11/70
578/578 [=====] - 0s 78us/step - loss: 423.6828 - mae: 1
Epoch 12/70
578/578 [=====] - 0s 81us/step - loss: 401.5423 - mae: 1
Epoch 13/70
578/578 [=====] - 0s 85us/step - loss: 391.2499 - mae: 1
Epoch 14/70
578/578 [=====] - 0s 83us/step - loss: 367.6163 - mae: 1
Epoch 15/70
578/578 [=====] - 0s 87us/step - loss: 351.5680 - mae: 1
Epoch 16/70
578/578 [=====] - 0s 83us/step - loss: 340.1702 - mae: 1
Epoch 17/70
578/578 [=====] - 0s 84us/step - loss: 321.1595 - mae: 1
Epoch 18/70
578/578 [=====] - 0s 87us/step - loss: 307.0517 - mae: 1
Epoch 19/70
578/578 [=====] - 0s 83us/step - loss: 290.3207 - mae: 1
Epoch 20/70
578/578 [=====] - 0s 86us/step - loss: 273.6432 - mae: 1
Epoch 21/70
578/578 [=====] - 0s 86us/step - loss: 265.0087 - mae: 1
Epoch 22/70
578/578 [=====] - 0s 80us/step - loss: 246.5244 - mae: 1
Epoch 23/70
578/578 [=====] - 0s 76us/step - loss: 239.9131 - mae: 1
Epoch 24/70
578/578 [=====] - 0s 76us/step - loss: 222.8087 - mae: 1
Epoch 25/70
578/578 [=====] - 0s 81us/step - loss: 213.4072 - mae: 1
Epoch 26/70
578/578 [=====] - 0s 83us/step - loss: 197.6861 - mae: 1
Epoch 27/70
578/578 [=====] - 0s 89us/step - loss: 186.9677 - mae: 1
Epoch 28/70
578/578 [=====] - 0s 94us/step - loss: 180.5058 - mae: 1
Epoch 29/70
578/578 [=====] - 0s 83us/step - loss: 168.6899 - mae: 1
Epoch 30/70
578/578 [=====] - 0s 86us/step - loss: 160.9449 - mae: 1
Epoch 31/70
578/578 [=====] - 0s 101us/step - loss: 149.1342 - mae:
Epoch 32/70
578/578 [=====] - 0s 86us/step - loss: 141.3026 - mae: 1
Epoch 33/70
578/578 [=====] - 0s 78us/step - loss: 129.0033 - mae: 9
Epoch 34/70
578/578 [=====] - 0s 72us/step - loss: 121.8724 - mae: 9
```



```
518/518 [=====] - 0s 13us/step - loss: 121.8724 - mae: 9
Epoch 35/70
578/578 [=====] - 0s 82us/step - loss: 115.6158 - mae: 9
Epoch 36/70
578/578 [=====] - 0s 89us/step - loss: 103.4753 - mae: 8
Epoch 37/70
578/578 [=====] - 0s 86us/step - loss: 100.5627 - mae: 8
Epoch 38/70
578/578 [=====] - 0s 89us/step - loss: 91.9472 - mae: 7.
Epoch 39/70
578/578 [=====] - 0s 83us/step - loss: 84.0925 - mae: 7.
Epoch 40/70
578/578 [=====] - 0s 80us/step - loss: 80.7923 - mae: 7.
Epoch 41/70
578/578 [=====] - 0s 78us/step - loss: 77.8156 - mae: 7.
Epoch 42/70
578/578 [=====] - 0s 73us/step - loss: 70.1506 - mae: 6.
Epoch 43/70
578/578 [=====] - 0s 70us/step - loss: 67.5735 - mae: 6.
Epoch 44/70
578/578 [=====] - 0s 71us/step - loss: 64.0294 - mae: 6.
Epoch 45/70
578/578 [=====] - 0s 72us/step - loss: 62.3896 - mae: 6.
Epoch 46/70
578/578 [=====] - 0s 75us/step - loss: 58.5589 - mae: 6.
Epoch 47/70
578/578 [=====] - 0s 72us/step - loss: 53.1953 - mae: 5.
Epoch 48/70
578/578 [=====] - 0s 71us/step - loss: 55.0341 - mae: 5.
Epoch 49/70
578/578 [=====] - 0s 72us/step - loss: 51.6851 - mae: 5.
Epoch 50/70
578/578 [=====] - 0s 79us/step - loss: 50.2752 - mae: 5.
Epoch 51/70
578/578 [=====] - 0s 80us/step - loss: 45.4532 - mae: 5.
Epoch 52/70
578/578 [=====] - 0s 91us/step - loss: 45.0785 - mae: 5.
Epoch 53/70
578/578 [=====] - 0s 82us/step - loss: 45.6242 - mae: 5.
Epoch 54/70
578/578 [=====] - 0s 72us/step - loss: 47.9324 - mae: 5.
Epoch 55/70
578/578 [=====] - 0s 73us/step - loss: 42.5413 - mae: 5.
Epoch 56/70
578/578 [=====] - 0s 71us/step - loss: 43.4870 - mae: 5.
Epoch 57/70
578/578 [=====] - 0s 79us/step - loss: 43.7793 - mae: 5.
Epoch 58/70
578/578 [=====] - 0s 77us/step - loss: 42.5083 - mae: 5.
Epoch 59/70
578/578 [=====] - 0s 75us/step - loss: 44.3913 - mae: 5.
Epoch 60/70
578/578 [=====] - 0s 73us/step - loss: 43.5474 - mae: 5.
Epoch 61/70
578/578 [=====] - 0s 71us/step - loss: 41.8640 - mae: 5.
Epoch 62/70
578/578 [=====] - 0s 72us/step - loss: 42.3795 - mae: 5.
Epoch 63/70
```

```

578/578 [=====] - 0s 73us/step - loss: 41.4779 - mae: 5.
Epoch 64/70
578/578 [=====] - 0s 72us/step - loss: 44.3141 - mae: 5.
Epoch 65/70
578/578 [=====] - 0s 72us/step - loss: 44.1765 - mae: 5.
Epoch 66/70
578/578 [=====] - 0s 73us/step - loss: 42.6559 - mae: 5.
Epoch 67/70
578/578 [=====] - 0s 74us/step - loss: 43.9086 - mae: 5.
Epoch 68/70
578/578 [=====] - 0s 71us/step - loss: 43.6065 - mae: 5.
Epoch 69/70
578/578 [=====] - 0s 71us/step - loss: 41.0955 - mae: 4.
Epoch 70/70
578/578 [=====] - 0s 72us/step - loss: 41.2432 - mae: 5.
Kappa Score: 0.0

```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

=====  
Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

```

Epoch 1/70
579/579 [=====] - 1s 1ms/step - loss: 1204.4582 - mae: 3
Epoch 2/70
579/579 [=====] - 0s 76us/step - loss: 740.8047 - mae: 2
Epoch 3/70
579/579 [=====] - 0s 81us/step - loss: 643.7075 - mae: 2
Epoch 4/70
579/579 [=====] - 0s 77us/step - loss: 603.6456 - mae: 2
Epoch 5/70
579/579 [=====] - 0s 73us/step - loss: 583.7104 - mae: 2
Epoch 6/70
579/579 [=====] - 0s 73us/step - loss: 551.2823 - mae: 2
Epoch 7/70
579/579 [=====] - 0s 83us/step - loss: 531.7961 - mae: 2
Epoch 8/70
579/579 [=====] - 0s 81us/step - loss: 509.1969 - mae: 2
Epoch 9/70
579/579 [=====] - 0s 79us/step - loss: 493.8273 - mae: 2
Epoch 10/70
579/579 [=====] - 0s 90us/step - loss: 468.5958 - mae: 2
Epoch 11/70
579/579 [=====] - 0s 79us/step - loss: 445.5815 - mae: 2
Epoch 12/70

```

```
579/579 [=====] - 0s 89us/step - loss: 431.0457 - mae: 1
Epoch 13/70
579/579 [=====] - 0s 83us/step - loss: 412.0790 - mae: 1
Epoch 14/70
579/579 [=====] - 0s 83us/step - loss: 393.0448 - mae: 1
Epoch 15/70
579/579 [=====] - 0s 86us/step - loss: 378.4963 - mae: 1
Epoch 16/70
579/579 [=====] - 0s 85us/step - loss: 359.5450 - mae: 1
Epoch 17/70
579/579 [=====] - 0s 87us/step - loss: 341.4138 - mae: 1
Epoch 18/70
579/579 [=====] - 0s 84us/step - loss: 329.4165 - mae: 1
Epoch 19/70
579/579 [=====] - 0s 80us/step - loss: 311.6562 - mae: 1
Epoch 20/70
579/579 [=====] - 0s 74us/step - loss: 298.0238 - mae: 1
Epoch 21/70
579/579 [=====] - 0s 74us/step - loss: 281.2201 - mae: 1
Epoch 22/70
579/579 [=====] - 0s 72us/step - loss: 264.9297 - mae: 1
Epoch 23/70
579/579 [=====] - 0s 79us/step - loss: 256.2683 - mae: 1
Epoch 24/70
579/579 [=====] - 0s 75us/step - loss: 241.3186 - mae: 1
Epoch 25/70
579/579 [=====] - 0s 76us/step - loss: 229.3941 - mae: 1
Epoch 26/70
579/579 [=====] - 0s 72us/step - loss: 220.9733 - mae: 1
Epoch 27/70
579/579 [=====] - 0s 76us/step - loss: 199.6678 - mae: 1
Epoch 28/70
579/579 [=====] - 0s 70us/step - loss: 193.1116 - mae: 1
Epoch 29/70
579/579 [=====] - 0s 72us/step - loss: 181.1142 - mae: 1
Epoch 30/70
579/579 [=====] - 0s 75us/step - loss: 171.5885 - mae: 1
Epoch 31/70
579/579 [=====] - 0s 74us/step - loss: 163.8755 - mae: 1
Epoch 32/70
579/579 [=====] - 0s 72us/step - loss: 150.0301 - mae: 1
Epoch 33/70
579/579 [=====] - 0s 73us/step - loss: 140.0154 - mae: 1
Epoch 34/70
579/579 [=====] - 0s 75us/step - loss: 134.0912 - mae: 1
Epoch 35/70
579/579 [=====] - 0s 77us/step - loss: 126.1285 - mae: 9
Epoch 36/70
579/579 [=====] - 0s 76us/step - loss: 115.6659 - mae: 9
Epoch 37/70
579/579 [=====] - 0s 80us/step - loss: 115.2864 - mae: 9
Epoch 38/70
579/579 [=====] - 0s 82us/step - loss: 105.1546 - mae: 8
Epoch 39/70
579/579 [=====] - 0s 70us/step - loss: 97.3701 - mae: 8.
Epoch 40/70
579/579 [=====] - 0s 72us/step - loss: 93.4220 - mae: 8.
Epoch 41/70
```

```
Epoch 41/70
579/579 [=====] - 0s 76us/step - loss: 85.2363 - mae: 7.
Epoch 42/70
579/579 [=====] - 0s 76us/step - loss: 79.5201 - mae: 7.
Epoch 43/70
579/579 [=====] - 0s 74us/step - loss: 76.1987 - mae: 7.
Epoch 44/70
579/579 [=====] - 0s 71us/step - loss: 72.0848 - mae: 6.
Epoch 45/70
579/579 [=====] - 0s 71us/step - loss: 62.9934 - mae: 6.
Epoch 46/70
579/579 [=====] - 0s 76us/step - loss: 63.9080 - mae: 6.
Epoch 47/70
579/579 [=====] - 0s 81us/step - loss: 60.3155 - mae: 6.
Epoch 48/70
579/579 [=====] - 0s 73us/step - loss: 56.9997 - mae: 5.
Epoch 49/70
579/579 [=====] - 0s 83us/step - loss: 54.8041 - mae: 5.
Epoch 50/70
579/579 [=====] - 0s 82us/step - loss: 56.7869 - mae: 5.
Epoch 51/70
579/579 [=====] - 0s 83us/step - loss: 50.6521 - mae: 5.
Epoch 52/70
579/579 [=====] - 0s 82us/step - loss: 48.8787 - mae: 5.
Epoch 53/70
579/579 [=====] - 0s 85us/step - loss: 48.1083 - mae: 5.
Epoch 54/70
579/579 [=====] - 0s 82us/step - loss: 47.9048 - mae: 5.
Epoch 55/70
579/579 [=====] - 0s 82us/step - loss: 48.1147 - mae: 5.
Epoch 56/70
579/579 [=====] - 0s 82us/step - loss: 44.5238 - mae: 5.
Epoch 57/70
579/579 [=====] - 0s 88us/step - loss: 48.4562 - mae: 5.
Epoch 58/70
579/579 [=====] - 0s 85us/step - loss: 46.8676 - mae: 5.
Epoch 59/70
579/579 [=====] - 0s 94us/step - loss: 46.4062 - mae: 5.
Epoch 60/70
579/579 [=====] - 0s 83us/step - loss: 45.1480 - mae: 5.
Epoch 61/70
579/579 [=====] - 0s 83us/step - loss: 45.0443 - mae: 5.
Epoch 62/70
579/579 [=====] - 0s 82us/step - loss: 49.0765 - mae: 5.
Epoch 63/70
579/579 [=====] - 0s 75us/step - loss: 46.9039 - mae: 5.
Epoch 64/70
579/579 [=====] - 0s 72us/step - loss: 43.9431 - mae: 5.
Epoch 65/70
579/579 [=====] - 0s 71us/step - loss: 43.5803 - mae: 5.
Epoch 66/70
579/579 [=====] - 0s 78us/step - loss: 45.4141 - mae: 5.
Epoch 67/70
579/579 [=====] - 0s 72us/step - loss: 45.2619 - mae: 5.
Epoch 68/70
579/579 [=====] - 0s 76us/step - loss: 46.4706 - mae: 5.
Epoch 69/70
579/579 [=====] - 0s 81us/step - loss: 46.5446 - mae: 5.
```

Epoch 70/70

579/579 [=====] - 0s 81us/step - loss: 45.8767 - mae: 5.

Kappa Score: 0.0

-----Fold 5-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 1, 400)	1870400
lstm_2 (LSTM)	(None, 128)	270848
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 1)	129

Total params: 2,141,377

Trainable params: 2,141,377

Non-trainable params: 0

Epoch 1/70

579/579 [=====] - 1s 995us/step - loss: 1185.0375 - mae:

Epoch 2/70

579/579 [=====] - 0s 72us/step - loss: 685.4121 - mae: 2

Epoch 3/70

579/579 [=====] - 0s 74us/step - loss: 592.5646 - mae: 2

Epoch 4/70

579/579 [=====] - 0s 85us/step - loss: 557.4500 - mae: 2

Epoch 5/70

579/579 [=====] - 0s 82us/step - loss: 527.5605 - mae: 2

Epoch 6/70

579/579 [=====] - 0s 73us/step - loss: 501.2163 - mae: 2

Epoch 7/70

579/579 [=====] - 0s 70us/step - loss: 484.0232 - mae: 2

Epoch 8/70

579/579 [=====] - 0s 73us/step - loss: 461.4978 - mae: 2

Epoch 9/70

579/579 [=====] - 0s 75us/step - loss: 439.5317 - mae: 2

Epoch 10/70

579/579 [=====] - 0s 76us/step - loss: 425.7037 - mae: 1

Epoch 11/70

579/579 [=====] - 0s 76us/step - loss: 405.6068 - mae: 1

Epoch 12/70

579/579 [=====] - 0s 72us/step - loss: 389.0638 - mae: 1

Epoch 13/70

579/579 [=====] - 0s 69us/step - loss: 365.8889 - mae: 1

Epoch 14/70

579/579 [=====] - 0s 73us/step - loss: 349.2948 - mae: 1

Epoch 15/70

579/579 [=====] - 0s 75us/step - loss: 340.0767 - mae: 1

Epoch 16/70

579/579 [=====] - 0s 72us/step - loss: 318.2787 - mae: 1

Epoch 17/70

579/579 [=====] - 0s 72us/step - loss: 303.0926 - mae: 1

Epoch 18/70

579/579 [=====] - 0s 72us/step - loss: 293.6195 - mae: 1

```
Epoch 19/70
579/579 [=====] - 0s 74us/step - loss: 275.2327 - mae: 1
Epoch 20/70
579/579 [=====] - 0s 74us/step - loss: 263.4304 - mae: 1
Epoch 21/70
579/579 [=====] - 0s 86us/step - loss: 249.0024 - mae: 1
Epoch 22/70
579/579 [=====] - 0s 83us/step - loss: 235.5689 - mae: 1
Epoch 23/70
579/579 [=====] - 0s 79us/step - loss: 221.3038 - mae: 1
Epoch 24/70
579/579 [=====] - 0s 73us/step - loss: 210.1026 - mae: 1
Epoch 25/70
579/579 [=====] - 0s 81us/step - loss: 197.2198 - mae: 1
Epoch 26/70
579/579 [=====] - 0s 75us/step - loss: 185.4160 - mae: 1
Epoch 27/70
579/579 [=====] - 0s 72us/step - loss: 177.2279 - mae: 1
Epoch 28/70
579/579 [=====] - 0s 71us/step - loss: 170.5269 - mae: 1
Epoch 29/70
579/579 [=====] - 0s 73us/step - loss: 155.9194 - mae: 1
Epoch 30/70
579/579 [=====] - 0s 68us/step - loss: 150.6679 - mae: 1
Epoch 31/70
579/579 [=====] - 0s 75us/step - loss: 141.8363 - mae: 1
Epoch 32/70
579/579 [=====] - 0s 72us/step - loss: 129.6448 - mae: 9
Epoch 33/70
579/579 [=====] - 0s 76us/step - loss: 123.4674 - mae: 9
Epoch 34/70
579/579 [=====] - 0s 72us/step - loss: 115.2782 - mae: 9
Epoch 35/70
579/579 [=====] - 0s 70us/step - loss: 108.9401 - mae: 8
Epoch 36/70
579/579 [=====] - 0s 71us/step - loss: 103.1874 - mae: 8
Epoch 37/70
579/579 [=====] - 0s 74us/step - loss: 96.2505 - mae: 8.
Epoch 38/70
579/579 [=====] - 0s 72us/step - loss: 89.4589 - mae: 7.
Epoch 39/70
579/579 [=====] - 0s 71us/step - loss: 85.1374 - mae: 7.
Epoch 40/70
579/579 [=====] - 0s 71us/step - loss: 75.1123 - mae: 7.
Epoch 41/70
579/579 [=====] - 0s 76us/step - loss: 72.8101 - mae: 6.
Epoch 42/70
579/579 [=====] - 0s 70us/step - loss: 66.5119 - mae: 6.
Epoch 43/70
579/579 [=====] - 0s 72us/step - loss: 63.6755 - mae: 6.
Epoch 44/70
579/579 [=====] - 0s 82us/step - loss: 60.8156 - mae: 6.
Epoch 45/70
579/579 [=====] - 0s 71us/step - loss: 58.9088 - mae: 6.
Epoch 46/70
579/579 [=====] - 0s 73us/step - loss: 56.1843 - mae: 5.
Epoch 47/70
579/579 [=====] - 0s 72us/step - loss: 50.3548 - mae: 5.
```

```
Epoch 48/70
579/579 [=====] - 0s 81us/step - loss: 51.9399 - mae: 5.
Epoch 49/70
579/579 [=====] - 0s 86us/step - loss: 51.8343 - mae: 5.
Epoch 50/70
579/579 [=====] - 0s 87us/step - loss: 48.3234 - mae: 5.
Epoch 51/70
579/579 [=====] - 0s 92us/step - loss: 47.7408 - mae: 5.
Epoch 52/70
579/579 [=====] - 0s 83us/step - loss: 50.8935 - mae: 5.
Epoch 53/70
579/579 [=====] - 0s 80us/step - loss: 48.6179 - mae: 5.
Epoch 54/70
579/579 [=====] - 0s 87us/step - loss: 44.9046 - mae: 5.
Epoch 55/70
579/579 [=====] - 0s 89us/step - loss: 47.2143 - mae: 5.
Epoch 56/70
579/579 [=====] - 0s 83us/step - loss: 46.2415 - mae: 5.
Epoch 57/70
579/579 [=====] - 0s 74us/step - loss: 47.9454 - mae: 5.
Epoch 58/70
579/579 [=====] - 0s 84us/step - loss: 49.0345 - mae: 5.
Epoch 59/70
579/579 [=====] - 0s 84us/step - loss: 45.1527 - mae: 5.
Epoch 60/70
579/579 [=====] - 0s 85us/step - loss: 44.2163 - mae: 5.
Epoch 61/70
579/579 [=====] - 0s 85us/step - loss: 46.7907 - mae: 5.
Epoch 62/70
579/579 [=====] - 0s 85us/step - loss: 49.1745 - mae: 5.
Epoch 63/70
579/579 [=====] - 0s 80us/step - loss: 45.3533 - mae: 5.
Epoch 64/70
579/579 [=====] - 0s 73us/step - loss: 48.7331 - mae: 5.
Epoch 65/70
579/579 [=====] - 0s 75us/step - loss: 44.8017 - mae: 5.
Epoch 66/70
579/579 [=====] - 0s 77us/step - loss: 41.3218 - mae: 5.
Epoch 67/70
579/579 [=====] - 0s 82us/step - loss: 46.7084 - mae: 5.
Epoch 68/70
579/579 [=====] - 0s 92us/step - loss: 44.2503 - mae: 5.
Epoch 69/70
579/579 [=====] - 0s 80us/step - loss: 45.4610 - mae: 5.
Epoch 70/70
579/579 [=====] - 0s 91us/step - loss: 46.0377 - mae: 5.
Kappa Score: 0.0
Average kappa score value is : 0.0
```





Below we will run for whole dataset using BERT but using CNN, which didnt performed so well.

```
# For whole dataset
import time
import torch
import transformers as ppb
import warnings
warnings.filterwarnings('ignore')
cv = KFold(n_splits=5, shuffle=True)
# X = set8
# y = set8['domain1_score']
X= data
y = data['domain1_score']
cv_data = cv.split(X)
results = []
prediction_list = []
fold_count =1
# use_cuda = True
# if use_cuda and torch.cuda.is_available():
#     torch.cuda()
# Hyperparameters for LSTM
```

```

Hidden_dim1=300
Hidden_dim2=100
return_sequences = True
dropout=0.5
recurrent_dropout=0.4
input_size=768
activation='relu'
bidirectional = True
batch_size = 64
epoch = 100
#####
cuda = torch.device('cuda')
# For DistilBERT:
model_class, tokenizer_class, pretrained_weights = (ppb.DistilBertModel, ppb.DistilB
## Want BERT instead of distilBERT? Uncomment the following line:
##model_class, tokenizer_class, pretrained_weights = (ppb.BertModel, ppb.BertTokeniz
# Load pretrained model/tokenizer
tokenizer = tokenizer_class.from_pretrained(pretrained_weights)
model = model_class.from_pretrained(pretrained_weights)
with torch.cuda.device(cuda):
    for traincv, testcv in cv_data:
        torch.cuda.empty_cache()
        print("\n-----Fold {}-----\n".format(fold_count))
        # get the train and test from the dataset.
        X_train, X_test, y_train, y_test = X.iloc[traincv], X.iloc[testcv], y.iloc[traincv], y.iloc[testcv]
        train_essays = X_train['essay']
        #print("y_train",y_train)
        test_essays = X_test['essay']
        # model = model.cuda()
        #y_train = torch.tensor(y_train, dtype=torch.long)
        sentences = []
        tokenize_sentences = []
        train_bert_embeddings = []
        #bert_embedding = BertEmbedding()
        # for essay in train_essays:
        #     # get all the sentences from the essay
        #     sentences += essay_to_sentences(essay, remove_stopwords = True)
        # sentences = pd.Series(sentences)
        # print(train_essays)
        tokenized_train = train_essays.apply((lambda x: tokenizer.encode(x, add_special_tokens=True)))
        tokenized_test = test_essays.apply((lambda x: tokenizer.encode(x, add_special_tokens=True)))

        ## train
        max_len = 0
        for i in tokenized_train.values:
            if len(i) > max_len:
                max_len = len(i)
        padded_train = np.array([i + [0]*(max_len-len(i)) for i in tokenized_train.values])
        attention_mask_train = np.where(padded_train != 0, 1, 0)

```

```

train_input_ids = torch.tensor(padded_train)
train_attention_mask = torch.tensor(attention_mask_train)
with torch.no_grad():
    last_hidden_states_train = model(train_input_ids, attention_mask=train_attenti

train_features = last_hidden_states_train[0][:,0,:].numpy()

## test
max_len = 0
for i in tokenized_test.values:
    if len(i) > max_len:
        max_len = len(i)
padded_test = np.array([i + [0]*(max_len-len(i)) for i in tokenized_test.values])
attention_mask_test = np.where(padded_test != 0, 1, 0)
test_input_ids = torch.tensor(padded_test)
test_attention_mask = torch.tensor(attention_mask_test)

with torch.no_grad():
    last_hidden_states_test = model(test_input_ids, attention_mask=test_attention_

test_features = last_hidden_states_test[0][:,0,:].numpy()
train_x,train_y = train_features.shape
test_x,test_y = test_features.shape
trainDataVectors = np.reshape(train_features,(train_x,1,train_y))
testDataVectors = np.reshape(test_features,(test_x,1,test_y))
# print(trainDataVectors)
# print(testDataVectors)
# trainDataVectors = np.reshape(train_features,(train_x,train_y,1))
# testDataVectors = np.reshape(test_features,(test_x,test_y,1))
trainDataVectors = np.reshape(train_features,(train_x,1, train_y))
testDataVectors = np.reshape(test_features,(test_x,1, test_y))
# lstm_model = get_model_CNN(bidirectional=False, output_dims = 1)
lstm_model = get_model(Hidden_dim1=Hidden_dim1, Hidden_dim2=Hidden_dim2, return_
                        dropout=dropout, recurrent_dropout=recurrent_dropout, ir
                        activation=activation, bidirectional=bidirectional)
history = lstm_model.fit(trainDataVectors, y_train, batch_size=batch_size, epoch
plot_accuracy_curve(history)
y_pred = lstm_model.predict(testDataVectors)
y_pred = np.around(y_pred)
#y_pred.dropna()
np.nan_to_num(y_pred)
# evaluate the model
print(y_pred)
result = cohen_kappa_score(y_test.values,y_pred,weights='quadratic')
print("Kappa Score: {}".format(result))
results.append(result)
fold_count +=1

```

```
import tensorflow as tf
tf.keras.backend.clear_session()
print("Average kappa score value is : {}".format(np.mean(np.asarray(results))))
# print(features.shape)
```



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232k/232k [00:00&lt;00:00, 637kB/s]

Downloading: 100%

546/546 [00:10&lt;00:00, 54.6B/s]

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-----Fold 1-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
bidirectional_1 (Bidirection (None, 1, 600))		2565600
bidirectional_2 (Bidirection (None, 200))		560800
dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201

Total params: 3,126,601

Trainable params: 3,126,601

Non-trainable params: 0

```

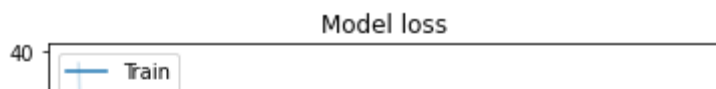
Epoch 1/100
10380/10380 [=====] - 5s 527us/step - loss: 38.7916 - ma
Epoch 2/100
10380/10380 [=====] - 4s 357us/step - loss: 22.0969 - ma
Epoch 3/100
10380/10380 [=====] - 4s 356us/step - loss: 17.4283 - ma
Epoch 4/100
10380/10380 [=====] - 4s 359us/step - loss: 15.5538 - ma
Epoch 5/100
10380/10380 [=====] - 4s 358us/step - loss: 14.6807 - ma
Epoch 6/100
10380/10380 [=====] - 4s 356us/step - loss: 13.4226 - ma
Epoch 7/100
10380/10380 [=====] - 4s 358us/step - loss: 12.3005 - ma
Epoch 8/100
10380/10380 [=====] - 4s 360us/step - loss: 12.7113 - ma
Epoch 9/100
10380/10380 [=====] - 4s 358us/step - loss: 12.0533 - ma
Epoch 10/100
10380/10380 [=====] - 4s 366us/step - loss: 11.3159 - ma
Epoch 11/100
10380/10380 [=====] - 4s 374us/step - loss: 10.8341 - ma
Epoch 12/100
10380/10380 [=====] - 4s 374us/step - loss: 11.5664 - ma
Epoch 13/100
10380/10380 [=====] - 4s 363us/step - loss: 10.2840 - ma
Epoch 14/100
10380/10380 [=====] - 4s 358us/step - loss: 10.0865 - ma
Epoch 15/100
10380/10380 [=====] - 4s 356us/step - loss: 10.5288 - ma

```

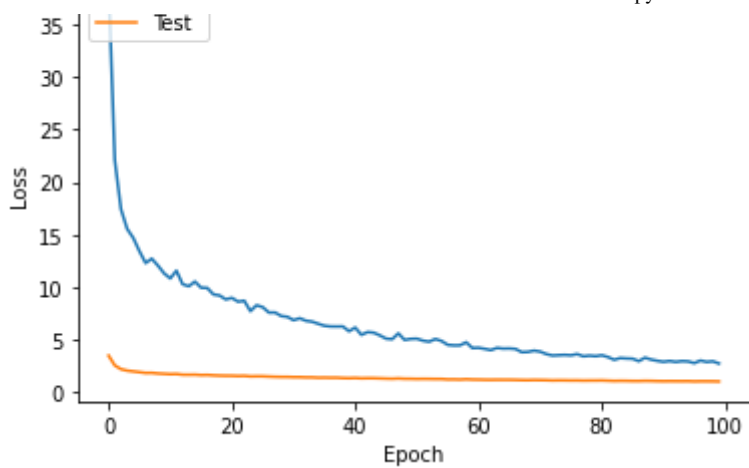
```
Epoch 16/100
10380/10380 [=====] - 4s 356us/step - loss: 9.9496 - mae
Epoch 17/100
10380/10380 [=====] - 4s 358us/step - loss: 9.9237 - mae
Epoch 18/100
10380/10380 [=====] - 4s 359us/step - loss: 9.3109 - mae
Epoch 19/100
10380/10380 [=====] - 4s 358us/step - loss: 9.2093 - mae
Epoch 20/100
10380/10380 [=====] - 4s 358us/step - loss: 8.8354 - mae
Epoch 21/100
10380/10380 [=====] - 4s 360us/step - loss: 8.9773 - mae
Epoch 22/100
10380/10380 [=====] - 4s 357us/step - loss: 8.6178 - mae
Epoch 23/100
10380/10380 [=====] - 4s 359us/step - loss: 8.7058 - mae
Epoch 24/100
10380/10380 [=====] - 4s 356us/step - loss: 7.7188 - mae
Epoch 25/100
10380/10380 [=====] - 4s 359us/step - loss: 8.2809 - mae
Epoch 26/100
10380/10380 [=====] - 4s 356us/step - loss: 8.0956 - mae
Epoch 27/100
10380/10380 [=====] - 4s 357us/step - loss: 7.5806 - mae
Epoch 28/100
10380/10380 [=====] - 4s 357us/step - loss: 7.5882 - mae
Epoch 29/100
10380/10380 [=====] - 4s 356us/step - loss: 7.2521 - mae
Epoch 30/100
10380/10380 [=====] - 4s 360us/step - loss: 7.1751 - mae
Epoch 31/100
10380/10380 [=====] - 4s 357us/step - loss: 6.8585 - mae
Epoch 32/100
10380/10380 [=====] - 4s 360us/step - loss: 7.0416 - mae
Epoch 33/100
10380/10380 [=====] - 4s 358us/step - loss: 6.8033 - mae
Epoch 34/100
10380/10380 [=====] - 4s 359us/step - loss: 6.7174 - mae
Epoch 35/100
10380/10380 [=====] - 4s 360us/step - loss: 6.5165 - mae
Epoch 36/100
10380/10380 [=====] - 4s 361us/step - loss: 6.3266 - mae
Epoch 37/100
10380/10380 [=====] - 4s 358us/step - loss: 6.2617 - mae
Epoch 38/100
10380/10380 [=====] - 4s 360us/step - loss: 6.2561 - mae
Epoch 39/100
10380/10380 [=====] - 4s 362us/step - loss: 6.2620 - mae
Epoch 40/100
10380/10380 [=====] - 4s 359us/step - loss: 5.8031 - mae
Epoch 41/100
10380/10380 [=====] - 4s 358us/step - loss: 6.1580 - mae
Epoch 42/100
10380/10380 [=====] - 4s 360us/step - loss: 5.4604 - mae
Epoch 43/100
10380/10380 [=====] - 4s 359us/step - loss: 5.7241 - mae
Epoch 44/100
10380/10380 [=====] - 4s 358us/step - loss: 5.6604 - mae
```

```
10380/10380 [=====] - 4s 358us/step - loss: 5.6694 - mae
Epoch 45/100
10380/10380 [=====] - 4s 361us/step - loss: 5.4091 - mae
Epoch 46/100
10380/10380 [=====] - 4s 359us/step - loss: 5.0996 - mae
Epoch 47/100
10380/10380 [=====] - 4s 364us/step - loss: 5.0487 - mae
Epoch 48/100
10380/10380 [=====] - 4s 364us/step - loss: 5.6042 - mae
Epoch 49/100
10380/10380 [=====] - 4s 362us/step - loss: 4.9798 - mae
Epoch 50/100
10380/10380 [=====] - 4s 362us/step - loss: 5.0740 - mae
Epoch 51/100
10380/10380 [=====] - 4s 362us/step - loss: 5.0981 - mae
Epoch 52/100
10380/10380 [=====] - 4s 361us/step - loss: 4.9043 - mae
Epoch 53/100
10380/10380 [=====] - 4s 357us/step - loss: 4.8098 - mae
Epoch 54/100
10380/10380 [=====] - 4s 356us/step - loss: 5.0636 - mae
Epoch 55/100
10380/10380 [=====] - 4s 358us/step - loss: 4.8785 - mae
Epoch 56/100
10380/10380 [=====] - 4s 358us/step - loss: 4.5100 - mae
Epoch 57/100
10380/10380 [=====] - 4s 361us/step - loss: 4.4574 - mae
Epoch 58/100
10380/10380 [=====] - 4s 359us/step - loss: 4.4646 - mae
Epoch 59/100
10380/10380 [=====] - 4s 358us/step - loss: 4.7527 - mae
Epoch 60/100
10380/10380 [=====] - 4s 357us/step - loss: 4.2056 - mae
Epoch 61/100
10380/10380 [=====] - 4s 358us/step - loss: 4.2293 - mae
Epoch 62/100
10380/10380 [=====] - 4s 359us/step - loss: 4.1281 - mae
Epoch 63/100
10380/10380 [=====] - 4s 355us/step - loss: 4.0107 - mae
Epoch 64/100
10380/10380 [=====] - 4s 356us/step - loss: 4.2170 - mae
Epoch 65/100
10380/10380 [=====] - 4s 360us/step - loss: 4.1511 - mae
Epoch 66/100
10380/10380 [=====] - 4s 374us/step - loss: 4.1650 - mae
Epoch 67/100
10380/10380 [=====] - 4s 359us/step - loss: 4.1206 - mae
Epoch 68/100
10380/10380 [=====] - 4s 357us/step - loss: 3.8137 - mae
Epoch 69/100
10380/10380 [=====] - 4s 358us/step - loss: 3.8357 - mae
Epoch 70/100
10380/10380 [=====] - 4s 356us/step - loss: 3.9575 - mae
Epoch 71/100
10380/10380 [=====] - 4s 356us/step - loss: 3.8658 - mae
Epoch 72/100
10380/10380 [=====] - 4s 354us/step - loss: 3.6315 - mae
Epoch 73/100
```

```
10380/10380 [=====] - 4s 356us/step - loss: 3.4945 - mae
Epoch 74/100
10380/10380 [=====] - 4s 358us/step - loss: 3.5255 - mae
Epoch 75/100
10380/10380 [=====] - 4s 356us/step - loss: 3.5523 - mae
Epoch 76/100
10380/10380 [=====] - 4s 357us/step - loss: 3.5153 - mae
Epoch 77/100
10380/10380 [=====] - 4s 354us/step - loss: 3.6264 - mae
Epoch 78/100
10380/10380 [=====] - 4s 358us/step - loss: 3.4205 - mae
Epoch 79/100
10380/10380 [=====] - 4s 356us/step - loss: 3.4818 - mae
Epoch 80/100
10380/10380 [=====] - 4s 356us/step - loss: 3.4326 - mae
Epoch 81/100
10380/10380 [=====] - 4s 355us/step - loss: 3.5168 - mae
Epoch 82/100
10380/10380 [=====] - 4s 359us/step - loss: 3.3482 - mae
Epoch 83/100
10380/10380 [=====] - 4s 357us/step - loss: 3.0891 - mae
Epoch 84/100
10380/10380 [=====] - 4s 359us/step - loss: 3.2513 - mae
Epoch 85/100
10380/10380 [=====] - 4s 358us/step - loss: 3.2118 - mae
Epoch 86/100
10380/10380 [=====] - 4s 357us/step - loss: 3.1906 - mae
Epoch 87/100
10380/10380 [=====] - 4s 358us/step - loss: 2.9543 - mae
Epoch 88/100
10380/10380 [=====] - 4s 356us/step - loss: 3.2884 - mae
Epoch 89/100
10380/10380 [=====] - 4s 360us/step - loss: 3.1070 - mae
Epoch 90/100
10380/10380 [=====] - 4s 357us/step - loss: 2.9863 - mae
Epoch 91/100
10380/10380 [=====] - 4s 358us/step - loss: 2.8963 - mae
Epoch 92/100
10380/10380 [=====] - 4s 352us/step - loss: 2.9678 - mae
Epoch 93/100
10380/10380 [=====] - 4s 357us/step - loss: 2.8861 - mae
Epoch 94/100
10380/10380 [=====] - 4s 369us/step - loss: 2.9575 - mae
Epoch 95/100
10380/10380 [=====] - 4s 371us/step - loss: 2.9308 - mae
Epoch 96/100
10380/10380 [=====] - 4s 368us/step - loss: 2.7712 - mae
Epoch 97/100
10380/10380 [=====] - 4s 356us/step - loss: 3.0125 - mae
Epoch 98/100
10380/10380 [=====] - 4s 356us/step - loss: 2.8847 - mae
Epoch 99/100
10380/10380 [=====] - 4s 358us/step - loss: 2.9411 - mae
Epoch 100/100
10380/10380 [=====] - 4s 357us/step - loss: 2.7340 - mae
```







```
[[ 9.]
 [ 8.]
 [ 9.]
 ...
 [38.]
 [29.]
 [38.]]
```

Kappa Score: 0.9239790570710182

-----Fold 2-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
bidirectional_1 (Bidirection (None, 1, 600))		2565600
bidirectional_2 (Bidirection (None, 200))		560800
dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201
Total params: 3,126,601		
Trainable params: 3,126,601		
Non-trainable params: 0		

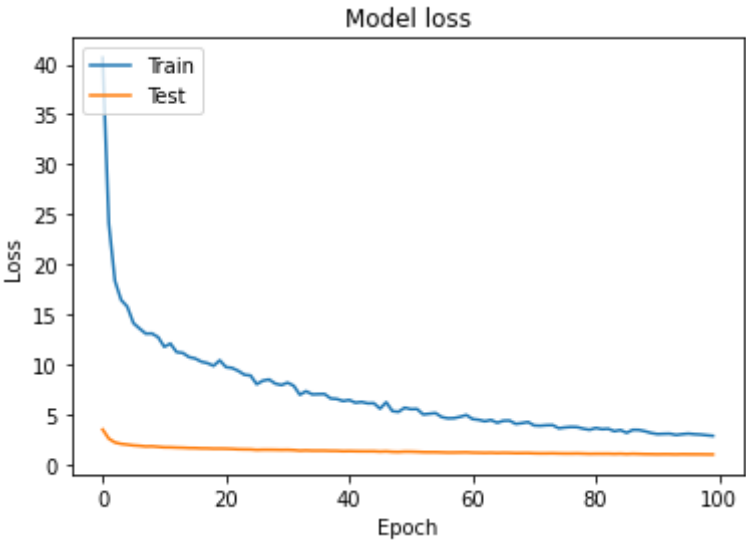
```
Epoch 1/100
10381/10381 [=====] - 5s 522us/step - loss: 40.6611 - ma
Epoch 2/100
10381/10381 [=====] - 4s 358us/step - loss: 24.1281 - ma
Epoch 3/100
10381/10381 [=====] - 4s 361us/step - loss: 18.3711 - ma
Epoch 4/100
10381/10381 [=====] - 4s 363us/step - loss: 16.4785 - ma
Epoch 5/100
10381/10381 [=====] - 4s 359us/step - loss: 15.8061 - ma
Epoch 6/100
10381/10381 [=====] - 4s 361us/step - loss: 14.1607 - ma
Epoch 7/100
10381/10381 [=====] - 4s 363us/step - loss: 13.6180 - ma
Epoch 8/100
10381/10381 [=====] - 4s 361us/step - loss: 13.1178 - ma
Epoch 9/100
```

```
10381/10381 [=====] - 4s 363us/step - loss: 13.1294 - ma
Epoch 10/100
10381/10381 [=====] - 4s 362us/step - loss: 12.7645 - ma
Epoch 11/100
10381/10381 [=====] - 4s 363us/step - loss: 11.8066 - ma
Epoch 12/100
10381/10381 [=====] - 4s 361us/step - loss: 12.1167 - ma
Epoch 13/100
10381/10381 [=====] - 4s 360us/step - loss: 11.2759 - ma
Epoch 14/100
10381/10381 [=====] - 4s 361us/step - loss: 11.1895 - ma
Epoch 15/100
10381/10381 [=====] - 4s 362us/step - loss: 10.7815 - ma
Epoch 16/100
10381/10381 [=====] - 4s 364us/step - loss: 10.6376 - ma
Epoch 17/100
10381/10381 [=====] - 4s 362us/step - loss: 10.3208 - ma
Epoch 18/100
10381/10381 [=====] - 4s 363us/step - loss: 10.1713 - ma
Epoch 19/100
10381/10381 [=====] - 4s 367us/step - loss: 9.9038 - mae
Epoch 20/100
10381/10381 [=====] - 4s 363us/step - loss: 10.4521 - ma
Epoch 21/100
10381/10381 [=====] - 4s 363us/step - loss: 9.7778 - mae
Epoch 22/100
10381/10381 [=====] - 4s 364us/step - loss: 9.6895 - mae
Epoch 23/100
10381/10381 [=====] - 4s 365us/step - loss: 9.4016 - mae
Epoch 24/100
10381/10381 [=====] - 4s 366us/step - loss: 9.0128 - mae
Epoch 25/100
10381/10381 [=====] - 4s 366us/step - loss: 8.9367 - mae
Epoch 26/100
10381/10381 [=====] - 4s 370us/step - loss: 8.0660 - mae
Epoch 27/100
10381/10381 [=====] - 4s 369us/step - loss: 8.4217 - mae
Epoch 28/100
10381/10381 [=====] - 4s 369us/step - loss: 8.5400 - mae
Epoch 29/100
10381/10381 [=====] - 4s 364us/step - loss: 8.1293 - mae
Epoch 30/100
10381/10381 [=====] - 4s 368us/step - loss: 7.9802 - mae
Epoch 31/100
10381/10381 [=====] - 4s 365us/step - loss: 8.2233 - mae
Epoch 32/100
10381/10381 [=====] - 4s 359us/step - loss: 7.9156 - mae
Epoch 33/100
10381/10381 [=====] - 4s 361us/step - loss: 7.0132 - mae
Epoch 34/100
10381/10381 [=====] - 4s 369us/step - loss: 7.3711 - mae
Epoch 35/100
10381/10381 [=====] - 4s 374us/step - loss: 7.0540 - mae
Epoch 36/100
10381/10381 [=====] - 4s 363us/step - loss: 7.0781 - mae
Epoch 37/100
10381/10381 [=====] - 4s 362us/step - loss: 7.0873 - mae
Epoch 38/100
```

```
10381/10381 [=====] - 4s 363us/step - loss: 6.6415 - mae
Epoch 39/100
10381/10381 [=====] - 4s 362us/step - loss: 6.5952 - mae
Epoch 40/100
10381/10381 [=====] - 4s 363us/step - loss: 6.3903 - mae
Epoch 41/100
10381/10381 [=====] - 4s 363us/step - loss: 6.4916 - mae
Epoch 42/100
10381/10381 [=====] - 4s 361us/step - loss: 6.2225 - mae
Epoch 43/100
10381/10381 [=====] - 4s 360us/step - loss: 6.2965 - mae
Epoch 44/100
10381/10381 [=====] - 4s 360us/step - loss: 6.1598 - mae
Epoch 45/100
10381/10381 [=====] - 4s 361us/step - loss: 6.1712 - mae
Epoch 46/100
10381/10381 [=====] - 4s 360us/step - loss: 5.6220 - mae
Epoch 47/100
10381/10381 [=====] - 4s 362us/step - loss: 6.2717 - mae
Epoch 48/100
10381/10381 [=====] - 4s 361us/step - loss: 5.3824 - mae
Epoch 49/100
10381/10381 [=====] - 4s 360us/step - loss: 5.3090 - mae
Epoch 50/100
10381/10381 [=====] - 4s 360us/step - loss: 5.7230 - mae
Epoch 51/100
10381/10381 [=====] - 4s 360us/step - loss: 5.5735 - mae
Epoch 52/100
10381/10381 [=====] - 4s 361us/step - loss: 5.5961 - mae
Epoch 53/100
10381/10381 [=====] - 4s 361us/step - loss: 5.0473 - mae
Epoch 54/100
10381/10381 [=====] - 4s 360us/step - loss: 5.1190 - mae
Epoch 55/100
10381/10381 [=====] - 4s 362us/step - loss: 5.1871 - mae
Epoch 56/100
10381/10381 [=====] - 4s 363us/step - loss: 4.7875 - mae
Epoch 57/100
10381/10381 [=====] - 4s 361us/step - loss: 4.6614 - mae
Epoch 58/100
10381/10381 [=====] - 4s 361us/step - loss: 4.6791 - mae
Epoch 59/100
10381/10381 [=====] - 4s 361us/step - loss: 4.8119 - mae
Epoch 60/100
10381/10381 [=====] - 4s 362us/step - loss: 4.9947 - mae
Epoch 61/100
10381/10381 [=====] - 4s 360us/step - loss: 4.5889 - mae
Epoch 62/100
10381/10381 [=====] - 4s 362us/step - loss: 4.5123 - mae
Epoch 63/100
10381/10381 [=====] - 4s 360us/step - loss: 4.3693 - mae
Epoch 64/100
10381/10381 [=====] - 4s 359us/step - loss: 4.4957 - mae
Epoch 65/100
10381/10381 [=====] - 4s 362us/step - loss: 4.2178 - mae
Epoch 66/100
10381/10381 [=====] - 4s 364us/step - loss: 4.4191 - mae
Epoch 67/100
```

```
Epoch 67/100
10381/10381 [=====] - 4s 378us/step - loss: 4.4385 - mae
Epoch 68/100
10381/10381 [=====] - 4s 378us/step - loss: 4.1057 - mae
Epoch 69/100
10381/10381 [=====] - 4s 365us/step - loss: 4.1811 - mae
Epoch 70/100
10381/10381 [=====] - 4s 358us/step - loss: 4.2908 - mae
Epoch 71/100
10381/10381 [=====] - 4s 360us/step - loss: 3.9490 - mae
Epoch 72/100
10381/10381 [=====] - 4s 363us/step - loss: 3.9202 - mae
Epoch 73/100
10381/10381 [=====] - 4s 358us/step - loss: 3.9715 - mae
Epoch 74/100
10381/10381 [=====] - 4s 362us/step - loss: 3.9840 - mae
Epoch 75/100
10381/10381 [=====] - 4s 361us/step - loss: 3.6669 - mae
Epoch 76/100
10381/10381 [=====] - 4s 358us/step - loss: 3.7517 - mae
Epoch 77/100
10381/10381 [=====] - 4s 362us/step - loss: 3.8047 - mae
Epoch 78/100
10381/10381 [=====] - 4s 360us/step - loss: 3.7807 - mae
Epoch 79/100
10381/10381 [=====] - 4s 360us/step - loss: 3.6249 - mae
Epoch 80/100
10381/10381 [=====] - 4s 362us/step - loss: 3.5202 - mae
Epoch 81/100
10381/10381 [=====] - 4s 358us/step - loss: 3.6956 - mae
Epoch 82/100
10381/10381 [=====] - 4s 360us/step - loss: 3.5785 - mae
Epoch 83/100
10381/10381 [=====] - 4s 358us/step - loss: 3.6206 - mae
Epoch 84/100
10381/10381 [=====] - 4s 361us/step - loss: 3.3797 - mae
Epoch 85/100
10381/10381 [=====] - 4s 362us/step - loss: 3.4923 - mae
Epoch 86/100
10381/10381 [=====] - 4s 359us/step - loss: 3.2137 - mae
Epoch 87/100
10381/10381 [=====] - 4s 363us/step - loss: 3.5085 - mae
Epoch 88/100
10381/10381 [=====] - 4s 361us/step - loss: 3.5007 - mae
Epoch 89/100
10381/10381 [=====] - 4s 362us/step - loss: 3.3652 - mae
Epoch 90/100
10381/10381 [=====] - 4s 362us/step - loss: 3.1943 - mae
Epoch 91/100
10381/10381 [=====] - 4s 363us/step - loss: 3.0882 - mae
Epoch 92/100
10381/10381 [=====] - 4s 363us/step - loss: 3.1128 - mae
Epoch 93/100
10381/10381 [=====] - 4s 361us/step - loss: 3.1280 - mae
Epoch 94/100
10381/10381 [=====] - 4s 363us/step - loss: 3.0005 - mae
Epoch 95/100
10381/10381 [=====] - 4s 360us/step - loss: 3.0753 - mae
```

```
4/22/2020 AES.ipynb - Colaboratory
Epoch 96/100
10381/10381 [=====] - 4s 360us/step - loss: 3.1337 - mae
Epoch 97/100
10381/10381 [=====] - 4s 364us/step - loss: 3.0722 - mae
Epoch 98/100
10381/10381 [=====] - 4s 361us/step - loss: 3.0402 - mae
Epoch 99/100
10381/10381 [=====] - 4s 362us/step - loss: 2.9729 - mae
Epoch 100/100
10381/10381 [=====] - 4s 363us/step - loss: 2.9130 - mae
```



```
[[ 8.]
 [ 9.]
 [10.]
 ...
 [26.]
 [29.]
 [ 5.]]
Kappa Score: 0.9450567379796316
```

-----Fold 3-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
bidirectional_1 (Bidirection	(None, 1, 600)	2565600
bidirectional_2 (Bidirection	(None, 200)	560800
dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201
=====		
Total params: 3,126,601		
Trainable params: 3,126,601		
Non-trainable params: 0		

```
Epoch 1/100
10381/10381 [=====] - 5s 504us/step - loss: 39.2819 - ma
Epoch 2/100
10381/10381 [=====] - 4s 376us/step - loss: 21.6161 - ma
Epoch 3/100
```

```
Epoch 3/100
10381/10381 [=====] - 4s 365us/step - loss: 16.9829 - ma
Epoch 4/100
10381/10381 [=====] - 4s 363us/step - loss: 14.9765 - ma
Epoch 5/100
10381/10381 [=====] - 4s 361us/step - loss: 14.8340 - ma
Epoch 6/100
10381/10381 [=====] - 4s 364us/step - loss: 13.2128 - ma
Epoch 7/100
10381/10381 [=====] - 4s 361us/step - loss: 12.8868 - ma
Epoch 8/100
10381/10381 [=====] - 4s 362us/step - loss: 12.7339 - ma
Epoch 9/100
10381/10381 [=====] - 4s 360us/step - loss: 11.5851 - ma
Epoch 10/100
10381/10381 [=====] - 4s 359us/step - loss: 11.6219 - ma
Epoch 11/100
10381/10381 [=====] - 4s 359us/step - loss: 11.4122 - ma
Epoch 12/100
10381/10381 [=====] - 4s 359us/step - loss: 11.1942 - ma
Epoch 13/100
10381/10381 [=====] - 4s 361us/step - loss: 10.6975 - ma
Epoch 14/100
10381/10381 [=====] - 4s 359us/step - loss: 10.0943 - ma
Epoch 15/100
10381/10381 [=====] - 4s 359us/step - loss: 9.7868 - mae
Epoch 16/100
10381/10381 [=====] - 4s 360us/step - loss: 10.3656 - ma
Epoch 17/100
10381/10381 [=====] - 4s 361us/step - loss: 9.7494 - mae
Epoch 18/100
10381/10381 [=====] - 4s 361us/step - loss: 9.2987 - mae
Epoch 19/100
10381/10381 [=====] - 4s 361us/step - loss: 9.1894 - mae
Epoch 20/100
10381/10381 [=====] - 4s 361us/step - loss: 9.0753 - mae
Epoch 21/100
10381/10381 [=====] - 4s 361us/step - loss: 9.1593 - mae
Epoch 22/100
10381/10381 [=====] - 4s 360us/step - loss: 8.5159 - mae
Epoch 23/100
10381/10381 [=====] - 4s 360us/step - loss: 8.7502 - mae
Epoch 24/100
10381/10381 [=====] - 4s 358us/step - loss: 8.2234 - mae
Epoch 25/100
10381/10381 [=====] - 4s 357us/step - loss: 8.2751 - mae
Epoch 26/100
10381/10381 [=====] - 4s 361us/step - loss: 7.4701 - mae
Epoch 27/100
10381/10381 [=====] - 4s 356us/step - loss: 8.0634 - mae
Epoch 28/100
10381/10381 [=====] - 4s 360us/step - loss: 8.0485 - mae
Epoch 29/100
10381/10381 [=====] - 4s 357us/step - loss: 7.7563 - mae
Epoch 30/100
10381/10381 [=====] - 4s 359us/step - loss: 7.3843 - mae
Epoch 31/100
10381/10381 [=====] - 4s 360us/step - loss: 7.5737 - mae
```

```
Epoch 32/100
10381/10381 [=====] - 4s 361us/step - loss: 7.2026 - mae
Epoch 33/100
10381/10381 [=====] - 4s 359us/step - loss: 6.8099 - mae
Epoch 34/100
10381/10381 [=====] - 4s 360us/step - loss: 6.3962 - mae
Epoch 35/100
10381/10381 [=====] - 4s 362us/step - loss: 6.7522 - mae
Epoch 36/100
10381/10381 [=====] - 4s 360us/step - loss: 6.7407 - mae
Epoch 37/100
10381/10381 [=====] - 4s 371us/step - loss: 6.3404 - mae
Epoch 38/100
10381/10381 [=====] - 4s 377us/step - loss: 6.4020 - mae
Epoch 39/100
10381/10381 [=====] - 4s 374us/step - loss: 6.1742 - mae
Epoch 40/100
10381/10381 [=====] - 4s 360us/step - loss: 6.4282 - mae
Epoch 41/100
10381/10381 [=====] - 4s 358us/step - loss: 5.9937 - mae
Epoch 42/100
10381/10381 [=====] - 4s 361us/step - loss: 6.2730 - mae
Epoch 43/100
10381/10381 [=====] - 4s 369us/step - loss: 5.7108 - mae
Epoch 44/100
10381/10381 [=====] - 4s 362us/step - loss: 5.7061 - mae
Epoch 45/100
10381/10381 [=====] - 4s 368us/step - loss: 5.6841 - mae
Epoch 46/100
10381/10381 [=====] - 4s 366us/step - loss: 5.3581 - mae
Epoch 47/100
10381/10381 [=====] - 4s 374us/step - loss: 5.4840 - mae
Epoch 48/100
10381/10381 [=====] - 4s 358us/step - loss: 5.1300 - mae
Epoch 49/100
10381/10381 [=====] - 4s 360us/step - loss: 5.1461 - mae
Epoch 50/100
10381/10381 [=====] - 4s 360us/step - loss: 5.4340 - mae
Epoch 51/100
10381/10381 [=====] - 4s 362us/step - loss: 4.8675 - mae
Epoch 52/100
10381/10381 [=====] - 4s 365us/step - loss: 4.9979 - mae
Epoch 53/100
10381/10381 [=====] - 4s 368us/step - loss: 4.8577 - mae
Epoch 54/100
10381/10381 [=====] - 4s 362us/step - loss: 4.6358 - mae
Epoch 55/100
10381/10381 [=====] - 4s 365us/step - loss: 4.8855 - mae
Epoch 56/100
10381/10381 [=====] - 4s 365us/step - loss: 4.5067 - mae
Epoch 57/100
10381/10381 [=====] - 4s 366us/step - loss: 4.8145 - mae
Epoch 58/100
10381/10381 [=====] - 4s 370us/step - loss: 4.3226 - mae
Epoch 59/100
10381/10381 [=====] - 4s 366us/step - loss: 4.4792 - mae
Epoch 60/100
10381/10381 [=====] - 4s 370us/step - loss: 4.3430 - mae
```

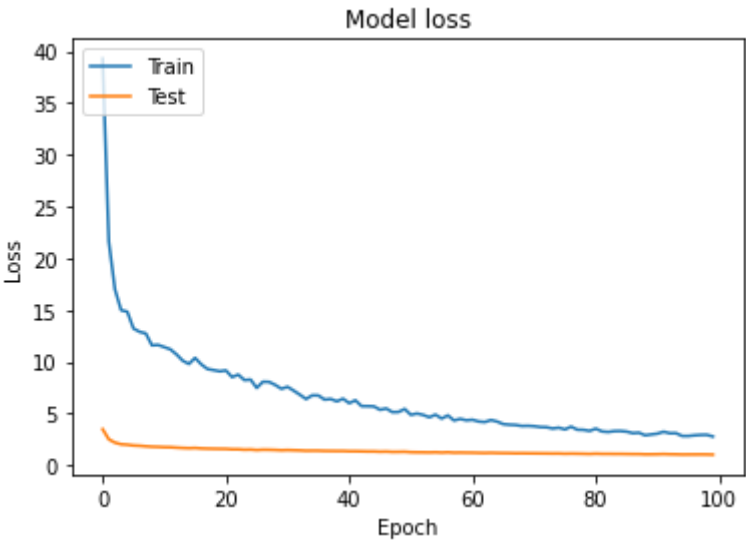
```
Epoch 61/100
10381/10381 [=====] - 4s 370us/step - loss: 4.3921 - mae
Epoch 62/100
10381/10381 [=====] - 4s 368us/step - loss: 4.2246 - mae
Epoch 63/100
10381/10381 [=====] - 4s 365us/step - loss: 4.1725 - mae
Epoch 64/100
10381/10381 [=====] - 4s 366us/step - loss: 4.3672 - mae
Epoch 65/100
10381/10381 [=====] - 4s 365us/step - loss: 4.2187 - mae
Epoch 66/100
10381/10381 [=====] - 4s 368us/step - loss: 3.9706 - mae
Epoch 67/100
10381/10381 [=====] - 4s 365us/step - loss: 3.9151 - mae
Epoch 68/100
10381/10381 [=====] - 4s 365us/step - loss: 3.8895 - mae
Epoch 69/100
10381/10381 [=====] - 4s 366us/step - loss: 3.7933 - mae
Epoch 70/100
10381/10381 [=====] - 4s 368us/step - loss: 3.8074 - mae
Epoch 71/100
10381/10381 [=====] - 4s 366us/step - loss: 3.7699 - mae
Epoch 72/100
10381/10381 [=====] - 4s 370us/step - loss: 3.6910 - mae
Epoch 73/100
10381/10381 [=====] - 4s 364us/step - loss: 3.6732 - mae
Epoch 74/100
10381/10381 [=====] - 4s 367us/step - loss: 3.5491 - mae
Epoch 75/100
10381/10381 [=====] - 4s 367us/step - loss: 3.6265 - mae
Epoch 76/100
10381/10381 [=====] - 4s 367us/step - loss: 3.4634 - mae
Epoch 77/100
10381/10381 [=====] - 4s 362us/step - loss: 3.7263 - mae
Epoch 78/100
10381/10381 [=====] - 4s 364us/step - loss: 3.4355 - mae
Epoch 79/100
10381/10381 [=====] - 4s 366us/step - loss: 3.4170 - mae
Epoch 80/100
10381/10381 [=====] - 4s 365us/step - loss: 3.3179 - mae
Epoch 81/100
10381/10381 [=====] - 4s 367us/step - loss: 3.5334 - mae
Epoch 82/100
10381/10381 [=====] - 4s 381us/step - loss: 3.2684 - mae
Epoch 83/100
10381/10381 [=====] - 4s 378us/step - loss: 3.2151 - mae
Epoch 84/100
10381/10381 [=====] - 4s 371us/step - loss: 3.2966 - mae
Epoch 85/100
10381/10381 [=====] - 4s 370us/step - loss: 3.3074 - mae
Epoch 86/100
10381/10381 [=====] - 4s 370us/step - loss: 3.2490 - mae
Epoch 87/100
10381/10381 [=====] - 4s 370us/step - loss: 3.1011 - mae
Epoch 88/100
10381/10381 [=====] - 4s 369us/step - loss: 3.1413 - mae
Epoch 89/100
10381/10381 [=====] - 4s 372us/step - loss: 2.8934 - mae
```



4/22/2020

AES.ipynb - Colaboratory

```
Epoch 90/100
10381/10381 [=====] - 4s 369us/step - loss: 2.9753 - mae
Epoch 91/100
10381/10381 [=====] - 4s 367us/step - loss: 3.0529 - mae
Epoch 92/100
10381/10381 [=====] - 4s 365us/step - loss: 3.2364 - mae
Epoch 93/100
10381/10381 [=====] - 4s 369us/step - loss: 3.0909 - mae
Epoch 94/100
10381/10381 [=====] - 4s 366us/step - loss: 3.1004 - mae
Epoch 95/100
10381/10381 [=====] - 4s 367us/step - loss: 2.8279 - mae
Epoch 96/100
10381/10381 [=====] - 4s 367us/step - loss: 2.8253 - mae
Epoch 97/100
10381/10381 [=====] - 4s 367us/step - loss: 2.8898 - mae
Epoch 98/100
10381/10381 [=====] - 4s 368us/step - loss: 2.9283 - mae
Epoch 99/100
10381/10381 [=====] - 4s 366us/step - loss: 2.9371 - mae
Epoch 100/100
10381/10381 [=====] - 4s 368us/step - loss: 2.7749 - mae
```



```
[[ 8.]
 [ 9.]
 [ 8.]
 ...
 [41.]
 [30.]
 [34.]]
Kappa Score: 0.9256860865252433
```

-----Fold 4-----

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
bidirectional_1 (Bidirection (None, 1, 600))		2565600
-----		
bidirectional_2 (Bidirection (None, 200))		560800
-----		

dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201

---

Total params: 3,126,601  
 Trainable params: 3,126,601  
 Non-trainable params: 0

---

Epoch 1/100

10381/10381 [=====] - 5s 505us/step - loss: 37.7470 - ma

Epoch 2/100

10381/10381 [=====] - 4s 364us/step - loss: 21.9039 - ma

Epoch 3/100

10381/10381 [=====] - 4s 370us/step - loss: 16.6000 - ma

Epoch 4/100

10381/10381 [=====] - 4s 365us/step - loss: 14.9789 - ma

Epoch 5/100

10381/10381 [=====] - 4s 364us/step - loss: 14.0101 - ma

Epoch 6/100

10381/10381 [=====] - 4s 360us/step - loss: 13.6132 - ma

Epoch 7/100

10381/10381 [=====] - 4s 362us/step - loss: 12.0997 - ma

Epoch 8/100

10381/10381 [=====] - 4s 373us/step - loss: 12.5388 - ma

Epoch 9/100

10381/10381 [=====] - 4s 377us/step - loss: 12.1008 - ma

Epoch 10/100

10381/10381 [=====] - 4s 376us/step - loss: 11.9470 - ma

Epoch 11/100

10381/10381 [=====] - 4s 364us/step - loss: 10.9155 - ma

Epoch 12/100

10381/10381 [=====] - 4s 361us/step - loss: 10.2287 - ma

Epoch 13/100

10381/10381 [=====] - 4s 362us/step - loss: 10.2627 - ma

Epoch 14/100

10381/10381 [=====] - 4s 365us/step - loss: 10.2318 - ma

Epoch 15/100

10381/10381 [=====] - 4s 363us/step - loss: 10.0959 - ma

Epoch 16/100

10381/10381 [=====] - 4s 362us/step - loss: 9.5122 - mae

Epoch 17/100

10381/10381 [=====] - 4s 359us/step - loss: 9.2218 - mae

Epoch 18/100

10381/10381 [=====] - 4s 362us/step - loss: 9.1437 - mae

Epoch 19/100

10381/10381 [=====] - 4s 391us/step - loss: 9.3269 - mae

Epoch 20/100

10381/10381 [=====] - 4s 427us/step - loss: 9.0379 - mae

Epoch 21/100

10381/10381 [=====] - 4s 366us/step - loss: 8.5351 - mae

Epoch 22/100

10381/10381 [=====] - 4s 364us/step - loss: 8.6083 - mae

Epoch 23/100

10381/10381 [=====] - 4s 364us/step - loss: 8.5446 - mae

Epoch 24/100

10381/10381 [=====] - 4s 365us/step - loss: 8.2659 - mae

Epoch 25/100

10381/10381 [=====] - 4s 365us/step - loss: 8.2482 - mae

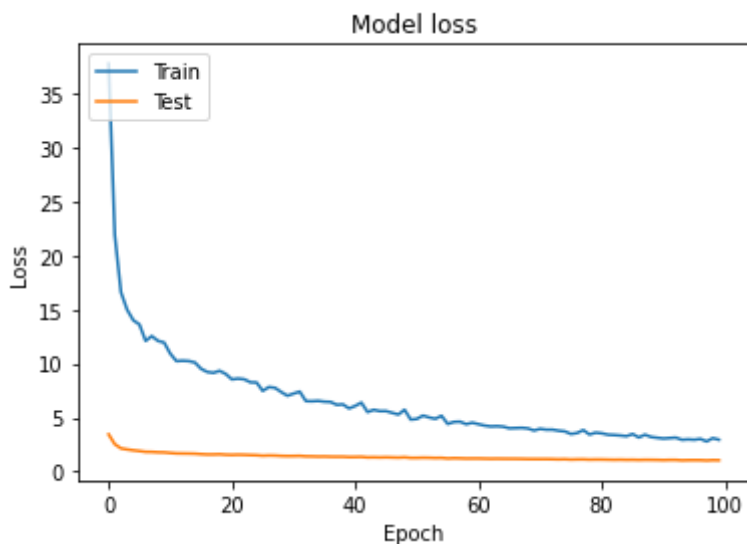
```
-----
Epoch 26/100
10381/10381 [=====] - 4s 370us/step - loss: 7.4702 - mae
Epoch 27/100
10381/10381 [=====] - 4s 372us/step - loss: 7.8261 - mae
Epoch 28/100
10381/10381 [=====] - 4s 372us/step - loss: 7.7505 - mae
Epoch 29/100
10381/10381 [=====] - 4s 369us/step - loss: 7.3633 - mae
Epoch 30/100
10381/10381 [=====] - 4s 374us/step - loss: 7.0217 - mae
Epoch 31/100
10381/10381 [=====] - 4s 361us/step - loss: 7.2184 - mae
Epoch 32/100
10381/10381 [=====] - 4s 360us/step - loss: 7.4036 - mae
Epoch 33/100
10381/10381 [=====] - 4s 362us/step - loss: 6.5275 - mae
Epoch 34/100
10381/10381 [=====] - 4s 361us/step - loss: 6.5139 - mae
Epoch 35/100
10381/10381 [=====] - 4s 363us/step - loss: 6.5470 - mae
Epoch 36/100
10381/10381 [=====] - 4s 363us/step - loss: 6.4707 - mae
Epoch 37/100
10381/10381 [=====] - 4s 362us/step - loss: 6.4489 - mae
Epoch 38/100
10381/10381 [=====] - 4s 360us/step - loss: 6.1809 - mae
Epoch 39/100
10381/10381 [=====] - 4s 366us/step - loss: 6.2243 - mae
Epoch 40/100
10381/10381 [=====] - 4s 363us/step - loss: 5.8437 - mae
Epoch 41/100
10381/10381 [=====] - 4s 363us/step - loss: 6.0767 - mae
Epoch 42/100
10381/10381 [=====] - 4s 363us/step - loss: 6.3868 - mae
Epoch 43/100
10381/10381 [=====] - 4s 362us/step - loss: 5.5119 - mae
Epoch 44/100
10381/10381 [=====] - 4s 363us/step - loss: 5.7150 - mae
Epoch 45/100
10381/10381 [=====] - 4s 363us/step - loss: 5.5998 - mae
Epoch 46/100
10381/10381 [=====] - 4s 361us/step - loss: 5.6034 - mae
Epoch 47/100
10381/10381 [=====] - 4s 365us/step - loss: 5.4389 - mae
Epoch 48/100
10381/10381 [=====] - 4s 362us/step - loss: 5.2796 - mae
Epoch 49/100
10381/10381 [=====] - 4s 379us/step - loss: 5.7256 - mae
Epoch 50/100
10381/10381 [=====] - 4s 363us/step - loss: 4.8164 - mae
Epoch 51/100
10381/10381 [=====] - 4s 361us/step - loss: 4.8746 - mae
Epoch 52/100
10381/10381 [=====] - 4s 360us/step - loss: 5.1850 - mae
Epoch 53/100
10381/10381 [=====] - 4s 361us/step - loss: 5.0101 - mae
Epoch 54/100
10381/10381 [=====] - 4s 362us/step - loss: 4.8860 - mae
```

```
10381/10381 [=====] - 4s 303us/step - loss: 4.8800 - mae
Epoch 55/100
10381/10381 [=====] - 4s 360us/step - loss: 5.1643 - mae
Epoch 56/100
10381/10381 [=====] - 4s 361us/step - loss: 4.4138 - mae
Epoch 57/100
10381/10381 [=====] - 4s 361us/step - loss: 4.5947 - mae
Epoch 58/100
10381/10381 [=====] - 4s 363us/step - loss: 4.6223 - mae
Epoch 59/100
10381/10381 [=====] - 4s 361us/step - loss: 4.3861 - mae
Epoch 60/100
10381/10381 [=====] - 4s 368us/step - loss: 4.5262 - mae
Epoch 61/100
10381/10381 [=====] - 4s 367us/step - loss: 4.3892 - mae
Epoch 62/100
10381/10381 [=====] - 4s 363us/step - loss: 4.2572 - mae
Epoch 63/100
10381/10381 [=====] - 4s 362us/step - loss: 4.1799 - mae
Epoch 64/100
10381/10381 [=====] - 4s 369us/step - loss: 4.2044 - mae
Epoch 65/100
10381/10381 [=====] - 4s 362us/step - loss: 4.1599 - mae
Epoch 66/100
10381/10381 [=====] - 4s 360us/step - loss: 4.0097 - mae
Epoch 67/100
10381/10381 [=====] - 4s 359us/step - loss: 4.0276 - mae
Epoch 68/100
10381/10381 [=====] - 4s 359us/step - loss: 4.0494 - mae
Epoch 69/100
10381/10381 [=====] - 4s 358us/step - loss: 3.9981 - mae
Epoch 70/100
10381/10381 [=====] - 4s 362us/step - loss: 3.8048 - mae
Epoch 71/100
10381/10381 [=====] - 4s 358us/step - loss: 3.9579 - mae
Epoch 72/100
10381/10381 [=====] - 4s 361us/step - loss: 3.8810 - mae
Epoch 73/100
10381/10381 [=====] - 4s 359us/step - loss: 3.8818 - mae
Epoch 74/100
10381/10381 [=====] - 4s 359us/step - loss: 3.7847 - mae
Epoch 75/100
10381/10381 [=====] - 4s 359us/step - loss: 3.7237 - mae
Epoch 76/100
10381/10381 [=====] - 4s 358us/step - loss: 3.4822 - mae
Epoch 77/100
10381/10381 [=====] - 4s 358us/step - loss: 3.5724 - mae
Epoch 78/100
10381/10381 [=====] - 4s 359us/step - loss: 3.8424 - mae
Epoch 79/100
10381/10381 [=====] - 4s 355us/step - loss: 3.4315 - mae
Epoch 80/100
10381/10381 [=====] - 4s 363us/step - loss: 3.6040 - mae
Epoch 81/100
10381/10381 [=====] - 4s 367us/step - loss: 3.5445 - mae
Epoch 82/100
10381/10381 [=====] - 4s 366us/step - loss: 3.4139 - mae
Epoch 83/100
```

```

10381/10381 [=====] - 4s 367us/step - loss: 3.3858 - mae
Epoch 84/100
10381/10381 [=====] - 4s 372us/step - loss: 3.3419 - mae
Epoch 85/100
10381/10381 [=====] - 4s 363us/step - loss: 3.2785 - mae
Epoch 86/100
10381/10381 [=====] - 4s 358us/step - loss: 3.4771 - mae
Epoch 87/100
10381/10381 [=====] - 4s 358us/step - loss: 3.1619 - mae
Epoch 88/100
10381/10381 [=====] - 4s 361us/step - loss: 3.4139 - mae
Epoch 89/100
10381/10381 [=====] - 4s 358us/step - loss: 3.2018 - mae
Epoch 90/100
10381/10381 [=====] - 4s 366us/step - loss: 3.1282 - mae
Epoch 91/100
10381/10381 [=====] - 4s 427us/step - loss: 3.0619 - mae
Epoch 92/100
10381/10381 [=====] - 4s 410us/step - loss: 3.1025 - mae
Epoch 93/100
10381/10381 [=====] - 5s 455us/step - loss: 3.1447 - mae
Epoch 94/100
10381/10381 [=====] - 4s 370us/step - loss: 2.9425 - mae
Epoch 95/100
10381/10381 [=====] - 4s 363us/step - loss: 2.9841 - mae
Epoch 96/100
10381/10381 [=====] - 4s 368us/step - loss: 2.9479 - mae
Epoch 97/100
10381/10381 [=====] - 4s 369us/step - loss: 3.0274 - mae
Epoch 98/100
10381/10381 [=====] - 4s 368us/step - loss: 2.7932 - mae
Epoch 99/100
10381/10381 [=====] - 4s 367us/step - loss: 3.0946 - mae
Epoch 100/100
10381/10381 [=====] - 4s 363us/step - loss: 2.9536 - mae

```



```

[[ 9.]
 [10.]
 [ 6.]
 ...
 [42.]
 [35.]
 [10.]

```

```
[ 10. ] ]
Kappa Score: 0.9236147722479966
```

```
-----Fold 5-----
```

```
Model: "sequential_1"
```

Layer (type)	Output Shape	Param #
bidirectional_1 (Bidirection (None, 1, 600))		2565600
bidirectional_2 (Bidirection (None, 200))		560800
dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201

```
Total params: 3,126,601
```

```
Trainable params: 3,126,601
```

```
Non-trainable params: 0
```

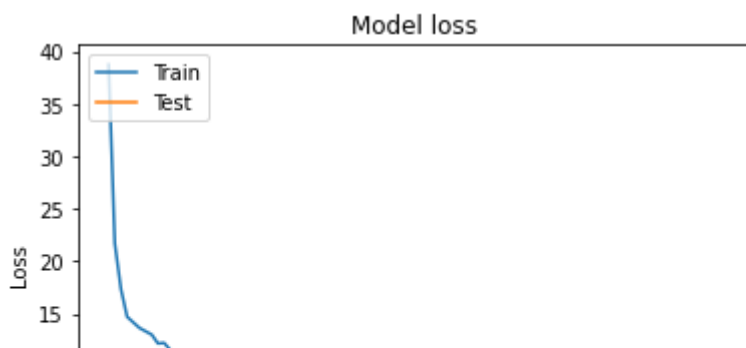
```
Epoch 1/100
10381/10381 [=====] - 5s 502us/step - loss: 38.7174 - ma
Epoch 2/100
10381/10381 [=====] - 4s 363us/step - loss: 21.7106 - ma
Epoch 3/100
10381/10381 [=====] - 4s 363us/step - loss: 17.3556 - ma
Epoch 4/100
10381/10381 [=====] - 4s 363us/step - loss: 14.7154 - ma
Epoch 5/100
10381/10381 [=====] - 4s 362us/step - loss: 14.1815 - ma
Epoch 6/100
10381/10381 [=====] - 4s 363us/step - loss: 13.6579 - ma
Epoch 7/100
10381/10381 [=====] - 4s 361us/step - loss: 13.3326 - ma
Epoch 8/100
10381/10381 [=====] - 4s 360us/step - loss: 13.0119 - ma
Epoch 9/100
10381/10381 [=====] - 4s 363us/step - loss: 12.1769 - ma
Epoch 10/100
10381/10381 [=====] - 4s 363us/step - loss: 12.2298 - ma
Epoch 11/100
10381/10381 [=====] - 4s 364us/step - loss: 11.5545 - ma
Epoch 12/100
10381/10381 [=====] - 4s 361us/step - loss: 11.1863 - ma
Epoch 13/100
10381/10381 [=====] - 4s 362us/step - loss: 10.9262 - ma
Epoch 14/100
10381/10381 [=====] - 4s 359us/step - loss: 10.3753 - ma
Epoch 15/100
10381/10381 [=====] - 4s 377us/step - loss: 10.4716 - ma
Epoch 16/100
10381/10381 [=====] - 4s 380us/step - loss: 10.1419 - ma
Epoch 17/100
10381/10381 [=====] - 4s 362us/step - loss: 10.5444 - ma
Epoch 18/100
10381/10381 [=====] - 4s 368us/step - loss: 9.3774 - mae
Epoch 19/100
```

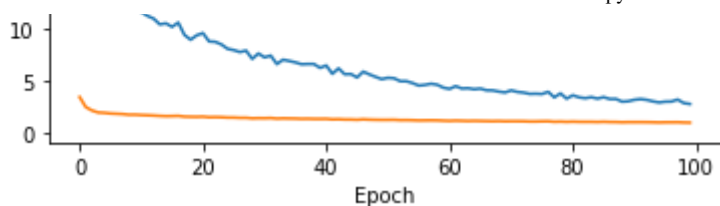
```
10381/10381 [=====] - 4s 364us/step - loss: 8.9192 - mae
Epoch 20/100
10381/10381 [=====] - 4s 365us/step - loss: 9.3352 - mae
Epoch 21/100
10381/10381 [=====] - 4s 367us/step - loss: 9.5456 - mae
Epoch 22/100
10381/10381 [=====] - 4s 363us/step - loss: 8.7556 - mae
Epoch 23/100
10381/10381 [=====] - 4s 364us/step - loss: 8.7163 - mae
Epoch 24/100
10381/10381 [=====] - 4s 365us/step - loss: 8.4673 - mae
Epoch 25/100
10381/10381 [=====] - 4s 366us/step - loss: 8.0523 - mae
Epoch 26/100
10381/10381 [=====] - 4s 364us/step - loss: 7.9282 - mae
Epoch 27/100
10381/10381 [=====] - 4s 366us/step - loss: 7.7437 - mae
Epoch 28/100
10381/10381 [=====] - 4s 366us/step - loss: 7.8802 - mae
Epoch 29/100
10381/10381 [=====] - 4s 367us/step - loss: 7.0921 - mae
Epoch 30/100
10381/10381 [=====] - 4s 367us/step - loss: 7.6056 - mae
Epoch 31/100
10381/10381 [=====] - 4s 364us/step - loss: 7.2368 - mae
Epoch 32/100
10381/10381 [=====] - 4s 367us/step - loss: 7.4064 - mae
Epoch 33/100
10381/10381 [=====] - 4s 367us/step - loss: 6.5997 - mae
Epoch 34/100
10381/10381 [=====] - 4s 368us/step - loss: 7.0156 - mae
Epoch 35/100
10381/10381 [=====] - 4s 370us/step - loss: 6.8927 - mae
Epoch 36/100
10381/10381 [=====] - 4s 369us/step - loss: 6.7611 - mae
Epoch 37/100
10381/10381 [=====] - 4s 371us/step - loss: 6.5811 - mae
Epoch 38/100
10381/10381 [=====] - 4s 368us/step - loss: 6.6054 - mae
Epoch 39/100
10381/10381 [=====] - 4s 371us/step - loss: 6.6037 - mae
Epoch 40/100
10381/10381 [=====] - 4s 367us/step - loss: 6.2375 - mae
Epoch 41/100
10381/10381 [=====] - 4s 365us/step - loss: 6.4662 - mae
Epoch 42/100
10381/10381 [=====] - 4s 367us/step - loss: 5.6739 - mae
Epoch 43/100
10381/10381 [=====] - 4s 364us/step - loss: 6.1891 - mae
Epoch 44/100
10381/10381 [=====] - 4s 365us/step - loss: 5.6299 - mae
Epoch 45/100
10381/10381 [=====] - 4s 364us/step - loss: 5.6498 - mae
Epoch 46/100
10381/10381 [=====] - 4s 363us/step - loss: 5.3238 - mae
Epoch 47/100
10381/10381 [=====] - 4s 363us/step - loss: 5.8779 - mae
Epoch 48/100
```

```
10381/10381 [=====] - 4s 365us/step - loss: 5.6157 - mae
Epoch 49/100
10381/10381 [=====] - 4s 363us/step - loss: 5.3831 - mae
Epoch 50/100
10381/10381 [=====] - 4s 364us/step - loss: 5.1644 - mae
Epoch 51/100
10381/10381 [=====] - 4s 364us/step - loss: 5.2909 - mae
Epoch 52/100
10381/10381 [=====] - 4s 368us/step - loss: 5.2488 - mae
Epoch 53/100
10381/10381 [=====] - 4s 362us/step - loss: 4.9701 - mae
Epoch 54/100
10381/10381 [=====] - 4s 365us/step - loss: 4.9692 - mae
Epoch 55/100
10381/10381 [=====] - 4s 362us/step - loss: 4.7904 - mae
Epoch 56/100
10381/10381 [=====] - 4s 365us/step - loss: 4.5547 - mae
Epoch 57/100
10381/10381 [=====] - 4s 365us/step - loss: 4.6128 - mae
Epoch 58/100
10381/10381 [=====] - 4s 362us/step - loss: 4.7269 - mae
Epoch 59/100
10381/10381 [=====] - 4s 365us/step - loss: 4.6335 - mae
Epoch 60/100
10381/10381 [=====] - 4s 373us/step - loss: 4.3530 - mae
Epoch 61/100
10381/10381 [=====] - 4s 378us/step - loss: 4.2355 - mae
Epoch 62/100
10381/10381 [=====] - 4s 383us/step - loss: 4.4969 - mae
Epoch 63/100
10381/10381 [=====] - 4s 364us/step - loss: 4.2715 - mae
Epoch 64/100
10381/10381 [=====] - 4s 366us/step - loss: 4.2995 - mae
Epoch 65/100
10381/10381 [=====] - 4s 365us/step - loss: 4.2064 - mae
Epoch 66/100
10381/10381 [=====] - 4s 369us/step - loss: 4.2651 - mae
Epoch 67/100
10381/10381 [=====] - 4s 368us/step - loss: 4.1038 - mae
Epoch 68/100
10381/10381 [=====] - 4s 378us/step - loss: 4.0920 - mae
Epoch 69/100
10381/10381 [=====] - 4s 362us/step - loss: 3.9793 - mae
Epoch 70/100
10381/10381 [=====] - 4s 360us/step - loss: 3.8969 - mae
Epoch 71/100
10381/10381 [=====] - 4s 362us/step - loss: 4.0936 - mae
Epoch 72/100
10381/10381 [=====] - 4s 364us/step - loss: 3.9491 - mae
Epoch 73/100
10381/10381 [=====] - 4s 364us/step - loss: 3.8841 - mae
Epoch 74/100
10381/10381 [=====] - 4s 361us/step - loss: 3.7626 - mae
Epoch 75/100
10381/10381 [=====] - 4s 361us/step - loss: 3.7797 - mae
Epoch 76/100
10381/10381 [=====] - 4s 364us/step - loss: 3.7509 - mae
Epoch 77/100
```



```
Epoch 77/100
10381/10381 [=====] - 4s 361us/step - loss: 3.9551 - mae
Epoch 78/100
10381/10381 [=====] - 4s 360us/step - loss: 3.4323 - mae
Epoch 79/100
10381/10381 [=====] - 4s 360us/step - loss: 3.8070 - mae
Epoch 80/100
10381/10381 [=====] - 4s 363us/step - loss: 3.3098 - mae
Epoch 81/100
10381/10381 [=====] - 4s 363us/step - loss: 3.6268 - mae
Epoch 82/100
10381/10381 [=====] - 4s 358us/step - loss: 3.4357 - mae
Epoch 83/100
10381/10381 [=====] - 4s 364us/step - loss: 3.3514 - mae
Epoch 84/100
10381/10381 [=====] - 4s 364us/step - loss: 3.4483 - mae
Epoch 85/100
10381/10381 [=====] - 4s 363us/step - loss: 3.3134 - mae
Epoch 86/100
10381/10381 [=====] - 4s 362us/step - loss: 3.4486 - mae
Epoch 87/100
10381/10381 [=====] - 4s 361us/step - loss: 3.2741 - mae
Epoch 88/100
10381/10381 [=====] - 4s 361us/step - loss: 3.2797 - mae
Epoch 89/100
10381/10381 [=====] - 4s 362us/step - loss: 3.0221 - mae
Epoch 90/100
10381/10381 [=====] - 4s 360us/step - loss: 3.0632 - mae
Epoch 91/100
10381/10381 [=====] - 4s 362us/step - loss: 3.2027 - mae
Epoch 92/100
10381/10381 [=====] - 4s 361us/step - loss: 3.2664 - mae
Epoch 93/100
10381/10381 [=====] - 4s 360us/step - loss: 3.1917 - mae
Epoch 94/100
10381/10381 [=====] - 4s 360us/step - loss: 3.0492 - mae
Epoch 95/100
10381/10381 [=====] - 4s 366us/step - loss: 2.9440 - mae
Epoch 96/100
10381/10381 [=====] - 4s 382us/step - loss: 3.0216 - mae
Epoch 97/100
10381/10381 [=====] - 4s 363us/step - loss: 3.0329 - mae
Epoch 98/100
10381/10381 [=====] - 4s 360us/step - loss: 3.2236 - mae
Epoch 99/100
10381/10381 [=====] - 4s 359us/step - loss: 2.8860 - mae
Epoch 100/100
10381/10381 [=====] - 4s 364us/step - loss: 2.8015 - mae
```





```
[[ 9.]
 [ 9.]
 [11.]
 ...
 [16.]
 [20.]
 [20.]]
```

Kappa Score: 0.9193338813957616

Average kappa score value is : 0.9275341070439304

```
import tensorflow as tf
tf.keras.backend.clear_session()
```

```
trainDataVectors = np.reshape(train_features,(train_x,train_y,1))
testDataVectors = np.reshape(test_features,(test_x,test_y,1))
print(y_train.shape)
print(trainDataVectors.shape)
```

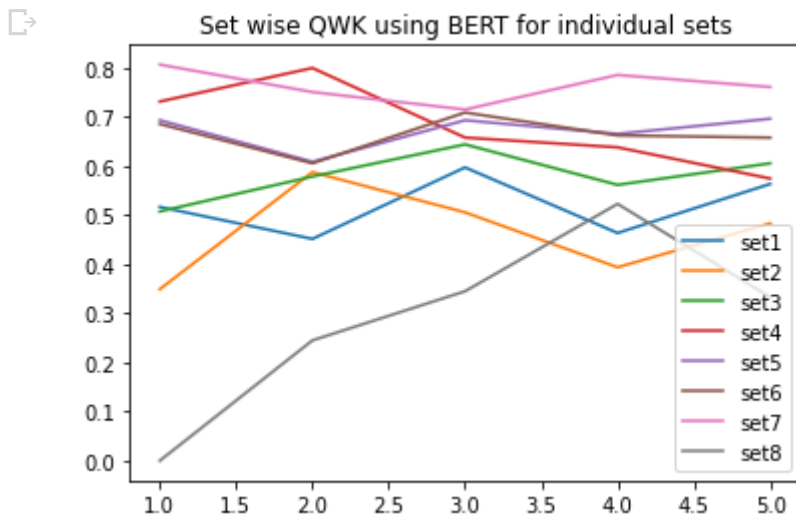
```
(10380,)
(10380, 768, 1)
```

```
# x = [0.0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1.0]
def plot_qwk_scores_all_sets():
    fig = plt.figure()
    ax = plt.subplot(111)
```

```

x = [1,2,3,4,5]
ax.plot(x, set1, label='set1')
ax.plot(x, set2, label='set2')
ax.plot(x, set3, label='set3')
ax.plot(x, set4, label='set4')
ax.plot(x, set5, label='set5')
ax.plot(x, set6, label='set6')
ax.plot(x, set7, label='set7')
ax.plot(x, set8, label='set8')
plt.title('Set wise QWK using BERT for individual sets')
ax.legend()
plt.show()

```



Buildind word2vec model method to render the text and convert to word2vec feature vector.

```

def build_word2vec(train_sentences, num_workers, num_features, min_word_count, conte
    downsampling):
    model = Word2Vec(workers=num_workers, size=num_features, min_count=min_word_cour
        sample=downsampling)
    # saving the word2vec model
    # model.wv.save_word2vec_format('word2vec_'+ str(fold_count) + '.bin', binary=Tru
    cores = multiprocessing.cpu_count()
    print("\n {} cores using".format(cores))
    start_time = time.time()
    model.build_vocab(train_sentences, progress_per=10000)
    print('Time to build vocab using word2vec: {} sec'.format(time.time() - start_ti
    start_time = time.time()
    model.train(train_sentences, total_examples=model.corpus_count, epochs=epochs, r
    print('Time to train the word2vec model: {} mins'.format(time.time() - start_tin
    model.init_sims(replace=True)
    sorted_dic = sorted(top10.items(), key=lambda k: k[1], reverse=True)
    return model,sorted_dic

```

Below method will run on individual sets using word2vec

```

# Individual sets
import time
import torch
import transformers as ppb
import warnings
warnings.filterwarnings('ignore')
set_count = 1
all_sets_score = []
# Hyperparameters for word2vec
num_features = 400
min_word_count = 40
num_workers = 4
context = 10
downsampling = 1e-3
epochs = 30

# Hyperparameters for LSTM
Hidden_dim1=300
Hidden_dim2=100
return_sequences = True
dropout=0.5
recurrent_dropout=0.4
input_size=400
activation='relu'
bidirectional = True
batch_size = 64
epoch = 70
#####
####
import tensorflow as tf
tf.keras.backend.clear_session()

for s in sets:
    print("\n-----SET {}-----\n".format(set_count))
    set_count +=1
    X = s
    y = s['domain1_score']
    cv = KFold(n_splits=5, shuffle=True)
    #X, y = prepare_data(dataset_path=dataset_path)
    cv_data = cv.split(X)
    results = []
    prediction_list = []
    fold_count =1
    # hyperparameters for word2vec
    most_common_words= []
    print(X.shape)
    print(y.shape)
    for traincv, testcv in cv_data:
        print("\n-----Fold {}-----\n".format(fold_count))
        # get the train and test from the dataset.

```



-----SET 1-----

(1783, 4)

(1783,)

-----Fold 1-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.2673826217651367 sec

Time to train the word2vec model: 9.049090385437012 mins

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
=====		
bidirectional_1 (Bidirection	(None, 1, 600)	1682400
bidirectional_2 (Bidirection	(None, 200)	560800
dropout_1 (Dropout)	(None, 200)	0
dense_1 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1426/1426 [=====] - 2s 1ms/step - loss: 42.2177 - mae: 5

Epoch 2/70

1426/1426 [=====] - 0s 341us/step - loss: 7.4798 - mae:

Epoch 3/70

1426/1426 [=====] - 1s 378us/step - loss: 4.5228 - mae:

Epoch 4/70

1426/1426 [=====] - 1s 364us/step - loss: 3.1228 - mae:

Epoch 5/70

1426/1426 [=====] - 0s 342us/step - loss: 2.5689 - mae:

Epoch 6/70

1426/1426 [=====] - 1s 387us/step - loss: 2.3119 - mae:

Epoch 7/70

1426/1426 [=====] - 1s 353us/step - loss: 2.2662 - mae:

Epoch 8/70

1426/1426 [=====] - 1s 357us/step - loss: 2.0239 - mae:

Epoch 9/70

1426/1426 [=====] - 1s 375us/step - loss: 2.0178 - mae:

Epoch 10/70

1426/1426 [=====] - 0s 349us/step - loss: 1.9319 - mae:

Epoch 11/70

1426/1426 [=====] - 0s 330us/step - loss: 1.8757 - mae:

Epoch 12/70

1426/1426 [=====] - 1s 369us/step - loss: 1.9345 - mae:

Epoch 13/70

1426/1426 [=====] - 0s 348us/step - loss: 1.9202 - mae:

Epoch 14/70

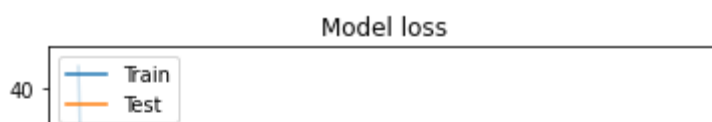
1426/1426 [=====] - 0s 332us/step - loss: 1.9081 - mae:

```
Epoch 15/70
1426/1426 [=====] - 0s 333us/step - loss: 1.9922 - mae:
Epoch 16/70
1426/1426 [=====] - 0s 338us/step - loss: 1.8797 - mae:
Epoch 17/70
1426/1426 [=====] - 0s 324us/step - loss: 1.8797 - mae:
Epoch 18/70
1426/1426 [=====] - 1s 363us/step - loss: 1.8062 - mae:
Epoch 19/70
1426/1426 [=====] - 1s 354us/step - loss: 1.9141 - mae:
Epoch 20/70
1426/1426 [=====] - 1s 354us/step - loss: 1.9516 - mae:
Epoch 21/70
1426/1426 [=====] - 0s 323us/step - loss: 1.8624 - mae:
Epoch 22/70
1426/1426 [=====] - 0s 319us/step - loss: 1.8291 - mae:
Epoch 23/70
1426/1426 [=====] - 1s 369us/step - loss: 1.8078 - mae:
Epoch 24/70
1426/1426 [=====] - 0s 343us/step - loss: 1.8501 - mae:
Epoch 25/70
1426/1426 [=====] - 0s 343us/step - loss: 1.8165 - mae:
Epoch 26/70
1426/1426 [=====] - 1s 379us/step - loss: 1.8311 - mae:
Epoch 27/70
1426/1426 [=====] - 0s 326us/step - loss: 1.8202 - mae:
Epoch 28/70
1426/1426 [=====] - 1s 375us/step - loss: 1.7695 - mae:
Epoch 29/70
1426/1426 [=====] - 0s 320us/step - loss: 1.7806 - mae:
Epoch 30/70
1426/1426 [=====] - 1s 357us/step - loss: 1.7724 - mae:
Epoch 31/70
1426/1426 [=====] - 0s 325us/step - loss: 1.8344 - mae:
Epoch 32/70
1426/1426 [=====] - 0s 326us/step - loss: 1.7482 - mae:
Epoch 33/70
1426/1426 [=====] - 0s 317us/step - loss: 1.8965 - mae:
Epoch 34/70
1426/1426 [=====] - 0s 346us/step - loss: 1.7261 - mae:
Epoch 35/70
1426/1426 [=====] - 0s 338us/step - loss: 1.7260 - mae:
Epoch 36/70
1426/1426 [=====] - 1s 357us/step - loss: 1.7962 - mae:
Epoch 37/70
1426/1426 [=====] - 1s 354us/step - loss: 1.8074 - mae:
Epoch 38/70
1426/1426 [=====] - 1s 351us/step - loss: 1.7875 - mae:
Epoch 39/70
1426/1426 [=====] - 0s 345us/step - loss: 1.7236 - mae:
Epoch 40/70
1426/1426 [=====] - 0s 343us/step - loss: 1.7979 - mae:
Epoch 41/70
1426/1426 [=====] - 0s 340us/step - loss: 1.7541 - mae:
Epoch 42/70
1426/1426 [=====] - 0s 320us/step - loss: 1.8508 - mae:
Epoch 43/70
1426/1426 [=====] - 1s 367us/step - loss: 1.7229 - mae:
```

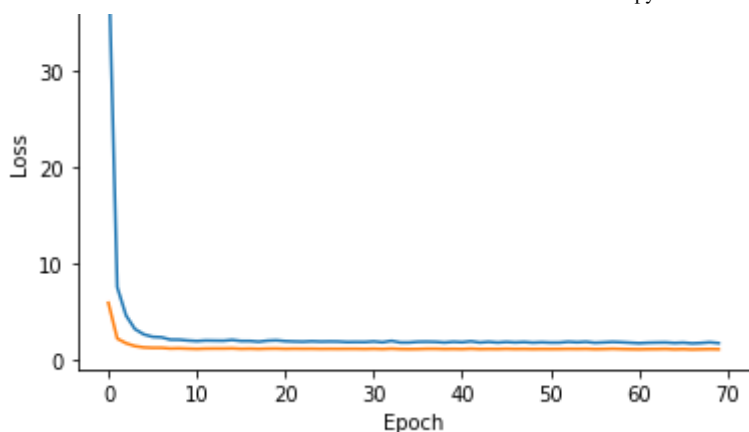
```

Epoch 44/70
1426/1426 [=====] - 1s 361us/step - loss: 1.7942 - mae:
Epoch 45/70
1426/1426 [=====] - 0s 347us/step - loss: 1.7203 - mae:
Epoch 46/70
1426/1426 [=====] - 0s 335us/step - loss: 1.7822 - mae:
Epoch 47/70
1426/1426 [=====] - 1s 363us/step - loss: 1.7335 - mae:
Epoch 48/70
1426/1426 [=====] - 1s 363us/step - loss: 1.7731 - mae:
Epoch 49/70
1426/1426 [=====] - 0s 330us/step - loss: 1.7098 - mae:
Epoch 50/70
1426/1426 [=====] - 1s 359us/step - loss: 1.7500 - mae:
Epoch 51/70
1426/1426 [=====] - 1s 360us/step - loss: 1.7126 - mae:
Epoch 52/70
1426/1426 [=====] - 1s 373us/step - loss: 1.7158 - mae:
Epoch 53/70
1426/1426 [=====] - 1s 368us/step - loss: 1.7987 - mae:
Epoch 54/70
1426/1426 [=====] - 1s 357us/step - loss: 1.7494 - mae:
Epoch 55/70
1426/1426 [=====] - 0s 312us/step - loss: 1.7992 - mae:
Epoch 56/70
1426/1426 [=====] - 0s 310us/step - loss: 1.6951 - mae:
Epoch 57/70
1426/1426 [=====] - 0s 323us/step - loss: 1.7382 - mae:
Epoch 58/70
1426/1426 [=====] - 0s 332us/step - loss: 1.7856 - mae:
Epoch 59/70
1426/1426 [=====] - 0s 329us/step - loss: 1.7521 - mae:
Epoch 60/70
1426/1426 [=====] - 0s 331us/step - loss: 1.7007 - mae:
Epoch 61/70
1426/1426 [=====] - 0s 342us/step - loss: 1.6495 - mae:
Epoch 62/70
1426/1426 [=====] - 1s 371us/step - loss: 1.6966 - mae:
Epoch 63/70
1426/1426 [=====] - 0s 341us/step - loss: 1.7174 - mae:
Epoch 64/70
1426/1426 [=====] - 0s 349us/step - loss: 1.7301 - mae:
Epoch 65/70
1426/1426 [=====] - 0s 336us/step - loss: 1.6702 - mae:
Epoch 66/70
1426/1426 [=====] - 0s 317us/step - loss: 1.7086 - mae:
Epoch 67/70
1426/1426 [=====] - 0s 328us/step - loss: 1.6316 - mae:
Epoch 68/70
1426/1426 [=====] - 0s 309us/step - loss: 1.6728 - mae:
Epoch 69/70
1426/1426 [=====] - 0s 345us/step - loss: 1.7456 - mae:
Epoch 70/70
1426/1426 [=====] - 1s 370us/step - loss: 1.6567 - mae:

```







Kappa Score: 0.5088826375493651

-----Fold 2-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.2600727081298828 sec

Time to train the word2vec model: 9.034634828567505 mins

Model: "sequential\_2"

Layer (type)	Output Shape	Param #
=====		
bidirectional_3 (Bidirection (None, 1, 600))		1682400
=====		
bidirectional_4 (Bidirection (None, 200))		560800
=====		
dropout_2 (Dropout)	(None, 200)	0
=====		
dense_2 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1426/1426 [=====] - 2s 1ms/step - loss: 43.6661 - mae: 6

Epoch 2/70

1426/1426 [=====] - 1s 352us/step - loss: 7.4120 - mae:

Epoch 3/70

1426/1426 [=====] - 1s 359us/step - loss: 4.4968 - mae:

Epoch 4/70

1426/1426 [=====] - 1s 357us/step - loss: 3.1593 - mae:

Epoch 5/70

1426/1426 [=====] - 1s 361us/step - loss: 2.7036 - mae:

Epoch 6/70

1426/1426 [=====] - 0s 339us/step - loss: 2.4366 - mae:

Epoch 7/70

1426/1426 [=====] - 0s 316us/step - loss: 2.3263 - mae:

Epoch 8/70

1426/1426 [=====] - 0s 307us/step - loss: 2.1239 - mae:

Epoch 9/70

1426/1426 [=====] - 0s 309us/step - loss: 2.1299 - mae:

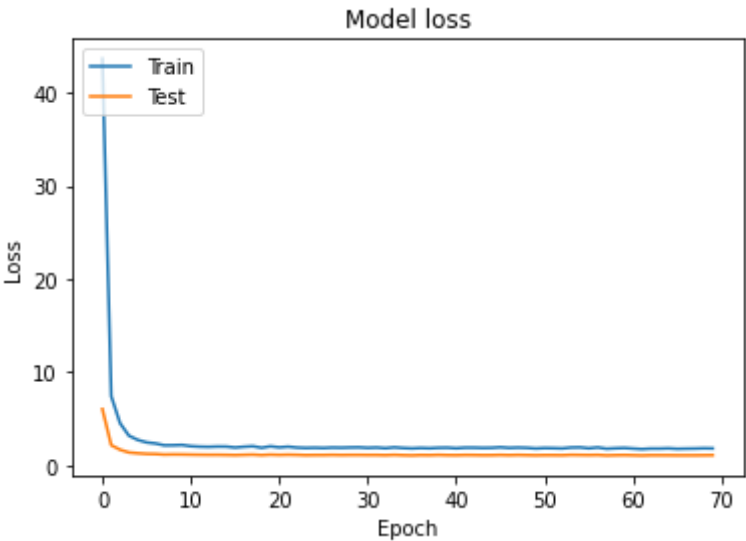
Epoch 10/70

1426/1426 [=====] - 0s 319us/step - loss: 2.1617 - mae:

```
Epoch 11/70
1426/1426 [=====] - 0s 305us/step - loss: 2.0321 - mae:
Epoch 12/70
1426/1426 [=====] - 0s 328us/step - loss: 1.9795 - mae:
Epoch 13/70
1426/1426 [=====] - 0s 321us/step - loss: 1.9593 - mae:
Epoch 14/70
1426/1426 [=====] - 0s 331us/step - loss: 1.9932 - mae:
Epoch 15/70
1426/1426 [=====] - 0s 322us/step - loss: 1.9872 - mae:
Epoch 16/70
1426/1426 [=====] - 0s 348us/step - loss: 1.8866 - mae:
Epoch 17/70
1426/1426 [=====] - 0s 329us/step - loss: 1.9679 - mae:
Epoch 18/70
1426/1426 [=====] - 1s 351us/step - loss: 2.0271 - mae:
Epoch 19/70
1426/1426 [=====] - 0s 320us/step - loss: 1.8581 - mae:
Epoch 20/70
1426/1426 [=====] - 0s 334us/step - loss: 2.0172 - mae:
Epoch 21/70
1426/1426 [=====] - 0s 333us/step - loss: 1.9020 - mae:
Epoch 22/70
1426/1426 [=====] - 1s 352us/step - loss: 1.9758 - mae:
Epoch 23/70
1426/1426 [=====] - 0s 348us/step - loss: 1.8791 - mae:
Epoch 24/70
1426/1426 [=====] - 0s 335us/step - loss: 1.8415 - mae:
Epoch 25/70
1426/1426 [=====] - 0s 331us/step - loss: 1.8624 - mae:
Epoch 26/70
1426/1426 [=====] - 1s 362us/step - loss: 1.8365 - mae:
Epoch 27/70
1426/1426 [=====] - 0s 344us/step - loss: 1.8819 - mae:
Epoch 28/70
1426/1426 [=====] - 0s 350us/step - loss: 1.8647 - mae:
Epoch 29/70
1426/1426 [=====] - 1s 363us/step - loss: 1.8917 - mae:
Epoch 30/70
1426/1426 [=====] - 0s 346us/step - loss: 1.9049 - mae:
Epoch 31/70
1426/1426 [=====] - 0s 342us/step - loss: 1.8510 - mae:
Epoch 32/70
1426/1426 [=====] - 1s 356us/step - loss: 1.8852 - mae:
Epoch 33/70
1426/1426 [=====] - 0s 344us/step - loss: 1.8146 - mae:
Epoch 34/70
1426/1426 [=====] - 1s 373us/step - loss: 1.9049 - mae:
Epoch 35/70
1426/1426 [=====] - 0s 350us/step - loss: 1.8342 - mae:
Epoch 36/70
1426/1426 [=====] - 1s 357us/step - loss: 1.7951 - mae:
Epoch 37/70
1426/1426 [=====] - 0s 319us/step - loss: 1.8387 - mae:
Epoch 38/70
1426/1426 [=====] - 0s 302us/step - loss: 1.8073 - mae:
Epoch 39/70
1426/1426 [=====] - 0s 331us/step - loss: 1.8553 - mae:
```

```
-----
Epoch 40/70
1426/1426 [=====] - 0s 312us/step - loss: 1.8694 - mae:
Epoch 41/70
1426/1426 [=====] - 0s 350us/step - loss: 1.8080 - mae:
Epoch 42/70
1426/1426 [=====] - 0s 322us/step - loss: 1.8711 - mae:
Epoch 43/70
1426/1426 [=====] - 0s 346us/step - loss: 1.8702 - mae:
Epoch 44/70
1426/1426 [=====] - 1s 358us/step - loss: 1.8447 - mae:
Epoch 45/70
1426/1426 [=====] - 0s 350us/step - loss: 1.8560 - mae:
Epoch 46/70
1426/1426 [=====] - 0s 314us/step - loss: 1.9142 - mae:
Epoch 47/70
1426/1426 [=====] - 0s 313us/step - loss: 1.8476 - mae:
Epoch 48/70
1426/1426 [=====] - 0s 344us/step - loss: 1.8799 - mae:
Epoch 49/70
1426/1426 [=====] - 0s 323us/step - loss: 1.8526 - mae:
Epoch 50/70
1426/1426 [=====] - 0s 341us/step - loss: 1.7856 - mae:
Epoch 51/70
1426/1426 [=====] - 0s 345us/step - loss: 1.8326 - mae:
Epoch 52/70
1426/1426 [=====] - 0s 319us/step - loss: 1.8179 - mae:
Epoch 53/70
1426/1426 [=====] - 0s 350us/step - loss: 1.7927 - mae:
Epoch 54/70
1426/1426 [=====] - 0s 322us/step - loss: 1.8869 - mae:
Epoch 55/70
1426/1426 [=====] - 0s 313us/step - loss: 1.9019 - mae:
Epoch 56/70
1426/1426 [=====] - 1s 359us/step - loss: 1.8054 - mae:
Epoch 57/70
1426/1426 [=====] - 0s 320us/step - loss: 1.8970 - mae:
Epoch 58/70
1426/1426 [=====] - 0s 337us/step - loss: 1.7583 - mae:
Epoch 59/70
1426/1426 [=====] - 1s 358us/step - loss: 1.8070 - mae:
Epoch 60/70
1426/1426 [=====] - 1s 351us/step - loss: 1.8396 - mae:
Epoch 61/70
1426/1426 [=====] - 0s 347us/step - loss: 1.7768 - mae:
Epoch 62/70
1426/1426 [=====] - 0s 340us/step - loss: 1.7191 - mae:
Epoch 63/70
1426/1426 [=====] - 1s 366us/step - loss: 1.7741 - mae:
Epoch 64/70
1426/1426 [=====] - 1s 355us/step - loss: 1.7720 - mae:
Epoch 65/70
1426/1426 [=====] - 1s 356us/step - loss: 1.8011 - mae:
Epoch 66/70
1426/1426 [=====] - 1s 357us/step - loss: 1.7465 - mae:
Epoch 67/70
1426/1426 [=====] - 1s 361us/step - loss: 1.7672 - mae:
Epoch 68/70
1426/1426 [=====] - 0s 320us/step - loss: 1.7780 - mae:
-----
```

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4/22/2020 AES.ipynb - Colaboratory
1426/1426 [=====] - 0s 330us/step - loss: 1.7789 - mae:
Epoch 69/70
1426/1426 [=====] - 1s 359us/step - loss: 1.8069 - mae:
Epoch 70/70
1426/1426 [=====] - 0s 321us/step - loss: 1.7933 - mae:
```



Kappa Score: 0.5837948120081609

-----Fold 3-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.26175808906555176 sec  
Time to train the word2vec model: 8.970890998840332 mins  
Model: "sequential\_3"

Layer (type)	Output Shape	Param #
=====		
bidirectional_5 (Bidirection (None, 1, 600))		1682400
bidirectional_6 (Bidirection (None, 200))		560800
dropout_3 (Dropout)	(None, 200)	0
dense_3 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

```
Epoch 1/70
1426/1426 [=====] - 2s 1ms/step - loss: 43.4500 - mae: 6
Epoch 2/70
1426/1426 [=====] - 0s 325us/step - loss: 7.2598 - mae:
Epoch 3/70
1426/1426 [=====] - 1s 357us/step - loss: 4.5394 - mae:
Epoch 4/70
1426/1426 [=====] - 0s 334us/step - loss: 3.1117 - mae:
Epoch 5/70
1426/1426 [=====] - 1s 358us/step - loss: 2.4528 - mae:
Epoch 6/70
1426/1426 [=====] - 0s 340us/step - loss: 2.3267 - mae:
```

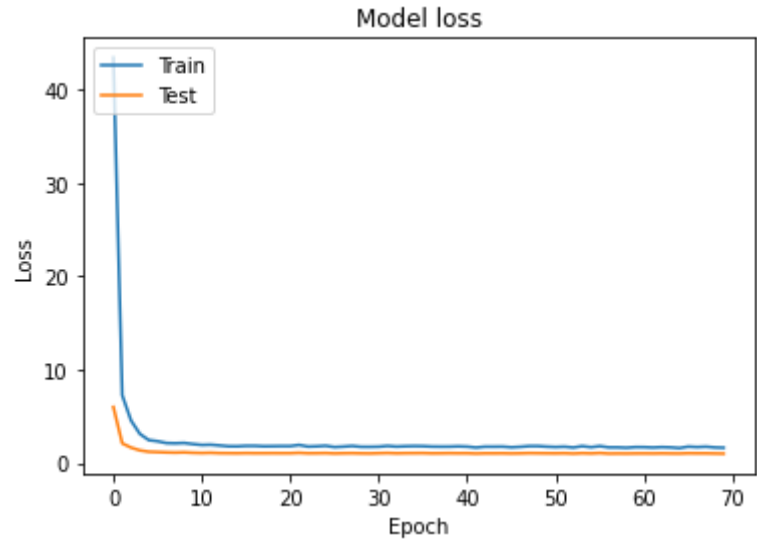
```
Epoch 7/70
1426/1426 [=====] - 1s 357us/step - loss: 2.1328 - mae:
Epoch 8/70
1426/1426 [=====] - 0s 336us/step - loss: 2.1078 - mae:
Epoch 9/70
1426/1426 [=====] - 0s 338us/step - loss: 2.1430 - mae:
Epoch 10/70
1426/1426 [=====] - 0s 339us/step - loss: 2.0259 - mae:
Epoch 11/70
1426/1426 [=====] - 1s 374us/step - loss: 1.9331 - mae:
Epoch 12/70
1426/1426 [=====] - 0s 347us/step - loss: 1.9589 - mae:
Epoch 13/70
1426/1426 [=====] - 0s 348us/step - loss: 1.8781 - mae:
Epoch 14/70
1426/1426 [=====] - 0s 310us/step - loss: 1.7917 - mae:
Epoch 15/70
1426/1426 [=====] - 0s 340us/step - loss: 1.7853 - mae:
Epoch 16/70
1426/1426 [=====] - 1s 364us/step - loss: 1.8331 - mae:
Epoch 17/70
1426/1426 [=====] - 0s 345us/step - loss: 1.8333 - mae:
Epoch 18/70
1426/1426 [=====] - 0s 309us/step - loss: 1.7899 - mae:
Epoch 19/70
1426/1426 [=====] - 0s 310us/step - loss: 1.7995 - mae:
Epoch 20/70
1426/1426 [=====] - 0s 340us/step - loss: 1.8114 - mae:
Epoch 21/70
1426/1426 [=====] - 1s 352us/step - loss: 1.8080 - mae:
Epoch 22/70
1426/1426 [=====] - 0s 320us/step - loss: 1.9325 - mae:
Epoch 23/70
1426/1426 [=====] - 0s 324us/step - loss: 1.7578 - mae:
Epoch 24/70
1426/1426 [=====] - 0s 334us/step - loss: 1.7875 - mae:
Epoch 25/70
1426/1426 [=====] - 0s 325us/step - loss: 1.8430 - mae:
Epoch 26/70
1426/1426 [=====] - 0s 318us/step - loss: 1.7051 - mae:
Epoch 27/70
1426/1426 [=====] - 1s 351us/step - loss: 1.7544 - mae:
Epoch 28/70
1426/1426 [=====] - 1s 353us/step - loss: 1.8255 - mae:
Epoch 29/70
1426/1426 [=====] - 0s 337us/step - loss: 1.7315 - mae:
Epoch 30/70
1426/1426 [=====] - 1s 351us/step - loss: 1.7285 - mae:
Epoch 31/70
1426/1426 [=====] - 0s 311us/step - loss: 1.7461 - mae:
Epoch 32/70
1426/1426 [=====] - 0s 348us/step - loss: 1.8281 - mae:
Epoch 33/70
1426/1426 [=====] - 0s 324us/step - loss: 1.7566 - mae:
Epoch 34/70
1426/1426 [=====] - 0s 328us/step - loss: 1.7931 - mae:
Epoch 35/70
1426/1426 [=====] - 0s 323us/step - loss: 1.8118 - mae:
```

```
1426/1426 [-----] - 0s 323us/step - loss: 1.8110 - mae:  
Epoch 36/70  
1426/1426 [=====] - 0s 331us/step - loss: 1.8018 - mae:  
Epoch 37/70  
1426/1426 [=====] - 0s 333us/step - loss: 1.7572 - mae:  
Epoch 38/70  
1426/1426 [=====] - 0s 327us/step - loss: 1.7484 - mae:  
Epoch 39/70  
1426/1426 [=====] - 0s 321us/step - loss: 1.7518 - mae:  
Epoch 40/70  
1426/1426 [=====] - 0s 329us/step - loss: 1.7825 - mae:  
Epoch 41/70  
1426/1426 [=====] - 0s 341us/step - loss: 1.7520 - mae:  
Epoch 42/70  
1426/1426 [=====] - 1s 351us/step - loss: 1.6538 - mae:  
Epoch 43/70  
1426/1426 [=====] - 1s 363us/step - loss: 1.7453 - mae:  
Epoch 44/70  
1426/1426 [=====] - 0s 336us/step - loss: 1.7446 - mae:  
Epoch 45/70  
1426/1426 [=====] - 1s 363us/step - loss: 1.7525 - mae:  
Epoch 46/70  
1426/1426 [=====] - 0s 326us/step - loss: 1.6797 - mae:  
Epoch 47/70  
1426/1426 [=====] - 0s 314us/step - loss: 1.7306 - mae:  
Epoch 48/70  
1426/1426 [=====] - 0s 340us/step - loss: 1.8083 - mae:  
Epoch 49/70  
1426/1426 [=====] - 0s 311us/step - loss: 1.8096 - mae:  
Epoch 50/70  
1426/1426 [=====] - 0s 315us/step - loss: 1.7493 - mae:  
Epoch 51/70  
1426/1426 [=====] - 0s 335us/step - loss: 1.7098 - mae:  
Epoch 52/70  
1426/1426 [=====] - 0s 347us/step - loss: 1.7449 - mae:  
Epoch 53/70  
1426/1426 [=====] - 1s 357us/step - loss: 1.6548 - mae:  
Epoch 54/70  
1426/1426 [=====] - 1s 355us/step - loss: 1.8058 - mae:  
Epoch 55/70  
1426/1426 [=====] - 0s 330us/step - loss: 1.6905 - mae:  
Epoch 56/70  
1426/1426 [=====] - 1s 361us/step - loss: 1.8069 - mae:  
Epoch 57/70  
1426/1426 [=====] - 0s 326us/step - loss: 1.6697 - mae:  
Epoch 58/70  
1426/1426 [=====] - 0s 328us/step - loss: 1.6697 - mae:  
Epoch 59/70  
1426/1426 [=====] - 0s 322us/step - loss: 1.6297 - mae:  
Epoch 60/70  
1426/1426 [=====] - 1s 362us/step - loss: 1.6991 - mae:  
Epoch 61/70  
1426/1426 [=====] - 1s 365us/step - loss: 1.6947 - mae:  
Epoch 62/70  
1426/1426 [=====] - 1s 356us/step - loss: 1.6540 - mae:  
Epoch 63/70  
1426/1426 [=====] - 1s 352us/step - loss: 1.6976 - mae:  
Epoch 64/70
```

4/22/2020

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1426/1426 [=====] - 0s 306us/step - loss: 1.6672 - mae:  
Epoch 65/70  
1426/1426 [=====] - 0s 324us/step - loss: 1.5965 - mae:  
Epoch 66/70  
1426/1426 [=====] - 0s 316us/step - loss: 1.7526 - mae:  
Epoch 67/70  
1426/1426 [=====] - 0s 340us/step - loss: 1.7038 - mae:  
Epoch 68/70  
1426/1426 [=====] - 0s 343us/step - loss: 1.7449 - mae:  
Epoch 69/70  
1426/1426 [=====] - 0s 324us/step - loss: 1.6608 - mae:  
Epoch 70/70  
1426/1426 [=====] - 0s 305us/step - loss: 1.6309 - mae:



Kappa Score: 0.4902762050120625

-----Fold 4-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.2515127658843994 sec  
Time to train the word2vec model: 8.912643671035767 mins  
Model: "sequential\_4"

Layer (type)	Output Shape	Param #
=====		
bidirectional_7 (Bidirection	(None, 1, 600)	1682400
bidirectional_8 (Bidirection	(None, 200)	560800
dropout_4 (Dropout)	(None, 200)	0
dense_4 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70  
1427/1427 [=====] - 2s 1ms/step - loss: 43.4006 - mae: 5  
Epoch 2/70  
1427/1427 [=====] - 1s 371us/step - loss: 7.5000 - mae:

```
1427/1427 [=====] - 1s 311us/step - loss: 7.5000 - mae:
Epoch 3/70
1427/1427 [=====] - 0s 333us/step - loss: 4.6418 - mae:
Epoch 4/70
1427/1427 [=====] - 0s 339us/step - loss: 3.0968 - mae:
Epoch 5/70
1427/1427 [=====] - 0s 337us/step - loss: 2.7275 - mae:
Epoch 6/70
1427/1427 [=====] - 1s 363us/step - loss: 2.4783 - mae:
Epoch 7/70
1427/1427 [=====] - 0s 333us/step - loss: 2.2605 - mae:
Epoch 8/70
1427/1427 [=====] - 1s 359us/step - loss: 2.0701 - mae:
Epoch 9/70
1427/1427 [=====] - 0s 317us/step - loss: 2.1689 - mae:
Epoch 10/70
1427/1427 [=====] - 1s 362us/step - loss: 2.0475 - mae:
Epoch 11/70
1427/1427 [=====] - 0s 344us/step - loss: 1.9665 - mae:
Epoch 12/70
1427/1427 [=====] - 1s 365us/step - loss: 2.0324 - mae:
Epoch 13/70
1427/1427 [=====] - 0s 348us/step - loss: 1.9540 - mae:
Epoch 14/70
1427/1427 [=====] - 1s 354us/step - loss: 1.9283 - mae:
Epoch 15/70
1427/1427 [=====] - 0s 323us/step - loss: 1.9463 - mae:
Epoch 16/70
1427/1427 [=====] - 0s 349us/step - loss: 1.9148 - mae:
Epoch 17/70
1427/1427 [=====] - 0s 327us/step - loss: 1.9934 - mae:
Epoch 18/70
1427/1427 [=====] - 0s 349us/step - loss: 1.8383 - mae:
Epoch 19/70
1427/1427 [=====] - 0s 301us/step - loss: 1.8528 - mae:
Epoch 20/70
1427/1427 [=====] - 0s 340us/step - loss: 1.9551 - mae:
Epoch 21/70
1427/1427 [=====] - 1s 362us/step - loss: 1.9654 - mae:
Epoch 22/70
1427/1427 [=====] - 1s 352us/step - loss: 1.8270 - mae:
Epoch 23/70
1427/1427 [=====] - 0s 336us/step - loss: 1.9083 - mae:
Epoch 24/70
1427/1427 [=====] - 0s 332us/step - loss: 1.8242 - mae:
Epoch 25/70
1427/1427 [=====] - 0s 336us/step - loss: 1.8819 - mae:
Epoch 26/70
1427/1427 [=====] - 0s 305us/step - loss: 1.8851 - mae:
Epoch 27/70
1427/1427 [=====] - 0s 312us/step - loss: 1.9072 - mae:
Epoch 28/70
1427/1427 [=====] - 0s 346us/step - loss: 1.8217 - mae:
Epoch 29/70
1427/1427 [=====] - 0s 331us/step - loss: 1.8981 - mae:
Epoch 30/70
1427/1427 [=====] - 0s 334us/step - loss: 1.8177 - mae:
Epoch 31/70
```

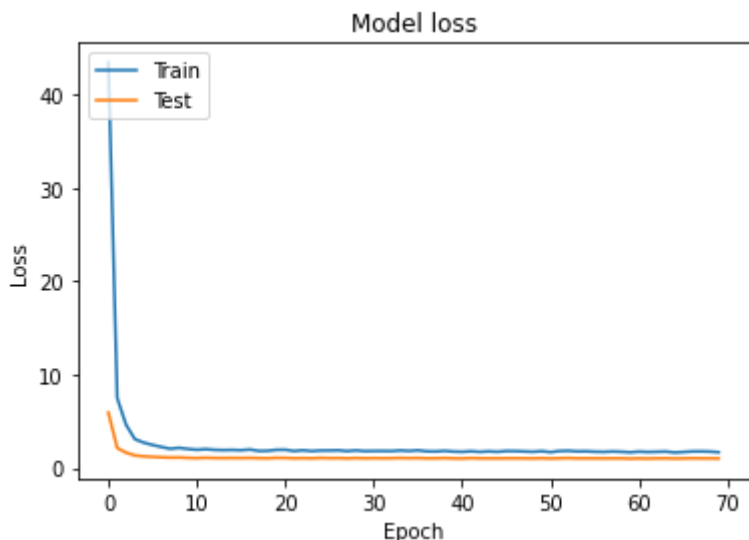


```
1427/1427 [=====] - 0s 323us/step - loss: 1.8363 - mae:
Epoch 32/70
1427/1427 [=====] - 0s 308us/step - loss: 1.8377 - mae:
Epoch 33/70
1427/1427 [=====] - 1s 355us/step - loss: 1.8265 - mae:
Epoch 34/70
1427/1427 [=====] - 0s 321us/step - loss: 1.8919 - mae:
Epoch 35/70
1427/1427 [=====] - 1s 360us/step - loss: 1.8385 - mae:
Epoch 36/70
1427/1427 [=====] - 0s 322us/step - loss: 1.9054 - mae:
Epoch 37/70
1427/1427 [=====] - 0s 349us/step - loss: 1.7985 - mae:
Epoch 38/70
1427/1427 [=====] - 0s 349us/step - loss: 1.7829 - mae:
Epoch 39/70
1427/1427 [=====] - 1s 355us/step - loss: 1.8480 - mae:
Epoch 40/70
1427/1427 [=====] - 0s 348us/step - loss: 1.7753 - mae:
Epoch 41/70
1427/1427 [=====] - 1s 361us/step - loss: 1.7449 - mae:
Epoch 42/70
1427/1427 [=====] - 0s 331us/step - loss: 1.8060 - mae:
Epoch 43/70
1427/1427 [=====] - 1s 357us/step - loss: 1.7396 - mae:
Epoch 44/70
1427/1427 [=====] - 1s 363us/step - loss: 1.7945 - mae:
Epoch 45/70
1427/1427 [=====] - 0s 346us/step - loss: 1.7500 - mae:
Epoch 46/70
1427/1427 [=====] - 0s 321us/step - loss: 1.8315 - mae:
Epoch 47/70
1427/1427 [=====] - 0s 306us/step - loss: 1.8216 - mae:
Epoch 48/70
1427/1427 [=====] - 0s 342us/step - loss: 1.7869 - mae:
Epoch 49/70
1427/1427 [=====] - 0s 320us/step - loss: 1.7485 - mae:
Epoch 50/70
1427/1427 [=====] - 0s 328us/step - loss: 1.8168 - mae:
Epoch 51/70
1427/1427 [=====] - 0s 340us/step - loss: 1.7077 - mae:
Epoch 52/70
1427/1427 [=====] - 0s 350us/step - loss: 1.8326 - mae:
Epoch 53/70
1427/1427 [=====] - 0s 325us/step - loss: 1.8548 - mae:
Epoch 54/70
1427/1427 [=====] - 0s 337us/step - loss: 1.7906 - mae:
Epoch 55/70
1427/1427 [=====] - 0s 311us/step - loss: 1.8023 - mae:
Epoch 56/70
1427/1427 [=====] - 1s 359us/step - loss: 1.7569 - mae:
Epoch 57/70
1427/1427 [=====] - 1s 352us/step - loss: 1.7373 - mae:
Epoch 58/70
1427/1427 [=====] - 0s 341us/step - loss: 1.7823 - mae:
Epoch 59/70
1427/1427 [=====] - 0s 332us/step - loss: 1.7478 - mae:
Epoch 60/70
```

```

1427/1427 [=====] - 1s 354us/step - loss: 1.6914 - mae:
Epoch 61/70
1427/1427 [=====] - 0s 324us/step - loss: 1.7660 - mae:
Epoch 62/70
1427/1427 [=====] - 0s 335us/step - loss: 1.7247 - mae:
Epoch 63/70
1427/1427 [=====] - 0s 347us/step - loss: 1.7463 - mae:
Epoch 64/70
1427/1427 [=====] - 0s 325us/step - loss: 1.7762 - mae:
Epoch 65/70
1427/1427 [=====] - 0s 309us/step - loss: 1.6712 - mae:
Epoch 66/70
1427/1427 [=====] - 0s 322us/step - loss: 1.7223 - mae:
Epoch 67/70
1427/1427 [=====] - 0s 320us/step - loss: 1.7874 - mae:
Epoch 68/70
1427/1427 [=====] - 1s 357us/step - loss: 1.7894 - mae:
Epoch 69/70
1427/1427 [=====] - 0s 339us/step - loss: 1.7686 - mae:
Epoch 70/70
1427/1427 [=====] - 1s 351us/step - loss: 1.6996 - mae:

```



Kappa Score: 0.5271526035131744

-----Fold 5-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.25843358039855957 sec
Time to train the word2vec model: 8.947765588760376 mins
Model: "sequential_5"

```

Layer (type)	Output Shape	Param #
=====		
bidirectional_9 (Bidirection (None, 1, 600))		1682400
bidirectional_10 (Bidirectio (None, 200))		560800
dropout_5 (Dropout)	(None, 200)	0
dense_5 (Dense)	(None, 1)	201

=====  
Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

---

Epoch 1/70

1427/1427 [=====] - 2s 1ms/step - loss: 43.0086 - mae: 5

Epoch 2/70

1427/1427 [=====] - 0s 348us/step - loss: 7.3486 - mae:

Epoch 3/70

1427/1427 [=====] - 0s 327us/step - loss: 4.5432 - mae:

Epoch 4/70

1427/1427 [=====] - 0s 339us/step - loss: 3.1651 - mae:

Epoch 5/70

1427/1427 [=====] - 0s 299us/step - loss: 2.4952 - mae:

Epoch 6/70

1427/1427 [=====] - 0s 309us/step - loss: 2.3425 - mae:

Epoch 7/70

1427/1427 [=====] - 0s 335us/step - loss: 2.1850 - mae:

Epoch 8/70

1427/1427 [=====] - 0s 328us/step - loss: 2.1456 - mae:

Epoch 9/70

1427/1427 [=====] - 0s 347us/step - loss: 1.9982 - mae:

Epoch 10/70

1427/1427 [=====] - 0s 344us/step - loss: 2.0016 - mae:

Epoch 11/70

1427/1427 [=====] - 0s 339us/step - loss: 1.8545 - mae:

Epoch 12/70

1427/1427 [=====] - 1s 353us/step - loss: 1.9380 - mae:

Epoch 13/70

1427/1427 [=====] - 0s 309us/step - loss: 1.8427 - mae:

Epoch 14/70

1427/1427 [=====] - 0s 338us/step - loss: 1.9321 - mae:

Epoch 15/70

1427/1427 [=====] - 0s 337us/step - loss: 1.9303 - mae:

Epoch 16/70

1427/1427 [=====] - 0s 331us/step - loss: 1.8899 - mae:

Epoch 17/70

1427/1427 [=====] - 0s 322us/step - loss: 1.9133 - mae:

Epoch 18/70

1427/1427 [=====] - 0s 339us/step - loss: 1.8598 - mae:

Epoch 19/70

1427/1427 [=====] - 1s 374us/step - loss: 1.7873 - mae:

Epoch 20/70

1427/1427 [=====] - 0s 348us/step - loss: 1.8575 - mae:

Epoch 21/70

1427/1427 [=====] - 0s 330us/step - loss: 1.7771 - mae:

Epoch 22/70

1427/1427 [=====] - 1s 382us/step - loss: 1.7819 - mae:

Epoch 23/70

1427/1427 [=====] - 0s 334us/step - loss: 1.7858 - mae:

Epoch 24/70

1427/1427 [=====] - 0s 321us/step - loss: 1.7027 - mae:

Epoch 25/70

1427/1427 [=====] - 0s 347us/step - loss: 1.7835 - mae:

Epoch 26/70

1427/1427 [=====] - 0s 349us/step - loss: 1.7958 - mae:

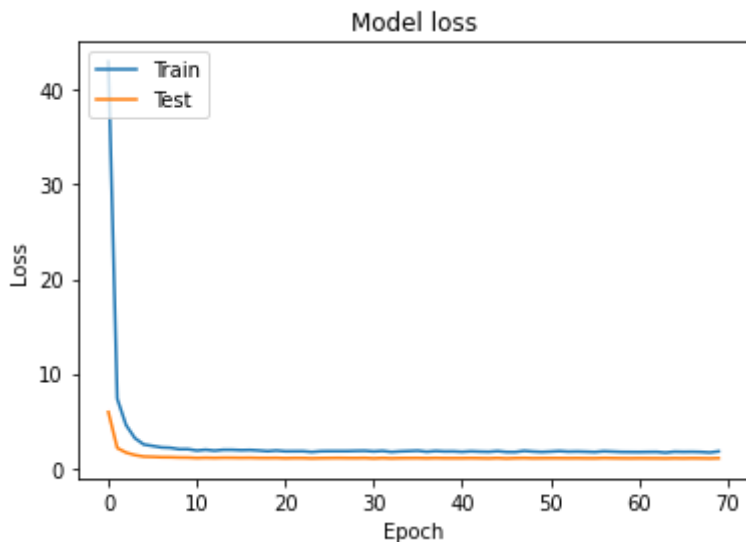
Epoch 27/70

```
1427/1427 [=====] - 0s 347us/step - loss: 1.7961 - mae:
Epoch 28/70
1427/1427 [=====] - 0s 336us/step - loss: 1.7952 - mae:
Epoch 29/70
1427/1427 [=====] - 0s 341us/step - loss: 1.8184 - mae:
Epoch 30/70
1427/1427 [=====] - 1s 369us/step - loss: 1.8317 - mae:
Epoch 31/70
1427/1427 [=====] - 0s 342us/step - loss: 1.7625 - mae:
Epoch 32/70
1427/1427 [=====] - 0s 346us/step - loss: 1.8219 - mae:
Epoch 33/70
1427/1427 [=====] - 1s 362us/step - loss: 1.7049 - mae:
Epoch 34/70
1427/1427 [=====] - 1s 380us/step - loss: 1.7704 - mae:
Epoch 35/70
1427/1427 [=====] - 1s 358us/step - loss: 1.8037 - mae:
Epoch 36/70
1427/1427 [=====] - 0s 315us/step - loss: 1.8407 - mae:
Epoch 37/70
1427/1427 [=====] - 0s 337us/step - loss: 1.7273 - mae:
Epoch 38/70
1427/1427 [=====] - 0s 344us/step - loss: 1.8119 - mae:
Epoch 39/70
1427/1427 [=====] - 0s 348us/step - loss: 1.7620 - mae:
Epoch 40/70
1427/1427 [=====] - 1s 359us/step - loss: 1.7693 - mae:
Epoch 41/70
1427/1427 [=====] - 1s 359us/step - loss: 1.7169 - mae:
Epoch 42/70
1427/1427 [=====] - 1s 354us/step - loss: 1.7808 - mae:
Epoch 43/70
1427/1427 [=====] - 1s 357us/step - loss: 1.7418 - mae:
Epoch 44/70
1427/1427 [=====] - 1s 363us/step - loss: 1.7204 - mae:
Epoch 45/70
1427/1427 [=====] - 0s 322us/step - loss: 1.7986 - mae:
Epoch 46/70
1427/1427 [=====] - 1s 358us/step - loss: 1.7012 - mae:
Epoch 47/70
1427/1427 [=====] - 0s 335us/step - loss: 1.6949 - mae:
Epoch 48/70
1427/1427 [=====] - 0s 305us/step - loss: 1.8243 - mae:
Epoch 49/70
1427/1427 [=====] - 0s 325us/step - loss: 1.7508 - mae:
Epoch 50/70
1427/1427 [=====] - 0s 326us/step - loss: 1.7027 - mae:
Epoch 51/70
1427/1427 [=====] - 0s 344us/step - loss: 1.7465 - mae:
Epoch 52/70
1427/1427 [=====] - 0s 300us/step - loss: 1.8004 - mae:
Epoch 53/70
1427/1427 [=====] - 0s 330us/step - loss: 1.7387 - mae:
Epoch 54/70
1427/1427 [=====] - 0s 308us/step - loss: 1.7564 - mae:
Epoch 55/70
1427/1427 [=====] - 0s 307us/step - loss: 1.7301 - mae:
Epoch 56/70
```

```

1427/1427 [=====] - 1s 351us/step - loss: 1.6953 - mae:
Epoch 57/70
1427/1427 [=====] - 1s 359us/step - loss: 1.7840 - mae:
Epoch 58/70
1427/1427 [=====] - 0s 338us/step - loss: 1.7463 - mae:
Epoch 59/70
1427/1427 [=====] - 0s 310us/step - loss: 1.7057 - mae:
Epoch 60/70
1427/1427 [=====] - 1s 354us/step - loss: 1.6998 - mae:
Epoch 61/70
1427/1427 [=====] - 1s 353us/step - loss: 1.6931 - mae:
Epoch 62/70
1427/1427 [=====] - 0s 345us/step - loss: 1.7070 - mae:
Epoch 63/70
1427/1427 [=====] - 1s 364us/step - loss: 1.7124 - mae:
Epoch 64/70
1427/1427 [=====] - 0s 318us/step - loss: 1.6335 - mae:
Epoch 65/70
1427/1427 [=====] - 0s 302us/step - loss: 1.7336 - mae:
Epoch 66/70
1427/1427 [=====] - 0s 326us/step - loss: 1.7134 - mae:
Epoch 67/70
1427/1427 [=====] - 0s 343us/step - loss: 1.7219 - mae:
Epoch 68/70
1427/1427 [=====] - 1s 368us/step - loss: 1.7011 - mae:
Epoch 69/70
1427/1427 [=====] - 0s 333us/step - loss: 1.6457 - mae:
Epoch 70/70
1427/1427 [=====] - 0s 338us/step - loss: 1.7660 - mae:

```



Kappa Score: 0.450233353695785

Average kappa score value is : 0.5120679223557096

-----SET 2-----

(1800, 7)

(1800, )

-----Fold 1-----

Converting sentences to word2vec model

4 cores using  
 Time to build vocab using word2vec: 0.25551414489746094 sec  
 Time to train the word2vec model: 8.659111022949219 mins  
 Model: "sequential\_6"

Layer (type)	Output Shape	Param #
bidirectional_11 (Bidirectio	(None, 1, 600)	1682400
bidirectional_12 (Bidirectio	(None, 200)	560800
dropout_6 (Dropout)	(None, 200)	0
dense_6 (Dense)	(None, 1)	201

=====  
 Total params: 2,243,401  
 Trainable params: 2,243,401  
 Non-trainable params: 0

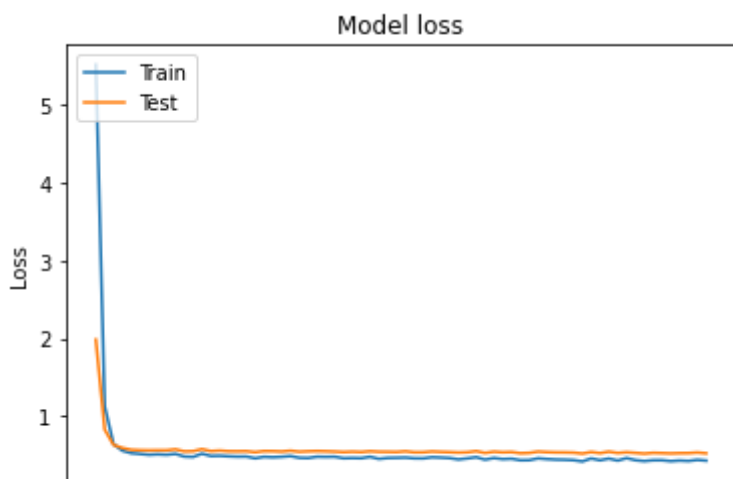
```
Epoch 1/70
1440/1440 [=====] - 2s 1ms/step - loss: 5.5126 - mae: 1.
Epoch 2/70
1440/1440 [=====] - 0s 320us/step - loss: 1.1251 - mae:
Epoch 3/70
1440/1440 [=====] - 0s 332us/step - loss: 0.6392 - mae:
Epoch 4/70
1440/1440 [=====] - 0s 328us/step - loss: 0.5555 - mae:
Epoch 5/70
1440/1440 [=====] - 0s 344us/step - loss: 0.5239 - mae:
Epoch 6/70
1440/1440 [=====] - 0s 322us/step - loss: 0.5140 - mae:
Epoch 7/70
1440/1440 [=====] - 0s 324us/step - loss: 0.5031 - mae:
Epoch 8/70
1440/1440 [=====] - 1s 353us/step - loss: 0.5087 - mae:
Epoch 9/70
1440/1440 [=====] - 0s 335us/step - loss: 0.5031 - mae:
Epoch 10/70
1440/1440 [=====] - 1s 349us/step - loss: 0.5145 - mae:
Epoch 11/70
1440/1440 [=====] - 0s 307us/step - loss: 0.4800 - mae:
Epoch 12/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4756 - mae:
Epoch 13/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5170 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4878 - mae:
Epoch 15/70
1440/1440 [=====] - 1s 353us/step - loss: 0.4903 - mae:
Epoch 16/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4834 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 323us/step - loss: 0.4792 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 315us/step - loss: 0.4805 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 330us/step - loss: 0.4575 - mae:
Epoch 20/70
```

```
1440/1440 [=====] - 1s 363us/step - loss: 0.4765 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4713 - mae:
Epoch 22/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4766 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4864 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 312us/step - loss: 0.4640 - mae:
Epoch 25/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4613 - mae:
Epoch 26/70
1440/1440 [=====] - 1s 355us/step - loss: 0.4779 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 313us/step - loss: 0.4759 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 301us/step - loss: 0.4777 - mae:
Epoch 29/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4583 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 301us/step - loss: 0.4613 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 301us/step - loss: 0.4588 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 325us/step - loss: 0.4769 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4503 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4622 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4638 - mae:
Epoch 36/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4669 - mae:
Epoch 37/70
1440/1440 [=====] - 1s 353us/step - loss: 0.4574 - mae:
Epoch 38/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4564 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4714 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4665 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4607 - mae:
Epoch 42/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4432 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4565 - mae:
Epoch 44/70
1440/1440 [=====] - 1s 353us/step - loss: 0.4721 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4405 - mae:
Epoch 46/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4616 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 340us/step - loss: 0.4472 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 362us/step - loss: 0.4522 - mae:
Epoch 49/70
```

```

Epoch 49/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4326 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4339 - mae:
Epoch 51/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4571 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4477 - mae:
Epoch 53/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4415 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4389 - mae:
Epoch 55/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4342 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4170 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 340us/step - loss: 0.4557 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4326 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4543 - mae:
Epoch 60/70
1440/1440 [=====] - 1s 370us/step - loss: 0.4284 - mae:
Epoch 61/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4603 - mae:
Epoch 62/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4335 - mae:
Epoch 63/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4220 - mae:
Epoch 64/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4326 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4329 - mae:
Epoch 66/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4212 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4289 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4234 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4375 - mae:
Epoch 70/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4277 - mae:

```





0 10 20 30 40 50 60 70  
Epoch

Kappa Score: 0.4659624413145539

-----Fold 2-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.2505044937133789 sec

Time to train the word2vec model: 8.646145343780518 mins

Model: "sequential\_7"

Layer (type)	Output Shape	Param #
bidirectional_13 (Bidirectio	(None, 1, 600)	1682400
bidirectional_14 (Bidirectio	(None, 200)	560800
dropout_7 (Dropout)	(None, 200)	0
dense_7 (Dense)	(None, 1)	201

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1440/1440 [=====] - 2s 1ms/step - loss: 5.3790 - mae: 1.

Epoch 2/70

1440/1440 [=====] - 0s 339us/step - loss: 1.0242 - mae:

Epoch 3/70

1440/1440 [=====] - 1s 348us/step - loss: 0.6399 - mae:

Epoch 4/70

1440/1440 [=====] - 0s 341us/step - loss: 0.5834 - mae:

Epoch 5/70

1440/1440 [=====] - 1s 368us/step - loss: 0.5391 - mae:

Epoch 6/70

1440/1440 [=====] - 1s 350us/step - loss: 0.5264 - mae:

Epoch 7/70

1440/1440 [=====] - 0s 301us/step - loss: 0.5368 - mae:

Epoch 8/70

1440/1440 [=====] - 0s 317us/step - loss: 0.5060 - mae:

Epoch 9/70

1440/1440 [=====] - 0s 302us/step - loss: 0.4860 - mae:

Epoch 10/70

1440/1440 [=====] - 0s 323us/step - loss: 0.4805 - mae:

Epoch 11/70

1440/1440 [=====] - 0s 319us/step - loss: 0.4862 - mae:

Epoch 12/70

1440/1440 [=====] - 0s 339us/step - loss: 0.4899 - mae:

Epoch 13/70

1440/1440 [=====] - 0s 339us/step - loss: 0.4906 - mae:

Epoch 14/70

1440/1440 [=====] - 0s 305us/step - loss: 0.4811 - mae:

Epoch 15/70

1440/1440 [=====] - 1s 361us/step - loss: 0.4863 - mae:

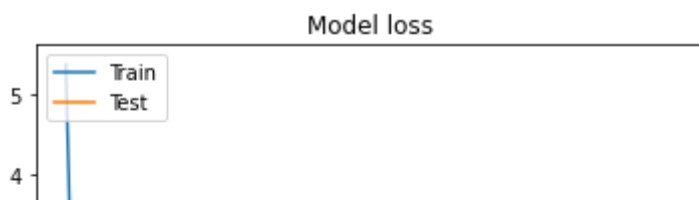
Epoch 16/70

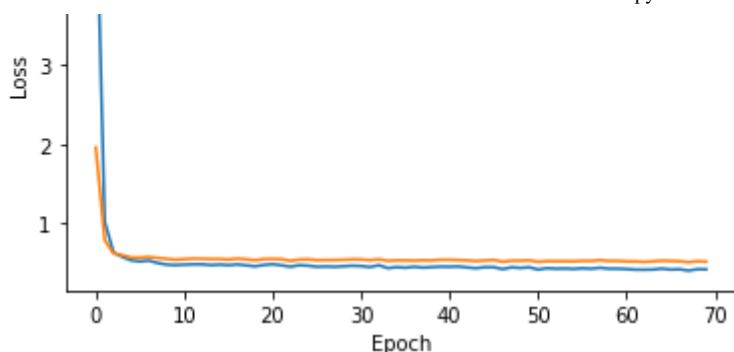
```
Epoch 16/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4801 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4885 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4772 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4652 - mae:
Epoch 20/70
1440/1440 [=====] - 1s 353us/step - loss: 0.4818 - mae:
Epoch 21/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4917 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4777 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4599 - mae:
Epoch 24/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4793 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4728 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4596 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4623 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4591 - mae:
Epoch 29/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4655 - mae:
Epoch 30/70
1440/1440 [=====] - 1s 347us/step - loss: 0.4725 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 337us/step - loss: 0.4683 - mae:
Epoch 32/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4557 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4789 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4422 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 340us/step - loss: 0.4546 - mae:
Epoch 36/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4483 - mae:
Epoch 37/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4590 - mae:
Epoch 38/70
1440/1440 [=====] - 0s 302us/step - loss: 0.4493 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4552 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 307us/step - loss: 0.4609 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4598 - mae:
Epoch 42/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4625 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4508 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4410 - mae:
```

```

Epoch 45/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4550 - mae:
Epoch 46/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4538 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4296 - mae:
Epoch 48/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4528 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 347us/step - loss: 0.4447 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4529 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4247 - mae:
Epoch 52/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4410 - mae:
Epoch 53/70
1440/1440 [=====] - 1s 368us/step - loss: 0.4354 - mae:
Epoch 54/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4371 - mae:
Epoch 55/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4327 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4405 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 325us/step - loss: 0.4350 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4465 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4348 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4350 - mae:
Epoch 61/70
1440/1440 [=====] - 1s 371us/step - loss: 0.4304 - mae:
Epoch 62/70
1440/1440 [=====] - 0s 315us/step - loss: 0.4233 - mae:
Epoch 63/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4229 - mae:
Epoch 64/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4248 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4362 - mae:
Epoch 66/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4246 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4286 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4108 - mae:
Epoch 69/70
1440/1440 [=====] - 1s 366us/step - loss: 0.4290 - mae:
Epoch 70/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4270 - mae:

```





Kappa Score: 0.4787533597849737

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.25393176078796387 sec

Time to train the word2vec model: 8.690581560134888 mins

Model: "sequential\_8"

Layer (type)	Output Shape	Param #
=====		
bidirectional_15 (Bidirectio	(None, 1, 600)	1682400
bidirectional_16 (Bidirectio	(None, 200)	560800
dropout_8 (Dropout)	(None, 200)	0
dense_8 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

1440/1440 [=====] - 2s 1ms/step - loss: 5.4711 - mae: 1.

Epoch 2/70

1440/1440 [=====] - 1s 357us/step - loss: 1.1372 - mae:

Epoch 3/70

1440/1440 [=====] - 1s 351us/step - loss: 0.6674 - mae:

Epoch 4/70

1440/1440 [=====] - 1s 358us/step - loss: 0.5885 - mae:

Epoch 5/70

1440/1440 [=====] - 0s 345us/step - loss: 0.5347 - mae:

Epoch 6/70

1440/1440 [=====] - 0s 307us/step - loss: 0.5522 - mae:

Epoch 7/70

1440/1440 [=====] - 1s 354us/step - loss: 0.5196 - mae:

Epoch 8/70

1440/1440 [=====] - 0s 298us/step - loss: 0.5293 - mae:

Epoch 9/70

1440/1440 [=====] - 0s 309us/step - loss: 0.5010 - mae:

Epoch 10/70

1440/1440 [=====] - 0s 327us/step - loss: 0.5104 - mae:

Epoch 11/70

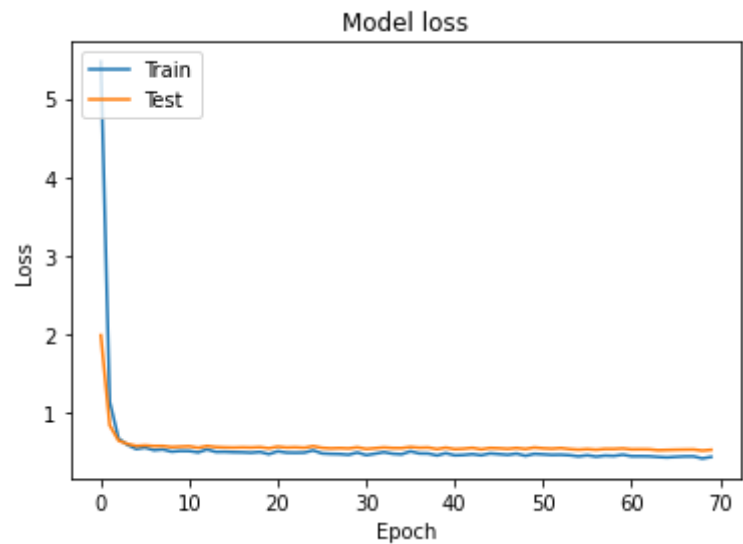
1440/1440 [=====] - 0s 313us/step - loss: 0.5092 - mae:

Epoch 12/70

```
Epoch 12/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4915 - mae:
Epoch 13/70
1440/1440 [=====] - 1s 352us/step - loss: 0.5299 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 315us/step - loss: 0.4977 - mae:
Epoch 15/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4985 - mae:
Epoch 16/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4941 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4925 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4876 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4972 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4690 - mae:
Epoch 21/70
1440/1440 [=====] - 1s 369us/step - loss: 0.5058 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4881 - mae:
Epoch 23/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4871 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4883 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 352us/step - loss: 0.5178 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 322us/step - loss: 0.4782 - mae:
Epoch 27/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4725 - mae:
Epoch 28/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4702 - mae:
Epoch 29/70
1440/1440 [=====] - 1s 372us/step - loss: 0.4615 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4902 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4565 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4747 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4947 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4741 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 304us/step - loss: 0.4670 - mae:
Epoch 36/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5054 - mae:
Epoch 37/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4782 - mae:
Epoch 38/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4770 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4522 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4814 - mae:
```

```
Epoch 41/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4542 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4583 - mae:
Epoch 43/70
1440/1440 [=====] - 1s 362us/step - loss: 0.4694 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4549 - mae:
Epoch 45/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4779 - mae:
Epoch 46/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4695 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4605 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4756 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4480 - mae:
Epoch 50/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4724 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4664 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4599 - mae:
Epoch 53/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4619 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4553 - mae:
Epoch 55/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4406 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4550 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4374 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 304us/step - loss: 0.4508 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 303us/step - loss: 0.4463 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4624 - mae:
Epoch 61/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4426 - mae:
Epoch 62/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4430 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4415 - mae:
Epoch 64/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4334 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4276 - mae:
Epoch 66/70
1440/1440 [=====] - 0s 313us/step - loss: 0.4348 - mae:
Epoch 67/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4401 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4407 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4139 - mae:
```

Epoch 70/70  
1440/1440 [=====] - 0s 331us/step - loss: 0.4342 - mae:



Kappa Score: 0.4062281503791749

-----Fold 4-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.25275254249572754 sec  
Time to train the word2vec model: 8.501373767852783 mins  
Model: "sequential\_9"

Layer (type)	Output Shape	Param #
=====		
bidirectional_17 (Bidirectio	(None, 1, 600)	1682400
bidirectional_18 (Bidirectio	(None, 200)	560800
dropout_9 (Dropout)	(None, 200)	0
dense_9 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

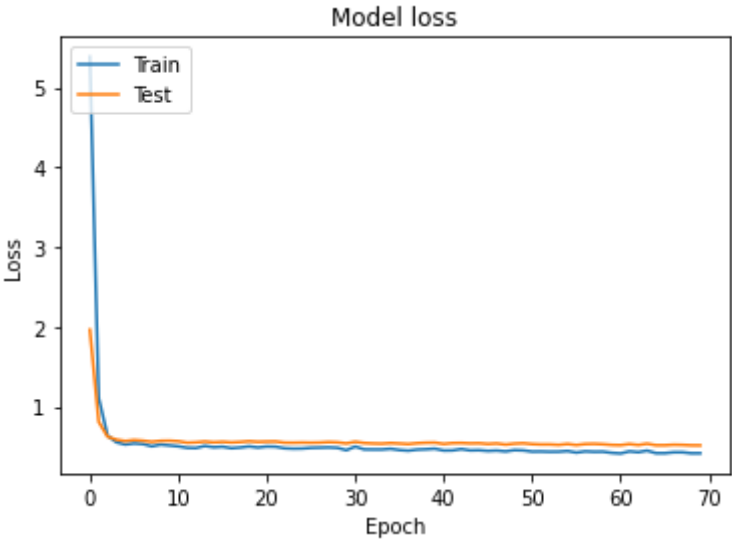
Epoch 1/70  
1440/1440 [=====] - 2s 1ms/step - loss: 5.3875 - mae: 1.  
Epoch 2/70  
1440/1440 [=====] - 1s 350us/step - loss: 1.1096 - mae:  
Epoch 3/70  
1440/1440 [=====] - 1s 353us/step - loss: 0.6369 - mae:  
Epoch 4/70  
1440/1440 [=====] - 0s 338us/step - loss: 0.5534 - mae:  
Epoch 5/70  
1440/1440 [=====] - 0s 313us/step - loss: 0.5257 - mae:  
Epoch 6/70  
1440/1440 [=====] - 0s 330us/step - loss: 0.5391 - mae:  
Epoch 7/70  
1440/1440 [=====] - 1s 377us/step - loss: 0.5319 - mae:

```
Epoch 8/70
1440/1440 [=====] - 0s 339us/step - loss: 0.5033 - mae:
Epoch 9/70
1440/1440 [=====] - 1s 363us/step - loss: 0.5245 - mae:
Epoch 10/70
1440/1440 [=====] - 0s 320us/step - loss: 0.5140 - mae:
Epoch 11/70
1440/1440 [=====] - 0s 324us/step - loss: 0.5029 - mae:
Epoch 12/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4838 - mae:
Epoch 13/70
1440/1440 [=====] - 0s 322us/step - loss: 0.4815 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 321us/step - loss: 0.5077 - mae:
Epoch 15/70
1440/1440 [=====] - 0s 300us/step - loss: 0.4912 - mae:
Epoch 16/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4977 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 312us/step - loss: 0.4793 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4879 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 347us/step - loss: 0.5019 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 337us/step - loss: 0.4879 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 331us/step - loss: 0.5001 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4977 - mae:
Epoch 23/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4781 - mae:
Epoch 24/70
1440/1440 [=====] - 1s 359us/step - loss: 0.4735 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 360us/step - loss: 0.4751 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4834 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4859 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4889 - mae:
Epoch 29/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4837 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4540 - mae:
Epoch 31/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4998 - mae:
Epoch 32/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4645 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4632 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4629 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4716 - mae:
Epoch 36/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4563 - mae:
```



```
Epoch 37/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4483 - mae:
Epoch 38/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4616 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4659 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 337us/step - loss: 0.4731 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 325us/step - loss: 0.4501 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4515 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4684 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4517 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 322us/step - loss: 0.4541 - mae:
Epoch 46/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4450 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4497 - mae:
Epoch 48/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4389 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 318us/step - loss: 0.4553 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4514 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4364 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 293us/step - loss: 0.4376 - mae:
Epoch 53/70
1440/1440 [=====] - 0s 312us/step - loss: 0.4347 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 312us/step - loss: 0.4356 - mae:
Epoch 55/70
1440/1440 [=====] - 0s 299us/step - loss: 0.4437 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 297us/step - loss: 0.4245 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4393 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4344 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4356 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 307us/step - loss: 0.4207 - mae:
Epoch 61/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4131 - mae:
Epoch 62/70
1440/1440 [=====] - 0s 315us/step - loss: 0.4396 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4293 - mae:
Epoch 64/70
1440/1440 [=====] - 0s 304us/step - loss: 0.4490 - mae:
Epoch 65/70
1440/1440 [=====] - 0s 294us/step - loss: 0.4167 - mae:
```

```
4/22/2020 AES.ipynb - Colaboratory
1440/1440 [-----] - 0s 294us/step - loss: 0.4107 - mae:
Epoch 66/70
1440/1440 [=====] - 0s 322us/step - loss: 0.4165 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4281 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4281 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4153 - mae:
Epoch 70/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4158 - mae:
```



Kappa Score: 0.4308035714285714

-----Fold 5-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.26012277603149414 sec  
Time to train the word2vec model: 8.555063486099243 mins  
Model: "sequential\_10"

Layer (type)	Output Shape	Param #
=====		
bidirectional_19 (Bidirectio	(None, 1, 600)	1682400
=====		
bidirectional_20 (Bidirectio	(None, 200)	560800
=====		
dropout_10 (Dropout)	(None, 200)	0
=====		
dense_10 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

```
Epoch 1/70
1440/1440 [=====] - 2s 1ms/step - loss: 5.3783 - mae: 1.
Epoch 2/70
1440/1440 [=====] - 0s 314us/step - loss: 1.1250 - mae:
Epoch 3/70
1440/1440 [=====] - 0s 309us/step - loss: 0.6880 - mae:
```

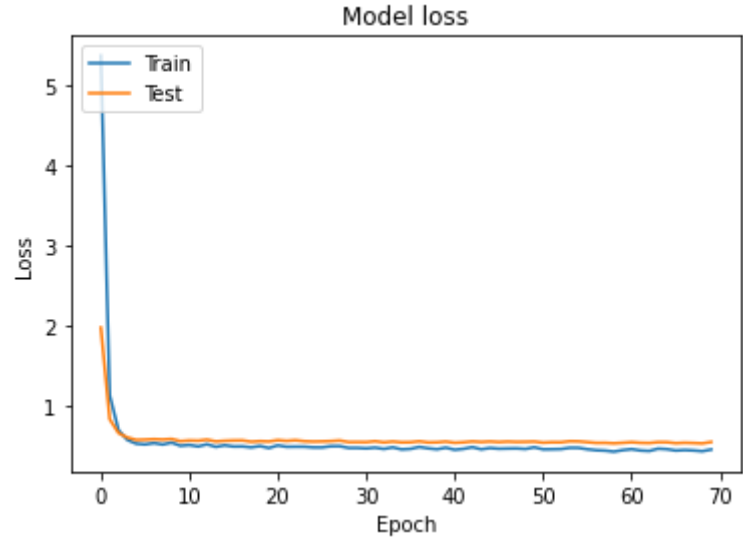
```
Epoch 4/70
1440/1440 [=====] - 0s 310us/step - loss: 0.5675 - mae:
Epoch 5/70
1440/1440 [=====] - 0s 343us/step - loss: 0.5200 - mae:
Epoch 6/70
1440/1440 [=====] - 0s 337us/step - loss: 0.5110 - mae:
Epoch 7/70
1440/1440 [=====] - 0s 325us/step - loss: 0.5279 - mae:
Epoch 8/70
1440/1440 [=====] - 0s 311us/step - loss: 0.5099 - mae:
Epoch 9/70
1440/1440 [=====] - 0s 346us/step - loss: 0.5336 - mae:
Epoch 10/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4936 - mae:
Epoch 11/70
1440/1440 [=====] - 0s 331us/step - loss: 0.5037 - mae:
Epoch 12/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4855 - mae:
Epoch 13/70
1440/1440 [=====] - 1s 351us/step - loss: 0.5121 - mae:
Epoch 14/70
1440/1440 [=====] - 1s 372us/step - loss: 0.4804 - mae:
Epoch 15/70
1440/1440 [=====] - 0s 318us/step - loss: 0.4999 - mae:
Epoch 16/70
1440/1440 [=====] - 0s 347us/step - loss: 0.4847 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4860 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 300us/step - loss: 0.4739 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 332us/step - loss: 0.4908 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 309us/step - loss: 0.4656 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4988 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4813 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4824 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4821 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4736 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 332us/step - loss: 0.4731 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4884 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4893 - mae:
Epoch 29/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4666 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4668 - mae:
Epoch 31/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4611 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4702 - mae:
```

```
1440/1440 [=====] - 0s 341us/step - loss: 0.4702 - mae:
Epoch 33/70
1440/1440 [=====] - 1s 368us/step - loss: 0.4544 - mae:
Epoch 34/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4741 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4485 - mae:
Epoch 36/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4548 - mae:
Epoch 37/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4788 - mae:
Epoch 38/70
1440/1440 [=====] - 0s 318us/step - loss: 0.4619 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 296us/step - loss: 0.4501 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4702 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4438 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4553 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 325us/step - loss: 0.4766 - mae:
Epoch 44/70
1440/1440 [=====] - 1s 370us/step - loss: 0.4496 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 332us/step - loss: 0.4661 - mae:
Epoch 46/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4570 - mae:
Epoch 47/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4596 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4609 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 306us/step - loss: 0.4540 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4748 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4490 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4503 - mae:
Epoch 53/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4524 - mae:
Epoch 54/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4683 - mae:
Epoch 55/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4676 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 340us/step - loss: 0.4502 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4381 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4331 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4203 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 347us/step - loss: 0.4390 - mae:
Epoch 61/70
```

4/22/2020

AES.ipynb - Colaboratory

1440/1440 [=====] - 1s 348us/step - loss: 0.4514 - mae:  
Epoch 62/70  
1440/1440 [=====] - 1s 349us/step - loss: 0.4347 - mae:  
Epoch 63/70  
1440/1440 [=====] - 1s 373us/step - loss: 0.4286 - mae:  
Epoch 64/70  
1440/1440 [=====] - 1s 347us/step - loss: 0.4576 - mae:  
Epoch 65/70  
1440/1440 [=====] - 1s 381us/step - loss: 0.4512 - mae:  
Epoch 66/70  
1440/1440 [=====] - 1s 364us/step - loss: 0.4340 - mae:  
Epoch 67/70  
1440/1440 [=====] - 1s 371us/step - loss: 0.4400 - mae:  
Epoch 68/70  
1440/1440 [=====] - 0s 337us/step - loss: 0.4349 - mae:  
Epoch 69/70  
1440/1440 [=====] - 1s 353us/step - loss: 0.4256 - mae:  
Epoch 70/70  
1440/1440 [=====] - 0s 321us/step - loss: 0.4466 - mae:



Kappa Score: 0.4639281129653402  
Average kappa score value is : 0.4491351271745228

-----SET 3-----

(1726, 4)  
(1726, )

-----Fold 1-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.11465001106262207 sec  
Time to train the word2vec model: 2.1772799491882324 mins  
Model: "sequential\_11"

Layer (type)	Output Shape	Param #
=====		
bidirectional_21 (Bidirectio	(None, 1, 600)	1682400
=====		
bidirectional_22 (Bidirectio	(None, 200)	560800

dropout_11 (Dropout)	(None, 200)	0
dense_11 (Dense)	(None, 1)	201

=====

Total params: 2,243,401  
 Trainable params: 2,243,401  
 Non-trainable params: 0

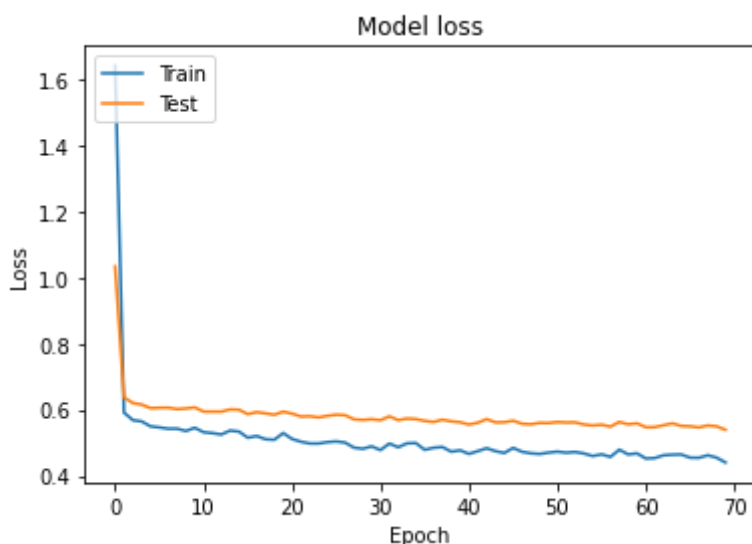
Epoch 1/70	1380/1380 [=====]	- 2s 1ms/step	- loss: 1.6399	- mae: 1.
Epoch 2/70	1380/1380 [=====]	- 0s 358us/step	- loss: 0.5914	- mae:
Epoch 3/70	1380/1380 [=====]	- 0s 334us/step	- loss: 0.5687	- mae:
Epoch 4/70	1380/1380 [=====]	- 0s 362us/step	- loss: 0.5649	- mae:
Epoch 5/70	1380/1380 [=====]	- 0s 338us/step	- loss: 0.5499	- mae:
Epoch 6/70	1380/1380 [=====]	- 0s 307us/step	- loss: 0.5467	- mae:
Epoch 7/70	1380/1380 [=====]	- 0s 325us/step	- loss: 0.5427	- mae:
Epoch 8/70	1380/1380 [=====]	- 0s 335us/step	- loss: 0.5429	- mae:
Epoch 9/70	1380/1380 [=====]	- 0s 347us/step	- loss: 0.5358	- mae:
Epoch 10/70	1380/1380 [=====]	- 1s 363us/step	- loss: 0.5455	- mae:
Epoch 11/70	1380/1380 [=====]	- 0s 324us/step	- loss: 0.5321	- mae:
Epoch 12/70	1380/1380 [=====]	- 0s 356us/step	- loss: 0.5294	- mae:
Epoch 13/70	1380/1380 [=====]	- 0s 354us/step	- loss: 0.5252	- mae:
Epoch 14/70	1380/1380 [=====]	- 0s 308us/step	- loss: 0.5371	- mae:
Epoch 15/70	1380/1380 [=====]	- 0s 353us/step	- loss: 0.5341	- mae:
Epoch 16/70	1380/1380 [=====]	- 0s 343us/step	- loss: 0.5155	- mae:
Epoch 17/70	1380/1380 [=====]	- 0s 310us/step	- loss: 0.5206	- mae:
Epoch 18/70	1380/1380 [=====]	- 0s 307us/step	- loss: 0.5110	- mae:
Epoch 19/70	1380/1380 [=====]	- 0s 308us/step	- loss: 0.5093	- mae:
Epoch 20/70	1380/1380 [=====]	- 0s 313us/step	- loss: 0.5295	- mae:
Epoch 21/70	1380/1380 [=====]	- 0s 352us/step	- loss: 0.5116	- mae:
Epoch 22/70	1380/1380 [=====]	- 0s 344us/step	- loss: 0.5035	- mae:
Epoch 23/70	1380/1380 [=====]	- 0s 347us/step	- loss: 0.4981	- mae:
Epoch 24/70	1380/1380 [=====]	- 0s 351us/step	- loss: 0.4979	- mae:
Epoch 25/70	1380/1380 [=====]	- 0s 366us/step	- loss: 0.5000	- mae:

```
1380/1380 [=====] - 0s 306us/step - loss: 0.5022 - mae:  
Epoch 26/70  
1380/1380 [=====] - 0s 298us/step - loss: 0.5042 - mae:  
Epoch 27/70  
1380/1380 [=====] - 0s 361us/step - loss: 0.5008 - mae:  
Epoch 28/70  
1380/1380 [=====] - 0s 358us/step - loss: 0.4855 - mae:  
Epoch 29/70  
1380/1380 [=====] - 0s 328us/step - loss: 0.4822 - mae:  
Epoch 30/70  
1380/1380 [=====] - 0s 348us/step - loss: 0.4893 - mae:  
Epoch 31/70  
1380/1380 [=====] - 0s 323us/step - loss: 0.4781 - mae:  
Epoch 32/70  
1380/1380 [=====] - 0s 305us/step - loss: 0.4979 - mae:  
Epoch 33/70  
1380/1380 [=====] - 0s 356us/step - loss: 0.4867 - mae:  
Epoch 34/70  
1380/1380 [=====] - 0s 313us/step - loss: 0.4985 - mae:  
Epoch 35/70  
1380/1380 [=====] - 0s 330us/step - loss: 0.4993 - mae:  
Epoch 36/70  
1380/1380 [=====] - 0s 321us/step - loss: 0.4789 - mae:  
Epoch 37/70  
1380/1380 [=====] - 0s 339us/step - loss: 0.4852 - mae:  
Epoch 38/70  
1380/1380 [=====] - 0s 304us/step - loss: 0.4874 - mae:  
Epoch 39/70  
1380/1380 [=====] - 0s 309us/step - loss: 0.4734 - mae:  
Epoch 40/70  
1380/1380 [=====] - 0s 356us/step - loss: 0.4774 - mae:  
Epoch 41/70  
1380/1380 [=====] - 1s 364us/step - loss: 0.4667 - mae:  
Epoch 42/70  
1380/1380 [=====] - 0s 314us/step - loss: 0.4749 - mae:  
Epoch 43/70  
1380/1380 [=====] - 0s 297us/step - loss: 0.4837 - mae:  
Epoch 44/70  
1380/1380 [=====] - 0s 333us/step - loss: 0.4749 - mae:  
Epoch 45/70  
1380/1380 [=====] - 0s 329us/step - loss: 0.4693 - mae:  
Epoch 46/70  
1380/1380 [=====] - 0s 319us/step - loss: 0.4846 - mae:  
Epoch 47/70  
1380/1380 [=====] - 0s 311us/step - loss: 0.4730 - mae:  
Epoch 48/70  
1380/1380 [=====] - 0s 341us/step - loss: 0.4684 - mae:  
Epoch 49/70  
1380/1380 [=====] - 0s 316us/step - loss: 0.4664 - mae:  
Epoch 50/70  
1380/1380 [=====] - 0s 308us/step - loss: 0.4705 - mae:  
Epoch 51/70  
1380/1380 [=====] - 0s 315us/step - loss: 0.4734 - mae:  
Epoch 52/70  
1380/1380 [=====] - 0s 301us/step - loss: 0.4703 - mae:  
Epoch 53/70  
1380/1380 [=====] - 0s 321us/step - loss: 0.4724 - mae:  
Epoch 54/70
```

```

1380/1380 [=====] - 0s 359us/step - loss: 0.4678 - mae:
Epoch 55/70
1380/1380 [=====] - 0s 332us/step - loss: 0.4602 - mae:
Epoch 56/70
1380/1380 [=====] - 0s 335us/step - loss: 0.4652 - mae:
Epoch 57/70
1380/1380 [=====] - 0s 325us/step - loss: 0.4574 - mae:
Epoch 58/70
1380/1380 [=====] - 0s 324us/step - loss: 0.4793 - mae:
Epoch 59/70
1380/1380 [=====] - 0s 350us/step - loss: 0.4650 - mae:
Epoch 60/70
1380/1380 [=====] - 0s 315us/step - loss: 0.4682 - mae:
Epoch 61/70
1380/1380 [=====] - 0s 323us/step - loss: 0.4527 - mae:
Epoch 62/70
1380/1380 [=====] - 0s 322us/step - loss: 0.4539 - mae:
Epoch 63/70
1380/1380 [=====] - 0s 320us/step - loss: 0.4624 - mae:
Epoch 64/70
1380/1380 [=====] - 0s 346us/step - loss: 0.4642 - mae:
Epoch 65/70
1380/1380 [=====] - 0s 348us/step - loss: 0.4648 - mae:
Epoch 66/70
1380/1380 [=====] - 0s 347us/step - loss: 0.4553 - mae:
Epoch 67/70
1380/1380 [=====] - 0s 322us/step - loss: 0.4548 - mae:
Epoch 68/70
1380/1380 [=====] - 0s 349us/step - loss: 0.4625 - mae:
Epoch 69/70
1380/1380 [=====] - 0s 362us/step - loss: 0.4552 - mae:
Epoch 70/70
1380/1380 [=====] - 0s 354us/step - loss: 0.4407 - mae:

```



Kappa Score: 0.37824622030237576

-----Fold 2-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.10076594352722168 sec

Time to train the word2vec model: 2.184833333333333 min



Time to train the word2vec model: 2.1848223209381104 mins

Model: "sequential\_12"

Layer (type)	Output Shape	Param #
bidirectional_23 (Bidirectional)	(None, 1, 600)	1682400
bidirectional_24 (Bidirectional)	(None, 200)	560800
dropout_12 (Dropout)	(None, 200)	0
dense_12 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

1381/1381 [=====] - 2s 1ms/step - loss: 1.6830 - mae: 1.

Epoch 2/70

1381/1381 [=====] - 1s 364us/step - loss: 0.6016 - mae:

Epoch 3/70

1381/1381 [=====] - 0s 345us/step - loss: 0.5803 - mae:

Epoch 4/70

1381/1381 [=====] - 0s 334us/step - loss: 0.5959 - mae:

Epoch 5/70

1381/1381 [=====] - 0s 341us/step - loss: 0.5647 - mae:

Epoch 6/70

1381/1381 [=====] - 0s 332us/step - loss: 0.5699 - mae:

Epoch 7/70

1381/1381 [=====] - 0s 355us/step - loss: 0.5623 - mae:

Epoch 8/70

1381/1381 [=====] - 0s 322us/step - loss: 0.5577 - mae:

Epoch 9/70

1381/1381 [=====] - 0s 347us/step - loss: 0.5685 - mae:

Epoch 10/70

1381/1381 [=====] - 0s 321us/step - loss: 0.5595 - mae:

Epoch 11/70

1381/1381 [=====] - 0s 333us/step - loss: 0.5694 - mae:

Epoch 12/70

1381/1381 [=====] - 0s 331us/step - loss: 0.5651 - mae:

Epoch 13/70

1381/1381 [=====] - 0s 328us/step - loss: 0.5550 - mae:

Epoch 14/70

1381/1381 [=====] - 0s 332us/step - loss: 0.5472 - mae:

Epoch 15/70

1381/1381 [=====] - 0s 347us/step - loss: 0.5483 - mae:

Epoch 16/70

1381/1381 [=====] - 0s 354us/step - loss: 0.5474 - mae:

Epoch 17/70

1381/1381 [=====] - 0s 320us/step - loss: 0.5384 - mae:

Epoch 18/70

1381/1381 [=====] - 0s 324us/step - loss: 0.5433 - mae:

Epoch 19/70

1381/1381 [=====] - 0s 346us/step - loss: 0.5404 - mae:

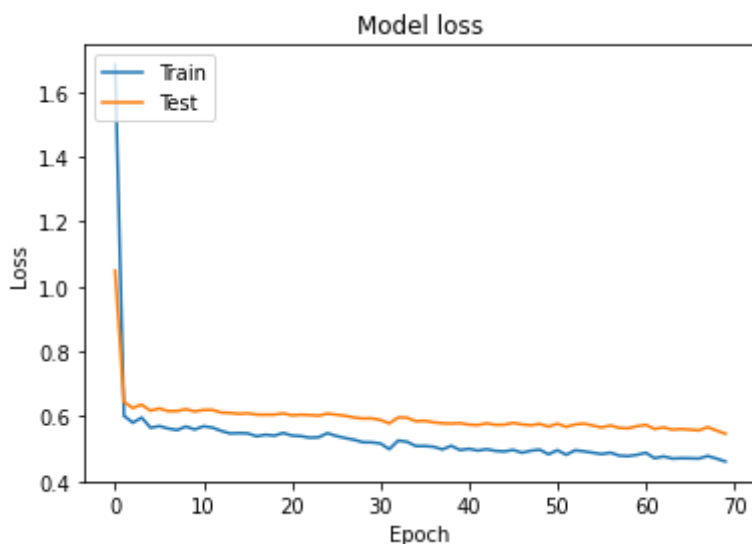
Epoch 20/70

1381/1381 [=====] - 0s 340us/step - loss: 0.5487 - mae:

Epoch 21/70

```
1381/1381 [=====] - 0s 319us/step - loss: 0.5406 - mae:
Epoch 22/70
1381/1381 [=====] - 0s 318us/step - loss: 0.5390 - mae:
Epoch 23/70
1381/1381 [=====] - 0s 322us/step - loss: 0.5342 - mae:
Epoch 24/70
1381/1381 [=====] - 0s 327us/step - loss: 0.5353 - mae:
Epoch 25/70
1381/1381 [=====] - 0s 323us/step - loss: 0.5480 - mae:
Epoch 26/70
1381/1381 [=====] - 0s 354us/step - loss: 0.5394 - mae:
Epoch 27/70
1381/1381 [=====] - 0s 338us/step - loss: 0.5331 - mae:
Epoch 28/70
1381/1381 [=====] - 0s 344us/step - loss: 0.5278 - mae:
Epoch 29/70
1381/1381 [=====] - 0s 342us/step - loss: 0.5203 - mae:
Epoch 30/70
1381/1381 [=====] - 0s 337us/step - loss: 0.5198 - mae:
Epoch 31/70
1381/1381 [=====] - 0s 359us/step - loss: 0.5163 - mae:
Epoch 32/70
1381/1381 [=====] - 0s 317us/step - loss: 0.4986 - mae:
Epoch 33/70
1381/1381 [=====] - 0s 303us/step - loss: 0.5254 - mae:
Epoch 34/70
1381/1381 [=====] - 0s 316us/step - loss: 0.5215 - mae:
Epoch 35/70
1381/1381 [=====] - 0s 324us/step - loss: 0.5084 - mae:
Epoch 36/70
1381/1381 [=====] - 0s 335us/step - loss: 0.5085 - mae:
Epoch 37/70
1381/1381 [=====] - 0s 344us/step - loss: 0.5061 - mae:
Epoch 38/70
1381/1381 [=====] - 0s 316us/step - loss: 0.4980 - mae:
Epoch 39/70
1381/1381 [=====] - 0s 311us/step - loss: 0.5091 - mae:
Epoch 40/70
1381/1381 [=====] - 0s 325us/step - loss: 0.4961 - mae:
Epoch 41/70
1381/1381 [=====] - 0s 343us/step - loss: 0.4998 - mae:
Epoch 42/70
1381/1381 [=====] - 0s 359us/step - loss: 0.4945 - mae:
Epoch 43/70
1381/1381 [=====] - 0s 309us/step - loss: 0.4986 - mae:
Epoch 44/70
1381/1381 [=====] - 0s 317us/step - loss: 0.4935 - mae:
Epoch 45/70
1381/1381 [=====] - 0s 310us/step - loss: 0.4917 - mae:
Epoch 46/70
1381/1381 [=====] - 0s 339us/step - loss: 0.4965 - mae:
Epoch 47/70
1381/1381 [=====] - 0s 335us/step - loss: 0.4878 - mae:
Epoch 48/70
1381/1381 [=====] - 0s 358us/step - loss: 0.4940 - mae:
Epoch 49/70
1381/1381 [=====] - 0s 347us/step - loss: 0.4972 - mae:
Epoch 50/70
```

```
1381/1381 [=====] - 0s 332us/step - loss: 0.4830 - mae:  
Epoch 51/70  
1381/1381 [=====] - 0s 326us/step - loss: 0.4956 - mae:  
Epoch 52/70  
1381/1381 [=====] - 0s 324us/step - loss: 0.4816 - mae:  
Epoch 53/70  
1381/1381 [=====] - 0s 321us/step - loss: 0.4952 - mae:  
Epoch 54/70  
1381/1381 [=====] - 0s 353us/step - loss: 0.4921 - mae:  
Epoch 55/70  
1381/1381 [=====] - 0s 343us/step - loss: 0.4879 - mae:  
Epoch 56/70  
1381/1381 [=====] - 0s 307us/step - loss: 0.4836 - mae:  
Epoch 57/70  
1381/1381 [=====] - 0s 309us/step - loss: 0.4880 - mae:  
Epoch 58/70  
1381/1381 [=====] - 0s 338us/step - loss: 0.4789 - mae:  
Epoch 59/70  
1381/1381 [=====] - 0s 353us/step - loss: 0.4775 - mae:  
Epoch 60/70  
1381/1381 [=====] - 0s 336us/step - loss: 0.4813 - mae:  
Epoch 61/70  
1381/1381 [=====] - 0s 319us/step - loss: 0.4877 - mae:  
Epoch 62/70  
1381/1381 [=====] - 0s 360us/step - loss: 0.4709 - mae:  
Epoch 63/70  
1381/1381 [=====] - 0s 341us/step - loss: 0.4766 - mae:  
Epoch 64/70  
1381/1381 [=====] - 0s 317us/step - loss: 0.4699 - mae:  
Epoch 65/70  
1381/1381 [=====] - 0s 333us/step - loss: 0.4709 - mae:  
Epoch 66/70  
1381/1381 [=====] - 0s 332us/step - loss: 0.4706 - mae:  
Epoch 67/70  
1381/1381 [=====] - 0s 307us/step - loss: 0.4699 - mae:  
Epoch 68/70  
1381/1381 [=====] - 0s 304us/step - loss: 0.4777 - mae:  
Epoch 69/70  
1381/1381 [=====] - 0s 312us/step - loss: 0.4696 - mae:  
Epoch 70/70  
1381/1381 [=====] - 0s 316us/step - loss: 0.4608 - mae:
```



Kappa Score: 0.43236109278078405

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.10247254371643066 sec

Time to train the word2vec model: 2.214927911758423 mins

Model: "sequential\_13"

Layer (type)	Output Shape	Param #
bidirectional_25 (Bidirectio	(None, 1, 600)	1682400
bidirectional_26 (Bidirectio	(None, 200)	560800
dropout_13 (Dropout)	(None, 200)	0
dense_13 (Dense)	(None, 1)	201

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1381/1381 [=====] - 2s 1ms/step - loss: 1.6717 - mae: 1.

Epoch 2/70

1381/1381 [=====] - 0s 341us/step - loss: 0.6226 - mae:

Epoch 3/70

1381/1381 [=====] - 0s 333us/step - loss: 0.5813 - mae:

Epoch 4/70

1381/1381 [=====] - 0s 329us/step - loss: 0.5724 - mae:

Epoch 5/70

1381/1381 [=====] - 0s 339us/step - loss: 0.5614 - mae:

Epoch 6/70

1381/1381 [=====] - 0s 337us/step - loss: 0.5704 - mae:

Epoch 7/70

1381/1381 [=====] - 0s 311us/step - loss: 0.5668 - mae:

Epoch 8/70

1381/1381 [=====] - 0s 336us/step - loss: 0.5717 - mae:

Epoch 9/70

1381/1381 [=====] - 0s 339us/step - loss: 0.5553 - mae:

Epoch 10/70

1381/1381 [=====] - 0s 346us/step - loss: 0.5583 - mae:

Epoch 11/70

1381/1381 [=====] - 0s 351us/step - loss: 0.5614 - mae:

Epoch 12/70

1381/1381 [=====] - 0s 335us/step - loss: 0.5580 - mae:

Epoch 13/70

1381/1381 [=====] - 0s 338us/step - loss: 0.5573 - mae:

Epoch 14/70

1381/1381 [=====] - 0s 306us/step - loss: 0.5611 - mae:

Epoch 15/70

1381/1381 [=====] - 0s 327us/step - loss: 0.5459 - mae:

Epoch 16/70

1381/1381 [=====] - 0s 357us/step - loss: 0.5591 - mae:

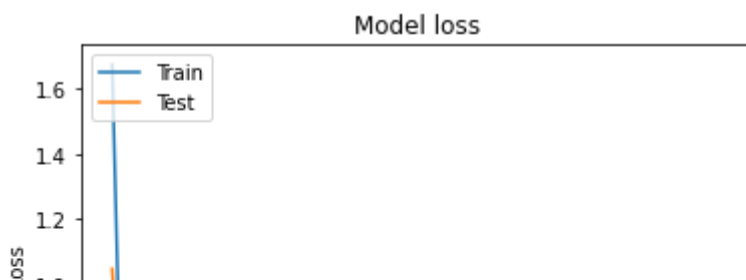
Epoch 17/70

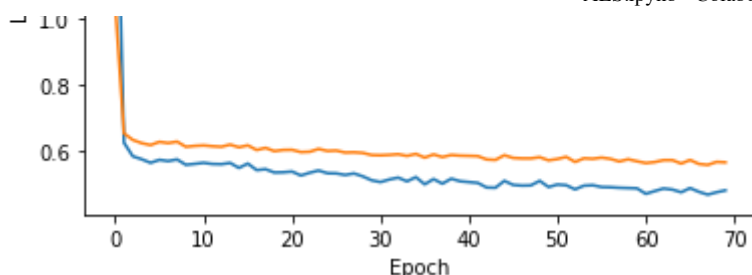
```
1381/1381 [=====] - 0s 321us/step - loss: 0.5392 - mae:  
Epoch 18/70  
1381/1381 [=====] - 0s 356us/step - loss: 0.5421 - mae:  
Epoch 19/70  
1381/1381 [=====] - 0s 335us/step - loss: 0.5318 - mae:  
Epoch 20/70  
1381/1381 [=====] - 0s 317us/step - loss: 0.5326 - mae:  
Epoch 21/70  
1381/1381 [=====] - 0s 332us/step - loss: 0.5348 - mae:  
Epoch 22/70  
1381/1381 [=====] - 0s 308us/step - loss: 0.5228 - mae:  
Epoch 23/70  
1381/1381 [=====] - 0s 338us/step - loss: 0.5312 - mae:  
Epoch 24/70  
1381/1381 [=====] - 0s 325us/step - loss: 0.5380 - mae:  
Epoch 25/70  
1381/1381 [=====] - 0s 342us/step - loss: 0.5297 - mae:  
Epoch 26/70  
1381/1381 [=====] - 0s 318us/step - loss: 0.5292 - mae:  
Epoch 27/70  
1381/1381 [=====] - 0s 357us/step - loss: 0.5244 - mae:  
Epoch 28/70  
1381/1381 [=====] - 0s 307us/step - loss: 0.5290 - mae:  
Epoch 29/70  
1381/1381 [=====] - 0s 358us/step - loss: 0.5201 - mae:  
Epoch 30/70  
1381/1381 [=====] - 0s 348us/step - loss: 0.5082 - mae:  
Epoch 31/70  
1381/1381 [=====] - 0s 354us/step - loss: 0.5028 - mae:  
Epoch 32/70  
1381/1381 [=====] - 0s 346us/step - loss: 0.5107 - mae:  
Epoch 33/70  
1381/1381 [=====] - 0s 327us/step - loss: 0.5163 - mae:  
Epoch 34/70  
1381/1381 [=====] - 0s 319us/step - loss: 0.5050 - mae:  
Epoch 35/70  
1381/1381 [=====] - 0s 343us/step - loss: 0.5178 - mae:  
Epoch 36/70  
1381/1381 [=====] - 0s 339us/step - loss: 0.4959 - mae:  
Epoch 37/70  
1381/1381 [=====] - 0s 344us/step - loss: 0.5119 - mae:  
Epoch 38/70  
1381/1381 [=====] - 0s 335us/step - loss: 0.4979 - mae:  
Epoch 39/70  
1381/1381 [=====] - 0s 351us/step - loss: 0.5131 - mae:  
Epoch 40/70  
1381/1381 [=====] - 0s 334us/step - loss: 0.5053 - mae:  
Epoch 41/70  
1381/1381 [=====] - 0s 313us/step - loss: 0.5027 - mae:  
Epoch 42/70  
1381/1381 [=====] - 0s 296us/step - loss: 0.5002 - mae:  
Epoch 43/70  
1381/1381 [=====] - 0s 313us/step - loss: 0.4862 - mae:  
Epoch 44/70  
1381/1381 [=====] - 0s 306us/step - loss: 0.4855 - mae:  
Epoch 45/70  
1381/1381 [=====] - 0s 334us/step - loss: 0.5065 - mae:  
Epoch 46/70
```

```

Epoch 46/70
1381/1381 [=====] - 0s 322us/step - loss: 0.4941 - mae:
Epoch 47/70
1381/1381 [=====] - 0s 319us/step - loss: 0.4921 - mae:
Epoch 48/70
1381/1381 [=====] - 0s 314us/step - loss: 0.4927 - mae:
Epoch 49/70
1381/1381 [=====] - 0s 336us/step - loss: 0.5064 - mae:
Epoch 50/70
1381/1381 [=====] - 0s 311us/step - loss: 0.4876 - mae:
Epoch 51/70
1381/1381 [=====] - 0s 358us/step - loss: 0.4952 - mae:
Epoch 52/70
1381/1381 [=====] - 0s 318us/step - loss: 0.4932 - mae:
Epoch 53/70
1381/1381 [=====] - 0s 322us/step - loss: 0.4805 - mae:
Epoch 54/70
1381/1381 [=====] - 0s 325us/step - loss: 0.4918 - mae:
Epoch 55/70
1381/1381 [=====] - 0s 303us/step - loss: 0.4932 - mae:
Epoch 56/70
1381/1381 [=====] - 0s 346us/step - loss: 0.4876 - mae:
Epoch 57/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4870 - mae:
Epoch 58/70
1381/1381 [=====] - 0s 351us/step - loss: 0.4853 - mae:
Epoch 59/70
1381/1381 [=====] - 0s 358us/step - loss: 0.4845 - mae:
Epoch 60/70
1381/1381 [=====] - 0s 355us/step - loss: 0.4836 - mae:
Epoch 61/70
1381/1381 [=====] - 0s 301us/step - loss: 0.4669 - mae:
Epoch 62/70
1381/1381 [=====] - 0s 343us/step - loss: 0.4753 - mae:
Epoch 63/70
1381/1381 [=====] - 0s 309us/step - loss: 0.4831 - mae:
Epoch 64/70
1381/1381 [=====] - 0s 343us/step - loss: 0.4799 - mae:
Epoch 65/70
1381/1381 [=====] - 0s 332us/step - loss: 0.4717 - mae:
Epoch 66/70
1381/1381 [=====] - 0s 341us/step - loss: 0.4844 - mae:
Epoch 67/70
1381/1381 [=====] - 0s 350us/step - loss: 0.4731 - mae:
Epoch 68/70
1381/1381 [=====] - 0s 317us/step - loss: 0.4644 - mae:
Epoch 69/70
1381/1381 [=====] - 0s 316us/step - loss: 0.4717 - mae:
Epoch 70/70
1381/1381 [=====] - 0s 298us/step - loss: 0.4775 - mae:

```





Kappa Score: 0.35625749700119946

-----Fold 4-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.10321426391601562 sec

Time to train the word2vec model: 2.1885085105895996 mins

Model: "sequential\_14"

Layer (type)	Output Shape	Param #
bidirectional_27 (Bidirectio	(None, 1, 600)	1682400
bidirectional_28 (Bidirectio	(None, 200)	560800
dropout_14 (Dropout)	(None, 200)	0
dense_14 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

1381/1381 [=====] - 2s 1ms/step - loss: 1.6362 - mae: 1.

Epoch 2/70

1381/1381 [=====] - 0s 341us/step - loss: 0.6107 - mae:

Epoch 3/70

1381/1381 [=====] - 0s 329us/step - loss: 0.5810 - mae:

Epoch 4/70

1381/1381 [=====] - 0s 343us/step - loss: 0.5704 - mae:

Epoch 5/70

1381/1381 [=====] - 0s 331us/step - loss: 0.5455 - mae:

Epoch 6/70

1381/1381 [=====] - 0s 311us/step - loss: 0.5755 - mae:

Epoch 7/70

1381/1381 [=====] - 0s 338us/step - loss: 0.5706 - mae:

Epoch 8/70

1381/1381 [=====] - 0s 360us/step - loss: 0.5709 - mae:

Epoch 9/70

1381/1381 [=====] - 0s 329us/step - loss: 0.5645 - mae:

Epoch 10/70

1381/1381 [=====] - 0s 299us/step - loss: 0.5510 - mae:

Epoch 11/70

1381/1381 [=====] - 0s 329us/step - loss: 0.5665 - mae:

Epoch 12/70

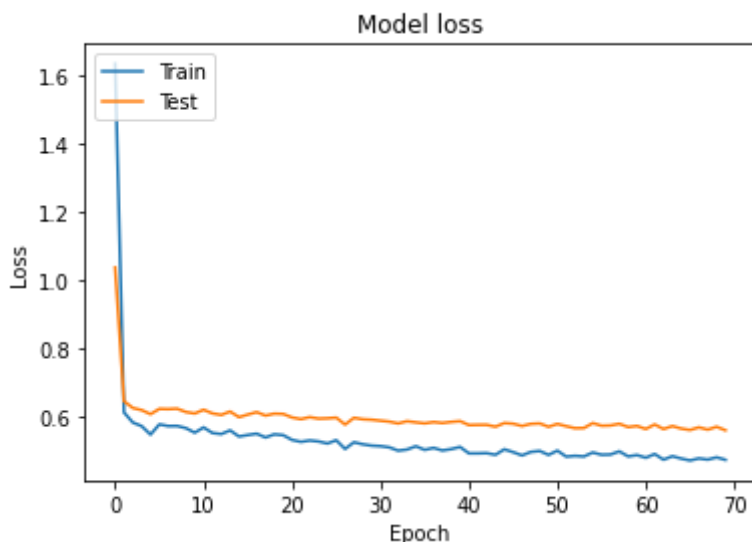
1381/1381 [=====] - 0s 355us/step - loss: 0.5501 - mae:

Epoch 13/70

```
Epoch 13/70
1381/1381 [=====] - 0s 307us/step - loss: 0.5470 - mae:
Epoch 14/70
1381/1381 [=====] - 0s 323us/step - loss: 0.5578 - mae:
Epoch 15/70
1381/1381 [=====] - 0s 337us/step - loss: 0.5398 - mae:
Epoch 16/70
1381/1381 [=====] - 0s 357us/step - loss: 0.5442 - mae:
Epoch 17/70
1381/1381 [=====] - 0s 320us/step - loss: 0.5481 - mae:
Epoch 18/70
1381/1381 [=====] - 0s 298us/step - loss: 0.5370 - mae:
Epoch 19/70
1381/1381 [=====] - 0s 308us/step - loss: 0.5462 - mae:
Epoch 20/70
1381/1381 [=====] - 0s 361us/step - loss: 0.5438 - mae:
Epoch 21/70
1381/1381 [=====] - 1s 373us/step - loss: 0.5297 - mae:
Epoch 22/70
1381/1381 [=====] - 0s 344us/step - loss: 0.5242 - mae:
Epoch 23/70
1381/1381 [=====] - 0s 350us/step - loss: 0.5281 - mae:
Epoch 24/70
1381/1381 [=====] - 0s 334us/step - loss: 0.5253 - mae:
Epoch 25/70
1381/1381 [=====] - 0s 331us/step - loss: 0.5193 - mae:
Epoch 26/70
1381/1381 [=====] - 0s 329us/step - loss: 0.5289 - mae:
Epoch 27/70
1381/1381 [=====] - 0s 350us/step - loss: 0.5032 - mae:
Epoch 28/70
1381/1381 [=====] - 0s 354us/step - loss: 0.5229 - mae:
Epoch 29/70
1381/1381 [=====] - 0s 354us/step - loss: 0.5169 - mae:
Epoch 30/70
1381/1381 [=====] - 0s 342us/step - loss: 0.5130 - mae:
Epoch 31/70
1381/1381 [=====] - 0s 351us/step - loss: 0.5115 - mae:
Epoch 32/70
1381/1381 [=====] - 0s 328us/step - loss: 0.5079 - mae:
Epoch 33/70
1381/1381 [=====] - 0s 306us/step - loss: 0.4982 - mae:
Epoch 34/70
1381/1381 [=====] - 0s 314us/step - loss: 0.5015 - mae:
Epoch 35/70
1381/1381 [=====] - 0s 314us/step - loss: 0.5112 - mae:
Epoch 36/70
1381/1381 [=====] - 0s 307us/step - loss: 0.5006 - mae:
Epoch 37/70
1381/1381 [=====] - 0s 348us/step - loss: 0.5063 - mae:
Epoch 38/70
1381/1381 [=====] - 0s 321us/step - loss: 0.4987 - mae:
Epoch 39/70
1381/1381 [=====] - 0s 333us/step - loss: 0.5028 - mae:
Epoch 40/70
1381/1381 [=====] - 0s 329us/step - loss: 0.5091 - mae:
Epoch 41/70
1381/1381 [=====] - 0s 358us/step - loss: 0.4901 - mae:
```



```
Epoch 42/70
1381/1381 [=====] - 0s 344us/step - loss: 0.4902 - mae:
Epoch 43/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4909 - mae:
Epoch 44/70
1381/1381 [=====] - 1s 364us/step - loss: 0.4860 - mae:
Epoch 45/70
1381/1381 [=====] - 1s 368us/step - loss: 0.5021 - mae:
Epoch 46/70
1381/1381 [=====] - 0s 362us/step - loss: 0.4938 - mae:
Epoch 47/70
1381/1381 [=====] - 0s 329us/step - loss: 0.4842 - mae:
Epoch 48/70
1381/1381 [=====] - 0s 352us/step - loss: 0.4945 - mae:
Epoch 49/70
1381/1381 [=====] - 0s 311us/step - loss: 0.4973 - mae:
Epoch 50/70
1381/1381 [=====] - 0s 317us/step - loss: 0.4857 - mae:
Epoch 51/70
1381/1381 [=====] - 0s 334us/step - loss: 0.4982 - mae:
Epoch 52/70
1381/1381 [=====] - 0s 343us/step - loss: 0.4806 - mae:
Epoch 53/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4829 - mae:
Epoch 54/70
1381/1381 [=====] - 0s 328us/step - loss: 0.4811 - mae:
Epoch 55/70
1381/1381 [=====] - 0s 295us/step - loss: 0.4927 - mae:
Epoch 56/70
1381/1381 [=====] - 0s 314us/step - loss: 0.4861 - mae:
Epoch 57/70
1381/1381 [=====] - 0s 360us/step - loss: 0.4868 - mae:
Epoch 58/70
1381/1381 [=====] - 0s 354us/step - loss: 0.4961 - mae:
Epoch 59/70
1381/1381 [=====] - 0s 306us/step - loss: 0.4812 - mae:
Epoch 60/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4852 - mae:
Epoch 61/70
1381/1381 [=====] - 0s 357us/step - loss: 0.4774 - mae:
Epoch 62/70
1381/1381 [=====] - 1s 363us/step - loss: 0.4882 - mae:
Epoch 63/70
1381/1381 [=====] - 0s 307us/step - loss: 0.4716 - mae:
Epoch 64/70
1381/1381 [=====] - 0s 345us/step - loss: 0.4818 - mae:
Epoch 65/70
1381/1381 [=====] - 0s 315us/step - loss: 0.4749 - mae:
Epoch 66/70
1381/1381 [=====] - 0s 360us/step - loss: 0.4693 - mae:
Epoch 67/70
1381/1381 [=====] - 0s 315us/step - loss: 0.4753 - mae:
Epoch 68/70
1381/1381 [=====] - 0s 308us/step - loss: 0.4720 - mae:
Epoch 69/70
1381/1381 [=====] - 0s 312us/step - loss: 0.4785 - mae:
Epoch 70/70
1381/1381 [=====] - 0s 312us/step - loss: 0.4712 - mae:
```



Kappa Score: 0.38100263852242744

-----Fold 5-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.10185909271240234 sec

Time to train the word2vec model: 2.165205955505371 mins

Model: "sequential\_15"

Layer (type)	Output Shape	Param #
bidirectional_29 (Bidirectional)	(None, 1, 600)	1682400
bidirectional_30 (Bidirectional)	(None, 200)	560800
dropout_15 (Dropout)	(None, 200)	0
dense_15 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

1381/1381 [=====] - 2s 1ms/step - loss: 1.5628 - mae: 0.

Epoch 2/70

1381/1381 [=====] - 0s 313us/step - loss: 0.5909 - mae:

Epoch 3/70

1381/1381 [=====] - 0s 343us/step - loss: 0.5696 - mae:

Epoch 4/70

1381/1381 [=====] - 0s 325us/step - loss: 0.5540 - mae:

Epoch 5/70

1381/1381 [=====] - 0s 343us/step - loss: 0.5458 - mae:

Epoch 6/70

1381/1381 [=====] - 0s 350us/step - loss: 0.5420 - mae:

Epoch 7/70

1381/1381 [=====] - 1s 364us/step - loss: 0.5386 - mae:

Epoch 8/70

1381/1381 [=====] - 0s 353us/step - loss: 0.5414 - mae:

Epoch 9/70

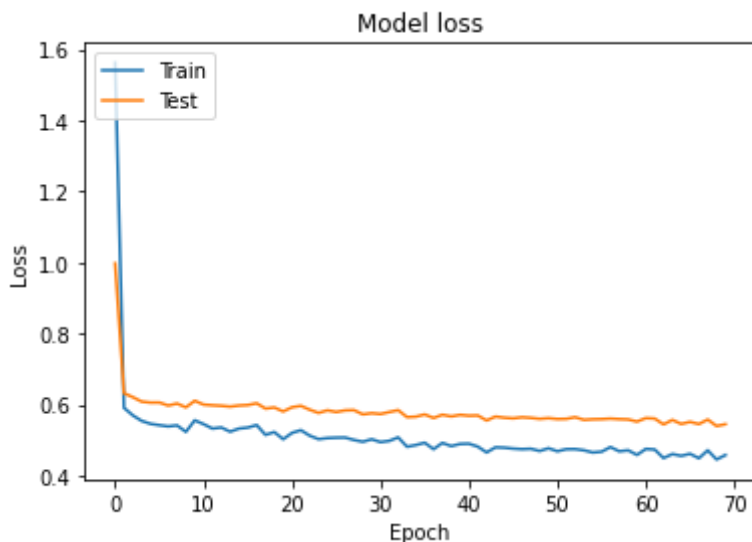
```
Epoch 9/70
1381/1381 [=====] - 0s 326us/step - loss: 0.5232 - mae:
Epoch 10/70
1381/1381 [=====] - 0s 358us/step - loss: 0.5557 - mae:
Epoch 11/70
1381/1381 [=====] - 0s 320us/step - loss: 0.5449 - mae:
Epoch 12/70
1381/1381 [=====] - 0s 326us/step - loss: 0.5325 - mae:
Epoch 13/70
1381/1381 [=====] - 0s 326us/step - loss: 0.5355 - mae:
Epoch 14/70
1381/1381 [=====] - 0s 313us/step - loss: 0.5236 - mae:
Epoch 15/70
1381/1381 [=====] - 0s 342us/step - loss: 0.5325 - mae:
Epoch 16/70
1381/1381 [=====] - 0s 324us/step - loss: 0.5352 - mae:
Epoch 17/70
1381/1381 [=====] - 0s 334us/step - loss: 0.5423 - mae:
Epoch 18/70
1381/1381 [=====] - 0s 309us/step - loss: 0.5147 - mae:
Epoch 19/70
1381/1381 [=====] - 0s 300us/step - loss: 0.5226 - mae:
Epoch 20/70
1381/1381 [=====] - 0s 317us/step - loss: 0.5024 - mae:
Epoch 21/70
1381/1381 [=====] - 0s 306us/step - loss: 0.5203 - mae:
Epoch 22/70
1381/1381 [=====] - 0s 303us/step - loss: 0.5278 - mae:
Epoch 23/70
1381/1381 [=====] - 0s 311us/step - loss: 0.5124 - mae:
Epoch 24/70
1381/1381 [=====] - 0s 350us/step - loss: 0.5027 - mae:
Epoch 25/70
1381/1381 [=====] - 0s 319us/step - loss: 0.5057 - mae:
Epoch 26/70
1381/1381 [=====] - 0s 330us/step - loss: 0.5067 - mae:
Epoch 27/70
1381/1381 [=====] - 0s 308us/step - loss: 0.5071 - mae:
Epoch 28/70
1381/1381 [=====] - 0s 306us/step - loss: 0.5003 - mae:
Epoch 29/70
1381/1381 [=====] - 0s 335us/step - loss: 0.4953 - mae:
Epoch 30/70
1381/1381 [=====] - 0s 358us/step - loss: 0.5023 - mae:
Epoch 31/70
1381/1381 [=====] - 0s 335us/step - loss: 0.4944 - mae:
Epoch 32/70
1381/1381 [=====] - 0s 300us/step - loss: 0.4977 - mae:
Epoch 33/70
1381/1381 [=====] - 0s 325us/step - loss: 0.5077 - mae:
Epoch 34/70
1381/1381 [=====] - 0s 336us/step - loss: 0.4813 - mae:
Epoch 35/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4860 - mae:
Epoch 36/70
1381/1381 [=====] - 0s 337us/step - loss: 0.4925 - mae:
Epoch 37/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4743 - mae:
```

```
Epoch 38/70
1381/1381 [=====] - 0s 327us/step - loss: 0.4920 - mae:
Epoch 39/70
1381/1381 [=====] - 0s 348us/step - loss: 0.4830 - mae:
Epoch 40/70
1381/1381 [=====] - 0s 362us/step - loss: 0.4891 - mae:
Epoch 41/70
1381/1381 [=====] - 1s 388us/step - loss: 0.4898 - mae:
Epoch 42/70
1381/1381 [=====] - 1s 372us/step - loss: 0.4816 - mae:
Epoch 43/70
1381/1381 [=====] - 1s 368us/step - loss: 0.4653 - mae:
Epoch 44/70
1381/1381 [=====] - 0s 352us/step - loss: 0.4796 - mae:
Epoch 45/70
1381/1381 [=====] - 1s 365us/step - loss: 0.4786 - mae:
Epoch 46/70
1381/1381 [=====] - 0s 337us/step - loss: 0.4760 - mae:
Epoch 47/70
1381/1381 [=====] - 0s 357us/step - loss: 0.4745 - mae:
Epoch 48/70
1381/1381 [=====] - 0s 326us/step - loss: 0.4755 - mae:
Epoch 49/70
1381/1381 [=====] - 1s 370us/step - loss: 0.4693 - mae:
Epoch 50/70
1381/1381 [=====] - 0s 337us/step - loss: 0.4770 - mae:
Epoch 51/70
1381/1381 [=====] - 0s 309us/step - loss: 0.4686 - mae:
Epoch 52/70
1381/1381 [=====] - 0s 321us/step - loss: 0.4743 - mae:
Epoch 53/70
1381/1381 [=====] - 0s 339us/step - loss: 0.4746 - mae:
Epoch 54/70
1381/1381 [=====] - 0s 326us/step - loss: 0.4712 - mae:
Epoch 55/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4651 - mae:
Epoch 56/70
1381/1381 [=====] - 0s 360us/step - loss: 0.4673 - mae:
Epoch 57/70
1381/1381 [=====] - 0s 345us/step - loss: 0.4803 - mae:
Epoch 58/70
1381/1381 [=====] - 0s 349us/step - loss: 0.4684 - mae:
Epoch 59/70
1381/1381 [=====] - 0s 322us/step - loss: 0.4712 - mae:
Epoch 60/70
1381/1381 [=====] - 1s 364us/step - loss: 0.4582 - mae:
Epoch 61/70
1381/1381 [=====] - 0s 325us/step - loss: 0.4751 - mae:
Epoch 62/70
1381/1381 [=====] - 0s 315us/step - loss: 0.4734 - mae:
Epoch 63/70
1381/1381 [=====] - 0s 334us/step - loss: 0.4494 - mae:
Epoch 64/70
1381/1381 [=====] - 0s 337us/step - loss: 0.4606 - mae:
Epoch 65/70
1381/1381 [=====] - 0s 330us/step - loss: 0.4556 - mae:
Epoch 66/70
1381/1381 [=====] - 0s 329us/step - loss: 0.4613 - mae:
```

```

Epoch 67/70
1381/1381 [=====] - 0s 332us/step - loss: 0.4488 - mae:
Epoch 68/70
1381/1381 [=====] - 0s 333us/step - loss: 0.4712 - mae:
Epoch 69/70
1381/1381 [=====] - 0s 329us/step - loss: 0.4454 - mae:
Epoch 70/70
1381/1381 [=====] - 0s 330us/step - loss: 0.4578 - mae:

```



Kappa Score: 0.316661722913816  
Average kappa score value is : 0.37290583430412055

-----SET 4-----

```

(1770, 4)
(1770,)

```

-----Fold 1-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.07589459419250488 sec
Time to train the word2vec model: 1.699512004852295 mins
Model: "sequential_16"

```

Layer (type)	Output Shape	Param #
=====		
bidirectional_31 (Bidirectio	(None, 1, 600)	1682400
bidirectional_32 (Bidirectio	(None, 200)	560800
dropout_16 (Dropout)	(None, 200)	0
dense_16 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

```

Epoch 1/70
1416/1416 [=====] - 2s 1ms/step - loss: 1.1373 - mae: 0.

```

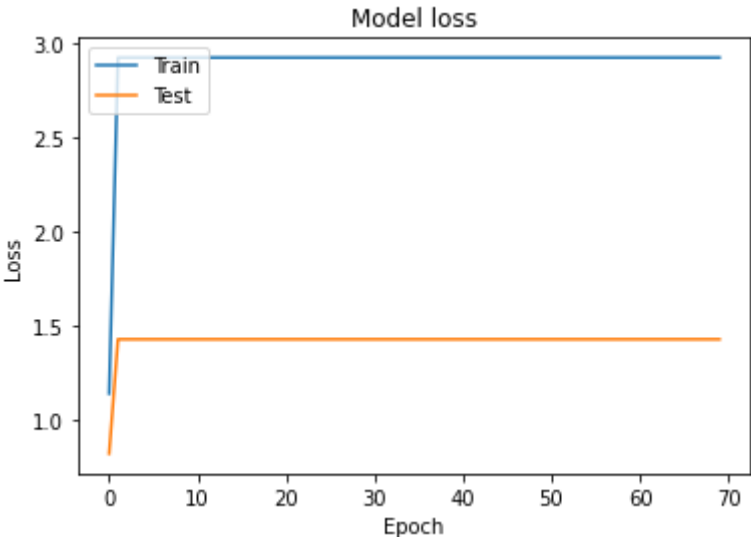
```
Epoch 2/70
1416/1416 [=====] - 0s 350us/step - loss: 2.9266 - mae:
Epoch 3/70
1416/1416 [=====] - 0s 307us/step - loss: 2.9266 - mae:
Epoch 4/70
1416/1416 [=====] - 0s 350us/step - loss: 2.9266 - mae:
Epoch 5/70
1416/1416 [=====] - 0s 322us/step - loss: 2.9266 - mae:
Epoch 6/70
1416/1416 [=====] - 0s 333us/step - loss: 2.9266 - mae:
Epoch 7/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9266 - mae:
Epoch 8/70
1416/1416 [=====] - 0s 335us/step - loss: 2.9266 - mae:
Epoch 9/70
1416/1416 [=====] - 0s 336us/step - loss: 2.9266 - mae:
Epoch 10/70
1416/1416 [=====] - 1s 356us/step - loss: 2.9266 - mae:
Epoch 11/70
1416/1416 [=====] - 0s 312us/step - loss: 2.9266 - mae:
Epoch 12/70
1416/1416 [=====] - 0s 330us/step - loss: 2.9266 - mae:
Epoch 13/70
1416/1416 [=====] - 0s 336us/step - loss: 2.9266 - mae:
Epoch 14/70
1416/1416 [=====] - 0s 328us/step - loss: 2.9266 - mae:
Epoch 15/70
1416/1416 [=====] - 0s 336us/step - loss: 2.9266 - mae:
Epoch 16/70
1416/1416 [=====] - 0s 351us/step - loss: 2.9266 - mae:
Epoch 17/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9266 - mae:
Epoch 18/70
1416/1416 [=====] - 0s 351us/step - loss: 2.9266 - mae:
Epoch 19/70
1416/1416 [=====] - 0s 332us/step - loss: 2.9266 - mae:
Epoch 20/70
1416/1416 [=====] - 1s 353us/step - loss: 2.9266 - mae:
Epoch 21/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9266 - mae:
Epoch 22/70
1416/1416 [=====] - 1s 364us/step - loss: 2.9266 - mae:
Epoch 23/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9266 - mae:
Epoch 24/70
1416/1416 [=====] - 0s 352us/step - loss: 2.9266 - mae:
Epoch 25/70
1416/1416 [=====] - 0s 328us/step - loss: 2.9266 - mae:
Epoch 26/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9266 - mae:
Epoch 27/70
1416/1416 [=====] - 0s 345us/step - loss: 2.9266 - mae:
Epoch 28/70
1416/1416 [=====] - 1s 366us/step - loss: 2.9266 - mae:
Epoch 29/70
1416/1416 [=====] - 0s 337us/step - loss: 2.9266 - mae:
Epoch 30/70
1416/1416 [=====] - 0s 343us/step - loss: 2.9266 - mae:
```

```
Epoch 31/70
1416/1416 [=====] - 0s 318us/step - loss: 2.9266 - mae:
Epoch 32/70
1416/1416 [=====] - 0s 330us/step - loss: 2.9266 - mae:
Epoch 33/70
1416/1416 [=====] - 0s 345us/step - loss: 2.9266 - mae:
Epoch 34/70
1416/1416 [=====] - 0s 320us/step - loss: 2.9266 - mae:
Epoch 35/70
1416/1416 [=====] - 1s 361us/step - loss: 2.9266 - mae:
Epoch 36/70
1416/1416 [=====] - 0s 348us/step - loss: 2.9266 - mae:
Epoch 37/70
1416/1416 [=====] - 0s 324us/step - loss: 2.9266 - mae:
Epoch 38/70
1416/1416 [=====] - 1s 371us/step - loss: 2.9266 - mae:
Epoch 39/70
1416/1416 [=====] - 1s 354us/step - loss: 2.9266 - mae:
Epoch 40/70
1416/1416 [=====] - 1s 356us/step - loss: 2.9266 - mae:
Epoch 41/70
1416/1416 [=====] - 1s 358us/step - loss: 2.9266 - mae:
Epoch 42/70
1416/1416 [=====] - 1s 377us/step - loss: 2.9266 - mae:
Epoch 43/70
1416/1416 [=====] - 0s 312us/step - loss: 2.9266 - mae:
Epoch 44/70
1416/1416 [=====] - 0s 310us/step - loss: 2.9266 - mae:
Epoch 45/70
1416/1416 [=====] - 0s 328us/step - loss: 2.9266 - mae:
Epoch 46/70
1416/1416 [=====] - 0s 348us/step - loss: 2.9266 - mae:
Epoch 47/70
1416/1416 [=====] - 0s 330us/step - loss: 2.9266 - mae:
Epoch 48/70
1416/1416 [=====] - 0s 333us/step - loss: 2.9266 - mae:
Epoch 49/70
1416/1416 [=====] - 1s 361us/step - loss: 2.9266 - mae:
Epoch 50/70
1416/1416 [=====] - 0s 338us/step - loss: 2.9266 - mae:
Epoch 51/70
1416/1416 [=====] - 0s 340us/step - loss: 2.9266 - mae:
Epoch 52/70
1416/1416 [=====] - 0s 327us/step - loss: 2.9266 - mae:
Epoch 53/70
1416/1416 [=====] - 1s 358us/step - loss: 2.9266 - mae:
Epoch 54/70
1416/1416 [=====] - 0s 324us/step - loss: 2.9266 - mae:
Epoch 55/70
1416/1416 [=====] - 0s 350us/step - loss: 2.9266 - mae:
Epoch 56/70
1416/1416 [=====] - 1s 360us/step - loss: 2.9266 - mae:
Epoch 57/70
1416/1416 [=====] - 0s 334us/step - loss: 2.9266 - mae:
Epoch 58/70
1416/1416 [=====] - 1s 354us/step - loss: 2.9266 - mae:
Epoch 59/70
1416/1416 [=====] - 0s 316us/step - loss: 2.9266 - mae:
```

4/22/2020

AES.ipynb - Colaboratory

1416/1416 [-----] - 0s 316us/step - loss: 2.9266 - mae:  
Epoch 60/70  
1416/1416 [=====] - 0s 324us/step - loss: 2.9266 - mae:  
Epoch 61/70  
1416/1416 [=====] - 1s 354us/step - loss: 2.9266 - mae:  
Epoch 62/70  
1416/1416 [=====] - 0s 340us/step - loss: 2.9266 - mae:  
Epoch 63/70  
1416/1416 [=====] - 0s 321us/step - loss: 2.9266 - mae:  
Epoch 64/70  
1416/1416 [=====] - 0s 347us/step - loss: 2.9266 - mae:  
Epoch 65/70  
1416/1416 [=====] - 1s 368us/step - loss: 2.9266 - mae:  
Epoch 66/70  
1416/1416 [=====] - 0s 320us/step - loss: 2.9266 - mae:  
Epoch 67/70  
1416/1416 [=====] - 0s 337us/step - loss: 2.9266 - mae:  
Epoch 68/70  
1416/1416 [=====] - 0s 328us/step - loss: 2.9266 - mae:  
Epoch 69/70  
1416/1416 [=====] - 0s 344us/step - loss: 2.9266 - mae:  
Epoch 70/70  
1416/1416 [=====] - 0s 350us/step - loss: 2.9266 - mae:



Kappa Score: 0.0

-----Fold 2-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.07567834854125977 sec  
Time to train the word2vec model: 1.6969597339630127 mins  
Model: "sequential\_17"

Layer (type)	Output Shape	Param #
bidirectional_33 (Bidirectio	(None, 1, 600)	1682400
bidirectional_34 (Bidirectio	(None, 200)	560800
dropout_17 (Dropout)	(None, 200)	0



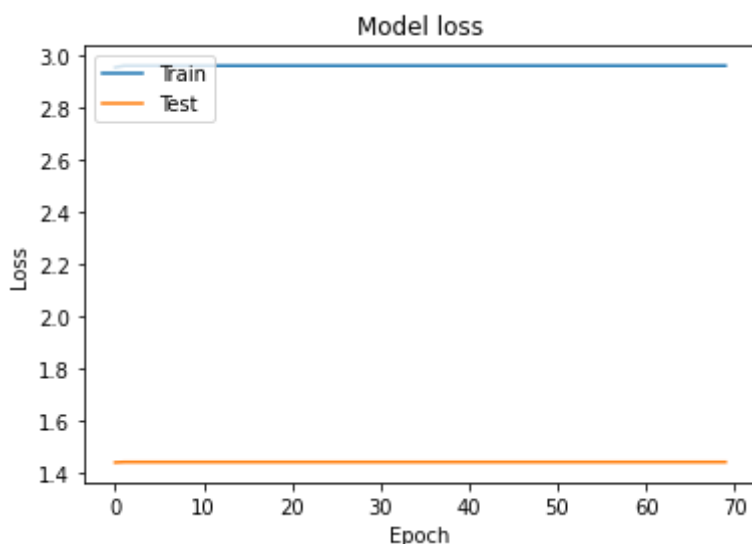
dense_17 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		
=====		
Epoch 1/70		
1416/1416	[=====]	- 2s 1ms/step - loss: 2.9561 - mae: 1.
Epoch 2/70		
1416/1416	[=====]	- 1s 362us/step - loss: 2.9626 - mae:
Epoch 3/70		
1416/1416	[=====]	- 1s 361us/step - loss: 2.9626 - mae:
Epoch 4/70		
1416/1416	[=====]	- 1s 376us/step - loss: 2.9626 - mae:
Epoch 5/70		
1416/1416	[=====]	- 1s 373us/step - loss: 2.9626 - mae:
Epoch 6/70		
1416/1416	[=====]	- 1s 365us/step - loss: 2.9626 - mae:
Epoch 7/70		
1416/1416	[=====]	- 1s 387us/step - loss: 2.9626 - mae:
Epoch 8/70		
1416/1416	[=====]	- 0s 346us/step - loss: 2.9626 - mae:
Epoch 9/70		
1416/1416	[=====]	- 0s 330us/step - loss: 2.9626 - mae:
Epoch 10/70		
1416/1416	[=====]	- 1s 364us/step - loss: 2.9626 - mae:
Epoch 11/70		
1416/1416	[=====]	- 0s 319us/step - loss: 2.9626 - mae:
Epoch 12/70		
1416/1416	[=====]	- 0s 350us/step - loss: 2.9626 - mae:
Epoch 13/70		
1416/1416	[=====]	- 0s 314us/step - loss: 2.9626 - mae:
Epoch 14/70		
1416/1416	[=====]	- 1s 367us/step - loss: 2.9626 - mae:
Epoch 15/70		
1416/1416	[=====]	- 0s 352us/step - loss: 2.9626 - mae:
Epoch 16/70		
1416/1416	[=====]	- 0s 324us/step - loss: 2.9626 - mae:
Epoch 17/70		
1416/1416	[=====]	- 0s 317us/step - loss: 2.9626 - mae:
Epoch 18/70		
1416/1416	[=====]	- 1s 363us/step - loss: 2.9626 - mae:
Epoch 19/70		
1416/1416	[=====]	- 1s 364us/step - loss: 2.9626 - mae:
Epoch 20/70		
1416/1416	[=====]	- 0s 315us/step - loss: 2.9626 - mae:
Epoch 21/70		
1416/1416	[=====]	- 0s 307us/step - loss: 2.9626 - mae:
Epoch 22/70		
1416/1416	[=====]	- 1s 370us/step - loss: 2.9626 - mae:
Epoch 23/70		
1416/1416	[=====]	- 1s 355us/step - loss: 2.9626 - mae:
Epoch 24/70		
1416/1416	[=====]	- 1s 365us/step - loss: 2.9626 - mae:
Epoch 25/70		
1416/1416	[=====]	- 0s 327us/step - loss: 2.9626 - mae:
Epoch 26/70		
1416/1416	[=====]	- 0s 326us/step - loss: 2.9626 - mae:

```
Epoch 27/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9626 - mae:
Epoch 28/70
1416/1416 [=====] - 1s 359us/step - loss: 2.9626 - mae:
Epoch 29/70
1416/1416 [=====] - 0s 322us/step - loss: 2.9626 - mae:
Epoch 30/70
1416/1416 [=====] - 0s 311us/step - loss: 2.9626 - mae:
Epoch 31/70
1416/1416 [=====] - 0s 352us/step - loss: 2.9626 - mae:
Epoch 32/70
1416/1416 [=====] - 0s 336us/step - loss: 2.9626 - mae:
Epoch 33/70
1416/1416 [=====] - 0s 342us/step - loss: 2.9626 - mae:
Epoch 34/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9626 - mae:
Epoch 35/70
1416/1416 [=====] - 1s 356us/step - loss: 2.9626 - mae:
Epoch 36/70
1416/1416 [=====] - 1s 374us/step - loss: 2.9626 - mae:
Epoch 37/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9626 - mae:
Epoch 38/70
1416/1416 [=====] - 1s 372us/step - loss: 2.9626 - mae:
Epoch 39/70
1416/1416 [=====] - 1s 365us/step - loss: 2.9626 - mae:
Epoch 40/70
1416/1416 [=====] - 0s 336us/step - loss: 2.9626 - mae:
Epoch 41/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9626 - mae:
Epoch 42/70
1416/1416 [=====] - 1s 358us/step - loss: 2.9626 - mae:
Epoch 43/70
1416/1416 [=====] - 1s 377us/step - loss: 2.9626 - mae:
Epoch 44/70
1416/1416 [=====] - 1s 362us/step - loss: 2.9626 - mae:
Epoch 45/70
1416/1416 [=====] - 1s 354us/step - loss: 2.9626 - mae:
Epoch 46/70
1416/1416 [=====] - 0s 332us/step - loss: 2.9626 - mae:
Epoch 47/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9626 - mae:
Epoch 48/70
1416/1416 [=====] - 0s 320us/step - loss: 2.9626 - mae:
Epoch 49/70
1416/1416 [=====] - 0s 323us/step - loss: 2.9626 - mae:
Epoch 50/70
1416/1416 [=====] - 0s 351us/step - loss: 2.9626 - mae:
Epoch 51/70
1416/1416 [=====] - 1s 373us/step - loss: 2.9626 - mae:
Epoch 52/70
1416/1416 [=====] - 0s 330us/step - loss: 2.9626 - mae:
Epoch 53/70
1416/1416 [=====] - 0s 331us/step - loss: 2.9626 - mae:
Epoch 54/70
1416/1416 [=====] - 1s 367us/step - loss: 2.9626 - mae:
Epoch 55/70
```

```

1416/1416 [=====] - 0s 341us/step - loss: 2.9626 - mae:
Epoch 56/70
1416/1416 [=====] - 1s 375us/step - loss: 2.9626 - mae:
Epoch 57/70
1416/1416 [=====] - 0s 321us/step - loss: 2.9626 - mae:
Epoch 58/70
1416/1416 [=====] - 0s 351us/step - loss: 2.9626 - mae:
Epoch 59/70
1416/1416 [=====] - 1s 364us/step - loss: 2.9626 - mae:
Epoch 60/70
1416/1416 [=====] - 1s 406us/step - loss: 2.9626 - mae:
Epoch 61/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9626 - mae:
Epoch 62/70
1416/1416 [=====] - 1s 354us/step - loss: 2.9626 - mae:
Epoch 63/70
1416/1416 [=====] - 0s 344us/step - loss: 2.9626 - mae:
Epoch 64/70
1416/1416 [=====] - 0s 324us/step - loss: 2.9626 - mae:
Epoch 65/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9626 - mae:
Epoch 66/70
1416/1416 [=====] - 1s 374us/step - loss: 2.9626 - mae:
Epoch 67/70
1416/1416 [=====] - 1s 372us/step - loss: 2.9626 - mae:
Epoch 68/70
1416/1416 [=====] - 1s 384us/step - loss: 2.9626 - mae:
Epoch 69/70
1416/1416 [=====] - 1s 375us/step - loss: 2.9626 - mae:
Epoch 70/70
1416/1416 [=====] - 1s 376us/step - loss: 2.9626 - mae:

```



Kappa Score: 0.0

-----Fold 3-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.07494425773620605 sec
Time to train the word2vec model: 1.7165570259094238 mins
Model: "sequential_18"

```

Layer (type)	Output Shape	Param #
bidirectional_35 (Bidirectio	(None, 1, 600)	1682400
bidirectional_36 (Bidirectio	(None, 200)	560800
dropout_18 (Dropout)	(None, 200)	0
dense_18 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

```

Epoch 1/70
1416/1416 [=====] - 2s 1ms/step - loss: 2.7445 - mae: 1.
Epoch 2/70
1416/1416 [=====] - 1s 362us/step - loss: 2.8432 - mae:
Epoch 3/70
1416/1416 [=====] - 0s 330us/step - loss: 2.8432 - mae:
Epoch 4/70
1416/1416 [=====] - 0s 335us/step - loss: 2.8432 - mae:
Epoch 5/70
1416/1416 [=====] - 0s 342us/step - loss: 2.8432 - mae:
Epoch 6/70
1416/1416 [=====] - 1s 377us/step - loss: 2.8432 - mae:
Epoch 7/70
1416/1416 [=====] - 0s 321us/step - loss: 2.8432 - mae:
Epoch 8/70
1416/1416 [=====] - 1s 354us/step - loss: 2.8432 - mae:
Epoch 9/70
1416/1416 [=====] - 0s 350us/step - loss: 2.8432 - mae:
Epoch 10/70
1416/1416 [=====] - 0s 339us/step - loss: 2.8432 - mae:
Epoch 11/70
1416/1416 [=====] - 0s 335us/step - loss: 2.8432 - mae:
Epoch 12/70
1416/1416 [=====] - 1s 360us/step - loss: 2.8432 - mae:
Epoch 13/70
1416/1416 [=====] - 0s 352us/step - loss: 2.8432 - mae:
Epoch 14/70
1416/1416 [=====] - 1s 356us/step - loss: 2.8432 - mae:
Epoch 15/70
1416/1416 [=====] - 0s 348us/step - loss: 2.8432 - mae:
Epoch 16/70
1416/1416 [=====] - 1s 371us/step - loss: 2.8432 - mae:
Epoch 17/70
1416/1416 [=====] - 0s 351us/step - loss: 2.8432 - mae:
Epoch 18/70
1416/1416 [=====] - 0s 351us/step - loss: 2.8432 - mae:
Epoch 19/70
1416/1416 [=====] - 0s 347us/step - loss: 2.8432 - mae:
Epoch 20/70
1416/1416 [=====] - 1s 363us/step - loss: 2.8432 - mae:
Epoch 21/70
1416/1416 [=====] - 0s 341us/step - loss: 2.8432 - mae:
Epoch 22/70
1416/1416 [=====] - 1s 368us/step - loss: 2.8432 - mae:

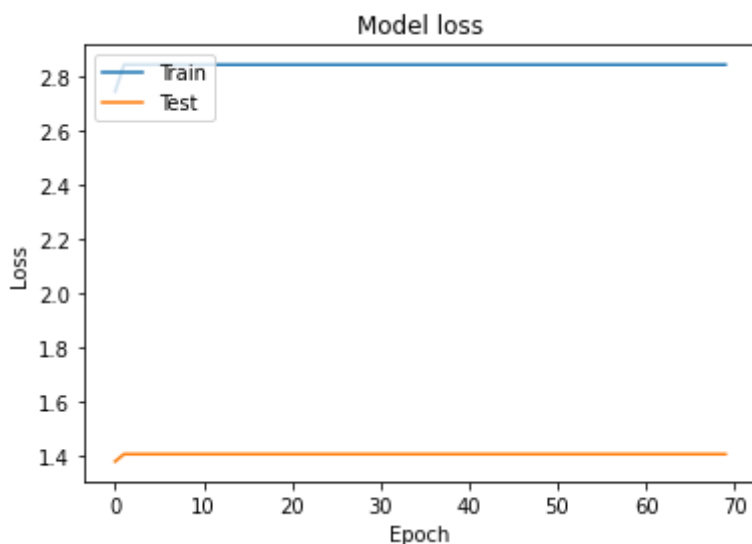
```

```
1416/1416 [=====] - 1s 368us/step - loss: 2.8432 - mae:  
Epoch 23/70  
1416/1416 [=====] - 1s 375us/step - loss: 2.8432 - mae:  
Epoch 24/70  
1416/1416 [=====] - 0s 344us/step - loss: 2.8432 - mae:  
Epoch 25/70  
1416/1416 [=====] - 1s 357us/step - loss: 2.8432 - mae:  
Epoch 26/70  
1416/1416 [=====] - 1s 363us/step - loss: 2.8432 - mae:  
Epoch 27/70  
1416/1416 [=====] - 0s 330us/step - loss: 2.8432 - mae:  
Epoch 28/70  
1416/1416 [=====] - 0s 337us/step - loss: 2.8432 - mae:  
Epoch 29/70  
1416/1416 [=====] - 0s 326us/step - loss: 2.8432 - mae:  
Epoch 30/70  
1416/1416 [=====] - 0s 319us/step - loss: 2.8432 - mae:  
Epoch 31/70  
1416/1416 [=====] - 0s 339us/step - loss: 2.8432 - mae:  
Epoch 32/70  
1416/1416 [=====] - 0s 331us/step - loss: 2.8432 - mae:  
Epoch 33/70  
1416/1416 [=====] - 0s 324us/step - loss: 2.8432 - mae:  
Epoch 34/70  
1416/1416 [=====] - 0s 312us/step - loss: 2.8432 - mae:  
Epoch 35/70  
1416/1416 [=====] - 0s 344us/step - loss: 2.8432 - mae:  
Epoch 36/70  
1416/1416 [=====] - 0s 348us/step - loss: 2.8432 - mae:  
Epoch 37/70  
1416/1416 [=====] - 1s 365us/step - loss: 2.8432 - mae:  
Epoch 38/70  
1416/1416 [=====] - 0s 350us/step - loss: 2.8432 - mae:  
Epoch 39/70  
1416/1416 [=====] - 0s 344us/step - loss: 2.8432 - mae:  
Epoch 40/70  
1416/1416 [=====] - 1s 368us/step - loss: 2.8432 - mae:  
Epoch 41/70  
1416/1416 [=====] - 1s 356us/step - loss: 2.8432 - mae:  
Epoch 42/70  
1416/1416 [=====] - 1s 358us/step - loss: 2.8432 - mae:  
Epoch 43/70  
1416/1416 [=====] - 1s 371us/step - loss: 2.8432 - mae:  
Epoch 44/70  
1416/1416 [=====] - 1s 373us/step - loss: 2.8432 - mae:  
Epoch 45/70  
1416/1416 [=====] - 0s 323us/step - loss: 2.8432 - mae:  
Epoch 46/70  
1416/1416 [=====] - 1s 373us/step - loss: 2.8432 - mae:  
Epoch 47/70  
1416/1416 [=====] - 0s 345us/step - loss: 2.8432 - mae:  
Epoch 48/70  
1416/1416 [=====] - 1s 360us/step - loss: 2.8432 - mae:  
Epoch 49/70  
1416/1416 [=====] - 0s 311us/step - loss: 2.8432 - mae:  
Epoch 50/70  
1416/1416 [=====] - 1s 367us/step - loss: 2.8432 - mae:  
Epoch 51/70
```

```

1416/1416 [=====] - 0s 340us/step - loss: 2.8432 - mae:
Epoch 52/70
1416/1416 [=====] - 0s 344us/step - loss: 2.8432 - mae:
Epoch 53/70
1416/1416 [=====] - 0s 316us/step - loss: 2.8432 - mae:
Epoch 54/70
1416/1416 [=====] - 0s 347us/step - loss: 2.8432 - mae:
Epoch 55/70
1416/1416 [=====] - 0s 320us/step - loss: 2.8432 - mae:
Epoch 56/70
1416/1416 [=====] - 0s 346us/step - loss: 2.8432 - mae:
Epoch 57/70
1416/1416 [=====] - 0s 343us/step - loss: 2.8432 - mae:
Epoch 58/70
1416/1416 [=====] - 1s 364us/step - loss: 2.8432 - mae:
Epoch 59/70
1416/1416 [=====] - 1s 355us/step - loss: 2.8432 - mae:
Epoch 60/70
1416/1416 [=====] - 0s 315us/step - loss: 2.8432 - mae:
Epoch 61/70
1416/1416 [=====] - 1s 372us/step - loss: 2.8432 - mae:
Epoch 62/70
1416/1416 [=====] - 0s 345us/step - loss: 2.8432 - mae:
Epoch 63/70
1416/1416 [=====] - 1s 366us/step - loss: 2.8432 - mae:
Epoch 64/70
1416/1416 [=====] - 0s 319us/step - loss: 2.8432 - mae:
Epoch 65/70
1416/1416 [=====] - 0s 321us/step - loss: 2.8432 - mae:
Epoch 66/70
1416/1416 [=====] - 0s 328us/step - loss: 2.8432 - mae:
Epoch 67/70
1416/1416 [=====] - 0s 344us/step - loss: 2.8432 - mae:
Epoch 68/70
1416/1416 [=====] - 0s 352us/step - loss: 2.8432 - mae:
Epoch 69/70
1416/1416 [=====] - 0s 346us/step - loss: 2.8432 - mae:
Epoch 70/70
1416/1416 [=====] - 0s 333us/step - loss: 2.8432 - mae:

```



Kappa Score: 0.0

-----FOLD 4-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.07524967193603516 sec

Time to train the word2vec model: 1.6358120441436768 mins

Model: "sequential\_19"

Layer (type)	Output Shape	Param #
=====		
bidirectional_37 (Bidirectional)	(None, 1, 600)	1682400
bidirectional_38 (Bidirectional)	(None, 200)	560800
dropout_19 (Dropout)	(None, 200)	0
dense_19 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1416/1416 [=====] - 2s 1ms/step - loss: 2.8664 - mae: 1.

Epoch 2/70

1416/1416 [=====] - 0s 344us/step - loss: 2.9654 - mae:

Epoch 3/70

1416/1416 [=====] - 0s 330us/step - loss: 2.9654 - mae:

Epoch 4/70

1416/1416 [=====] - 0s 333us/step - loss: 2.9654 - mae:

Epoch 5/70

1416/1416 [=====] - 0s 327us/step - loss: 2.9654 - mae:

Epoch 6/70

1416/1416 [=====] - 0s 351us/step - loss: 2.9654 - mae:

Epoch 7/70

1416/1416 [=====] - 1s 366us/step - loss: 2.9654 - mae:

Epoch 8/70

1416/1416 [=====] - 1s 364us/step - loss: 2.9654 - mae:

Epoch 9/70

1416/1416 [=====] - 1s 370us/step - loss: 2.9654 - mae:

Epoch 10/70

1416/1416 [=====] - 1s 359us/step - loss: 2.9654 - mae:

Epoch 11/70

1416/1416 [=====] - 1s 372us/step - loss: 2.9654 - mae:

Epoch 12/70

1416/1416 [=====] - 0s 345us/step - loss: 2.9654 - mae:

Epoch 13/70

1416/1416 [=====] - 0s 353us/step - loss: 2.9654 - mae:

Epoch 14/70

1416/1416 [=====] - 0s 324us/step - loss: 2.9654 - mae:

Epoch 15/70

1416/1416 [=====] - 0s 325us/step - loss: 2.9654 - mae:

Epoch 16/70

1416/1416 [=====] - 0s 344us/step - loss: 2.9654 - mae:

Epoch 17/70

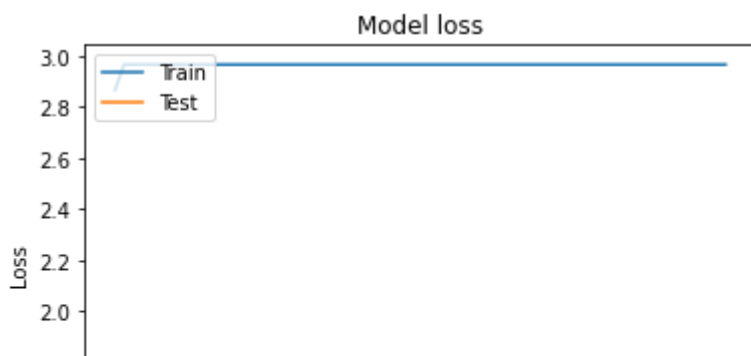
1416/1416 [=====] - 0s 327us/step - loss: 2.9654 - mae:

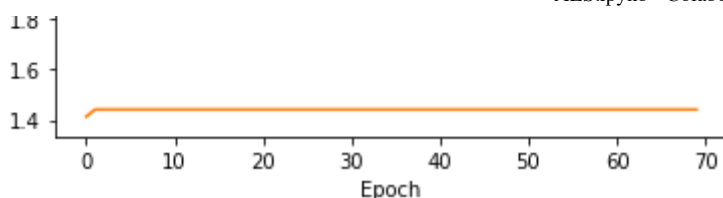
Epoch 18/70

```
1416/1416 [=====] - 0s 348us/step - loss: 2.9654 - mae:
Epoch 19/70
1416/1416 [=====] - 1s 367us/step - loss: 2.9654 - mae:
Epoch 20/70
1416/1416 [=====] - 0s 349us/step - loss: 2.9654 - mae:
Epoch 21/70
1416/1416 [=====] - 0s 345us/step - loss: 2.9654 - mae:
Epoch 22/70
1416/1416 [=====] - 0s 337us/step - loss: 2.9654 - mae:
Epoch 23/70
1416/1416 [=====] - 1s 360us/step - loss: 2.9654 - mae:
Epoch 24/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9654 - mae:
Epoch 25/70
1416/1416 [=====] - 1s 368us/step - loss: 2.9654 - mae:
Epoch 26/70
1416/1416 [=====] - 1s 356us/step - loss: 2.9654 - mae:
Epoch 27/70
1416/1416 [=====] - 0s 349us/step - loss: 2.9654 - mae:
Epoch 28/70
1416/1416 [=====] - 0s 349us/step - loss: 2.9654 - mae:
Epoch 29/70
1416/1416 [=====] - 0s 316us/step - loss: 2.9654 - mae:
Epoch 30/70
1416/1416 [=====] - 1s 362us/step - loss: 2.9654 - mae:
Epoch 31/70
1416/1416 [=====] - 1s 376us/step - loss: 2.9654 - mae:
Epoch 32/70
1416/1416 [=====] - 1s 364us/step - loss: 2.9654 - mae:
Epoch 33/70
1416/1416 [=====] - 1s 367us/step - loss: 2.9654 - mae:
Epoch 34/70
1416/1416 [=====] - 1s 363us/step - loss: 2.9654 - mae:
Epoch 35/70
1416/1416 [=====] - 0s 317us/step - loss: 2.9654 - mae:
Epoch 36/70
1416/1416 [=====] - 0s 322us/step - loss: 2.9654 - mae:
Epoch 37/70
1416/1416 [=====] - 0s 348us/step - loss: 2.9654 - mae:
Epoch 38/70
1416/1416 [=====] - 1s 362us/step - loss: 2.9654 - mae:
Epoch 39/70
1416/1416 [=====] - 0s 314us/step - loss: 2.9654 - mae:
Epoch 40/70
1416/1416 [=====] - 0s 341us/step - loss: 2.9654 - mae:
Epoch 41/70
1416/1416 [=====] - 1s 363us/step - loss: 2.9654 - mae:
Epoch 42/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9654 - mae:
Epoch 43/70
1416/1416 [=====] - 0s 303us/step - loss: 2.9654 - mae:
Epoch 44/70
1416/1416 [=====] - 0s 342us/step - loss: 2.9654 - mae:
Epoch 45/70
1416/1416 [=====] - 0s 353us/step - loss: 2.9654 - mae:
Epoch 46/70
1416/1416 [=====] - 0s 330us/step - loss: 2.9654 - mae:
Epoch 47/70
```



```
1416/1416 [=====] - 0s 327us/step - loss: 2.9654 - mae:  
Epoch 48/70  
1416/1416 [=====] - 0s 336us/step - loss: 2.9654 - mae:  
Epoch 49/70  
1416/1416 [=====] - 0s 321us/step - loss: 2.9654 - mae:  
Epoch 50/70  
1416/1416 [=====] - 0s 351us/step - loss: 2.9654 - mae:  
Epoch 51/70  
1416/1416 [=====] - 0s 334us/step - loss: 2.9654 - mae:  
Epoch 52/70  
1416/1416 [=====] - 0s 308us/step - loss: 2.9654 - mae:  
Epoch 53/70  
1416/1416 [=====] - 1s 367us/step - loss: 2.9654 - mae:  
Epoch 54/70  
1416/1416 [=====] - 0s 349us/step - loss: 2.9654 - mae:  
Epoch 55/70  
1416/1416 [=====] - 0s 319us/step - loss: 2.9654 - mae:  
Epoch 56/70  
1416/1416 [=====] - 0s 345us/step - loss: 2.9654 - mae:  
Epoch 57/70  
1416/1416 [=====] - 0s 333us/step - loss: 2.9654 - mae:  
Epoch 58/70  
1416/1416 [=====] - 0s 336us/step - loss: 2.9654 - mae:  
Epoch 59/70  
1416/1416 [=====] - 0s 339us/step - loss: 2.9654 - mae:  
Epoch 60/70  
1416/1416 [=====] - 1s 361us/step - loss: 2.9654 - mae:  
Epoch 61/70  
1416/1416 [=====] - 1s 357us/step - loss: 2.9654 - mae:  
Epoch 62/70  
1416/1416 [=====] - 0s 352us/step - loss: 2.9654 - mae:  
Epoch 63/70  
1416/1416 [=====] - 0s 343us/step - loss: 2.9654 - mae:  
Epoch 64/70  
1416/1416 [=====] - 0s 310us/step - loss: 2.9654 - mae:  
Epoch 65/70  
1416/1416 [=====] - 0s 341us/step - loss: 2.9654 - mae:  
Epoch 66/70  
1416/1416 [=====] - 1s 373us/step - loss: 2.9654 - mae:  
Epoch 67/70  
1416/1416 [=====] - 1s 357us/step - loss: 2.9654 - mae:  
Epoch 68/70  
1416/1416 [=====] - 1s 362us/step - loss: 2.9654 - mae:  
Epoch 69/70  
1416/1416 [=====] - 1s 368us/step - loss: 2.9654 - mae:  
Epoch 70/70  
1416/1416 [=====] - 1s 374us/step - loss: 2.9654 - mae:
```





Kappa Score: 0.0

-----Fold 5-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.07580757141113281 sec

Time to train the word2vec model: 1.682042121887207 mins

Model: "sequential\_20"

Layer (type)	Output Shape	Param #
=====		
bidirectional_39 (Bidirectio	(None, 1, 600)	1682400
bidirectional_40 (Bidirectio	(None, 200)	560800
dropout_20 (Dropout)	(None, 200)	0
dense_20 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1416/1416 [=====] - 2s 1ms/step - loss: 2.8099 - mae: 1.

Epoch 2/70

1416/1416 [=====] - 0s 312us/step - loss: 2.9718 - mae:

Epoch 3/70

1416/1416 [=====] - 0s 337us/step - loss: 2.9718 - mae:

Epoch 4/70

1416/1416 [=====] - 1s 354us/step - loss: 2.9718 - mae:

Epoch 5/70

1416/1416 [=====] - 0s 328us/step - loss: 2.9718 - mae:

Epoch 6/70

1416/1416 [=====] - 0s 317us/step - loss: 2.9718 - mae:

Epoch 7/70

1416/1416 [=====] - 0s 333us/step - loss: 2.9718 - mae:

Epoch 8/70

1416/1416 [=====] - 0s 318us/step - loss: 2.9718 - mae:

Epoch 9/70

1416/1416 [=====] - 0s 346us/step - loss: 2.9718 - mae:

Epoch 10/70

1416/1416 [=====] - 0s 316us/step - loss: 2.9718 - mae:

Epoch 11/70

1416/1416 [=====] - 1s 367us/step - loss: 2.9718 - mae:

Epoch 12/70

1416/1416 [=====] - 0s 329us/step - loss: 2.9718 - mae:

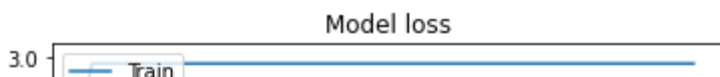
Epoch 13/70

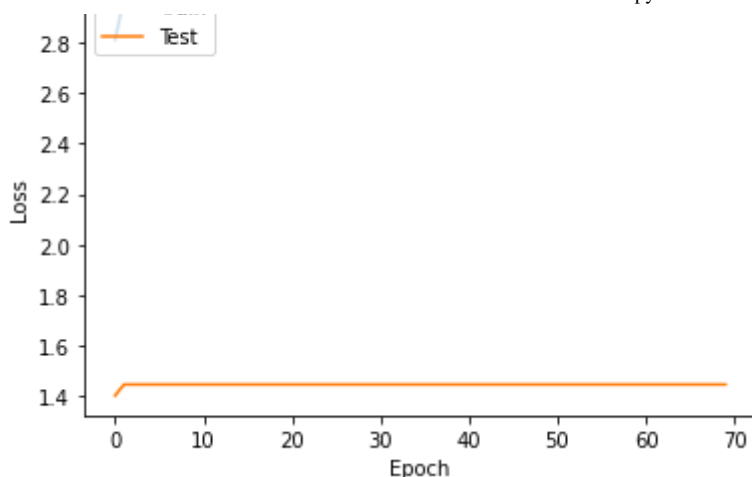
1416/1416 [=====] - 0s 339us/step - loss: 2.9718 - mae:

Epoch 14/70

```
1416/1416 [=====] - 0s 314us/step - loss: 2.9718 - mae:
Epoch 15/70
1416/1416 [=====] - 0s 314us/step - loss: 2.9718 - mae:
Epoch 16/70
1416/1416 [=====] - 0s 315us/step - loss: 2.9718 - mae:
Epoch 17/70
1416/1416 [=====] - 1s 359us/step - loss: 2.9718 - mae:
Epoch 18/70
1416/1416 [=====] - 0s 322us/step - loss: 2.9718 - mae:
Epoch 19/70
1416/1416 [=====] - 0s 305us/step - loss: 2.9718 - mae:
Epoch 20/70
1416/1416 [=====] - 0s 327us/step - loss: 2.9718 - mae:
Epoch 21/70
1416/1416 [=====] - 0s 329us/step - loss: 2.9718 - mae:
Epoch 22/70
1416/1416 [=====] - 0s 343us/step - loss: 2.9718 - mae:
Epoch 23/70
1416/1416 [=====] - 1s 365us/step - loss: 2.9718 - mae:
Epoch 24/70
1416/1416 [=====] - 0s 324us/step - loss: 2.9718 - mae:
Epoch 25/70
1416/1416 [=====] - 0s 344us/step - loss: 2.9718 - mae:
Epoch 26/70
1416/1416 [=====] - 0s 333us/step - loss: 2.9718 - mae:
Epoch 27/70
1416/1416 [=====] - 0s 346us/step - loss: 2.9718 - mae:
Epoch 28/70
1416/1416 [=====] - 0s 326us/step - loss: 2.9718 - mae:
Epoch 29/70
1416/1416 [=====] - 0s 344us/step - loss: 2.9718 - mae:
Epoch 30/70
1416/1416 [=====] - 1s 360us/step - loss: 2.9718 - mae:
Epoch 31/70
1416/1416 [=====] - 1s 357us/step - loss: 2.9718 - mae:
Epoch 32/70
1416/1416 [=====] - 0s 344us/step - loss: 2.9718 - mae:
Epoch 33/70
1416/1416 [=====] - 1s 355us/step - loss: 2.9718 - mae:
Epoch 34/70
1416/1416 [=====] - 0s 331us/step - loss: 2.9718 - mae:
Epoch 35/70
1416/1416 [=====] - 0s 334us/step - loss: 2.9718 - mae:
Epoch 36/70
1416/1416 [=====] - 0s 343us/step - loss: 2.9718 - mae:
Epoch 37/70
1416/1416 [=====] - 1s 356us/step - loss: 2.9718 - mae:
Epoch 38/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9718 - mae:
Epoch 39/70
1416/1416 [=====] - 0s 332us/step - loss: 2.9718 - mae:
Epoch 40/70
1416/1416 [=====] - 0s 351us/step - loss: 2.9718 - mae:
Epoch 41/70
1416/1416 [=====] - 0s 343us/step - loss: 2.9718 - mae:
Epoch 42/70
1416/1416 [=====] - 0s 341us/step - loss: 2.9718 - mae:
Epoch 43/70
```

```
Epoch 43/70
1416/1416 [=====] - 0s 347us/step - loss: 2.9718 - mae:
Epoch 44/70
1416/1416 [=====] - 0s 346us/step - loss: 2.9718 - mae:
Epoch 45/70
1416/1416 [=====] - 0s 328us/step - loss: 2.9718 - mae:
Epoch 46/70
1416/1416 [=====] - 0s 350us/step - loss: 2.9718 - mae:
Epoch 47/70
1416/1416 [=====] - 1s 358us/step - loss: 2.9718 - mae:
Epoch 48/70
1416/1416 [=====] - 0s 337us/step - loss: 2.9718 - mae:
Epoch 49/70
1416/1416 [=====] - 0s 349us/step - loss: 2.9718 - mae:
Epoch 50/70
1416/1416 [=====] - 0s 319us/step - loss: 2.9718 - mae:
Epoch 51/70
1416/1416 [=====] - 0s 340us/step - loss: 2.9718 - mae:
Epoch 52/70
1416/1416 [=====] - 0s 346us/step - loss: 2.9718 - mae:
Epoch 53/70
1416/1416 [=====] - 0s 305us/step - loss: 2.9718 - mae:
Epoch 54/70
1416/1416 [=====] - 0s 329us/step - loss: 2.9718 - mae:
Epoch 55/70
1416/1416 [=====] - 0s 315us/step - loss: 2.9718 - mae:
Epoch 56/70
1416/1416 [=====] - 1s 357us/step - loss: 2.9718 - mae:
Epoch 57/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9718 - mae:
Epoch 58/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9718 - mae:
Epoch 59/70
1416/1416 [=====] - 0s 331us/step - loss: 2.9718 - mae:
Epoch 60/70
1416/1416 [=====] - 0s 299us/step - loss: 2.9718 - mae:
Epoch 61/70
1416/1416 [=====] - 0s 313us/step - loss: 2.9718 - mae:
Epoch 62/70
1416/1416 [=====] - 0s 303us/step - loss: 2.9718 - mae:
Epoch 63/70
1416/1416 [=====] - 0s 352us/step - loss: 2.9718 - mae:
Epoch 64/70
1416/1416 [=====] - 0s 337us/step - loss: 2.9718 - mae:
Epoch 65/70
1416/1416 [=====] - 1s 360us/step - loss: 2.9718 - mae:
Epoch 66/70
1416/1416 [=====] - 1s 357us/step - loss: 2.9718 - mae:
Epoch 67/70
1416/1416 [=====] - 0s 346us/step - loss: 2.9718 - mae:
Epoch 68/70
1416/1416 [=====] - 0s 339us/step - loss: 2.9718 - mae:
Epoch 69/70
1416/1416 [=====] - 1s 358us/step - loss: 2.9718 - mae:
Epoch 70/70
1416/1416 [=====] - 0s 311us/step - loss: 2.9718 - mae:
```





Kappa Score: 0.0

Average kappa score value is : 0.0

-----SET 5-----

(1805, 4)

(1805,)

-----Fold 1-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.10522055625915527 sec

Time to train the word2vec model: 2.5224337577819824 mins

Model: "sequential\_21"

Layer (type)	Output Shape	Param #
bidirectional_41 (Bidirectio	(None, 1, 600)	1682400
bidirectional_42 (Bidirectio	(None, 200)	560800
dropout_21 (Dropout)	(None, 200)	0
dense_21 (Dense)	(None, 1)	201

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1444/1444 [=====] - 2s 1ms/step - loss: 2.7256 - mae: 1.

Epoch 2/70

1444/1444 [=====] - 0s 315us/step - loss: 0.8383 - mae:

Epoch 3/70

1444/1444 [=====] - 0s 319us/step - loss: 0.7661 - mae:

Epoch 4/70

1444/1444 [=====] - 0s 297us/step - loss: 0.7334 - mae:

Epoch 5/70

1444/1444 [=====] - 0s 315us/step - loss: 0.7012 - mae:

Epoch 6/70

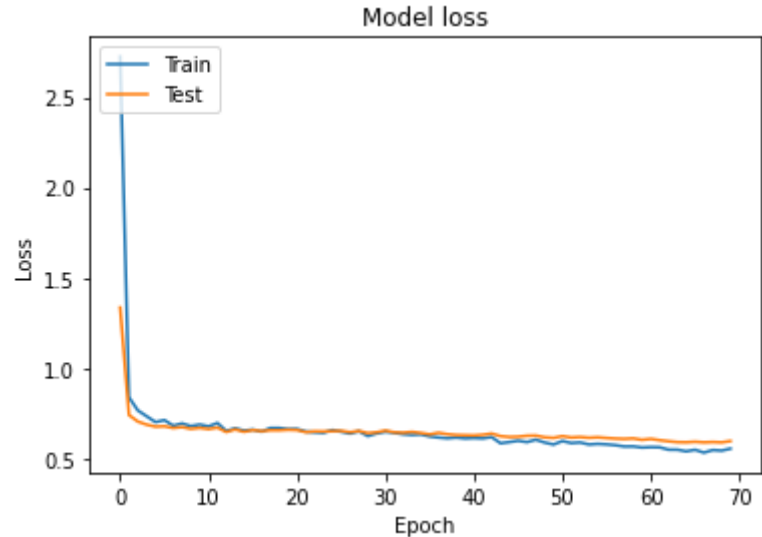
1444/1444 [=====] - 0s 310us/step - loss: 0.7121 - mae:

Epoch 7/70

```
1444/1444 [=====] - 1s 350us/step - loss: 0.6814 - mae:
Epoch 8/70
1444/1444 [=====] - 0s 305us/step - loss: 0.6934 - mae:
Epoch 9/70
1444/1444 [=====] - 0s 329us/step - loss: 0.6790 - mae:
Epoch 10/70
1444/1444 [=====] - 1s 360us/step - loss: 0.6873 - mae:
Epoch 11/70
1444/1444 [=====] - 0s 317us/step - loss: 0.6775 - mae:
Epoch 12/70
1444/1444 [=====] - 0s 313us/step - loss: 0.6960 - mae:
Epoch 13/70
1444/1444 [=====] - 0s 298us/step - loss: 0.6516 - mae:
Epoch 14/70
1444/1444 [=====] - 0s 326us/step - loss: 0.6669 - mae:
Epoch 15/70
1444/1444 [=====] - 0s 293us/step - loss: 0.6540 - mae:
Epoch 16/70
1444/1444 [=====] - 0s 327us/step - loss: 0.6595 - mae:
Epoch 17/70
1444/1444 [=====] - 1s 354us/step - loss: 0.6484 - mae:
Epoch 18/70
1444/1444 [=====] - 0s 346us/step - loss: 0.6684 - mae:
Epoch 19/70
1444/1444 [=====] - 0s 335us/step - loss: 0.6684 - mae:
Epoch 20/70
1444/1444 [=====] - 1s 354us/step - loss: 0.6621 - mae:
Epoch 21/70
1444/1444 [=====] - 0s 344us/step - loss: 0.6632 - mae:
Epoch 22/70
1444/1444 [=====] - 0s 338us/step - loss: 0.6484 - mae:
Epoch 23/70
1444/1444 [=====] - 1s 350us/step - loss: 0.6445 - mae:
Epoch 24/70
1444/1444 [=====] - 1s 365us/step - loss: 0.6419 - mae:
Epoch 25/70
1444/1444 [=====] - 0s 304us/step - loss: 0.6572 - mae:
Epoch 26/70
1444/1444 [=====] - 0s 339us/step - loss: 0.6479 - mae:
Epoch 27/70
1444/1444 [=====] - 0s 311us/step - loss: 0.6376 - mae:
Epoch 28/70
1444/1444 [=====] - 0s 336us/step - loss: 0.6507 - mae:
Epoch 29/70
1444/1444 [=====] - 0s 339us/step - loss: 0.6237 - mae:
Epoch 30/70
1444/1444 [=====] - 0s 334us/step - loss: 0.6384 - mae:
Epoch 31/70
1444/1444 [=====] - 0s 338us/step - loss: 0.6477 - mae:
Epoch 32/70
1444/1444 [=====] - 0s 334us/step - loss: 0.6417 - mae:
Epoch 33/70
1444/1444 [=====] - 0s 332us/step - loss: 0.6340 - mae:
Epoch 34/70
1444/1444 [=====] - 0s 321us/step - loss: 0.6304 - mae:
Epoch 35/70
1444/1444 [=====] - 1s 354us/step - loss: 0.6329 - mae:
Epoch 36/70
```

```
Epoch 36/70
1444/1444 [=====] - 1s 351us/step - loss: 0.6215 - mae:
Epoch 37/70
1444/1444 [=====] - 0s 333us/step - loss: 0.6158 - mae:
Epoch 38/70
1444/1444 [=====] - 0s 333us/step - loss: 0.6116 - mae:
Epoch 39/70
1444/1444 [=====] - 0s 314us/step - loss: 0.6155 - mae:
Epoch 40/70
1444/1444 [=====] - 1s 356us/step - loss: 0.6107 - mae:
Epoch 41/70
1444/1444 [=====] - 0s 311us/step - loss: 0.6127 - mae:
Epoch 42/70
1444/1444 [=====] - 0s 294us/step - loss: 0.6109 - mae:
Epoch 43/70
1444/1444 [=====] - 0s 335us/step - loss: 0.6184 - mae:
Epoch 44/70
1444/1444 [=====] - 0s 308us/step - loss: 0.5839 - mae:
Epoch 45/70
1444/1444 [=====] - 0s 327us/step - loss: 0.5905 - mae:
Epoch 46/70
1444/1444 [=====] - 0s 339us/step - loss: 0.5980 - mae:
Epoch 47/70
1444/1444 [=====] - 0s 341us/step - loss: 0.5904 - mae:
Epoch 48/70
1444/1444 [=====] - 0s 326us/step - loss: 0.6037 - mae:
Epoch 49/70
1444/1444 [=====] - 0s 323us/step - loss: 0.5879 - mae:
Epoch 50/70
1444/1444 [=====] - 0s 323us/step - loss: 0.5770 - mae:
Epoch 51/70
1444/1444 [=====] - 1s 362us/step - loss: 0.5963 - mae:
Epoch 52/70
1444/1444 [=====] - 0s 310us/step - loss: 0.5851 - mae:
Epoch 53/70
1444/1444 [=====] - 0s 344us/step - loss: 0.5884 - mae:
Epoch 54/70
1444/1444 [=====] - 0s 333us/step - loss: 0.5772 - mae:
Epoch 55/70
1444/1444 [=====] - 0s 328us/step - loss: 0.5805 - mae:
Epoch 56/70
1444/1444 [=====] - 0s 326us/step - loss: 0.5777 - mae:
Epoch 57/70
1444/1444 [=====] - 0s 301us/step - loss: 0.5733 - mae:
Epoch 58/70
1444/1444 [=====] - 0s 324us/step - loss: 0.5660 - mae:
Epoch 59/70
1444/1444 [=====] - 0s 301us/step - loss: 0.5664 - mae:
Epoch 60/70
1444/1444 [=====] - 0s 317us/step - loss: 0.5604 - mae:
Epoch 61/70
1444/1444 [=====] - 0s 302us/step - loss: 0.5624 - mae:
Epoch 62/70
1444/1444 [=====] - 0s 322us/step - loss: 0.5615 - mae:
Epoch 63/70
1444/1444 [=====] - 1s 350us/step - loss: 0.5484 - mae:
Epoch 64/70
1444/1444 [=====] - 0s 322us/step - loss: 0.5482 - mae:
```

```
4/22/2020 AES.ipynb - Colaboratory
Epoch 65/70
1444/1444 [=====] - 0s 334us/step - loss: 0.5393 - mae:
Epoch 66/70
1444/1444 [=====] - 0s 327us/step - loss: 0.5478 - mae:
Epoch 67/70
1444/1444 [=====] - 0s 297us/step - loss: 0.5320 - mae:
Epoch 68/70
1444/1444 [=====] - 0s 307us/step - loss: 0.5463 - mae:
Epoch 69/70
1444/1444 [=====] - 1s 350us/step - loss: 0.5431 - mae:
Epoch 70/70
1444/1444 [=====] - 0s 333us/step - loss: 0.5541 - mae:
```



Kappa Score: 0.5511327203688938

-----Fold 2-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.10744452476501465 sec  
Time to train the word2vec model: 2.601982831954956 mins  
Model: "sequential\_22"

Layer (type)	Output Shape	Param #
=====		
bidirectional_43 (Bidirectio	(None, 1, 600)	1682400
bidirectional_44 (Bidirectio	(None, 200)	560800
dropout_22 (Dropout)	(None, 200)	0
dense_22 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

```
Epoch 1/70
1444/1444 [=====] - 2s 1ms/step - loss: 2.7133 - mae: 1.
Epoch 2/70
1444/1444 [=====] - 0s 317us/step - loss: 0.8468 - mae:
Epoch 3/70
```



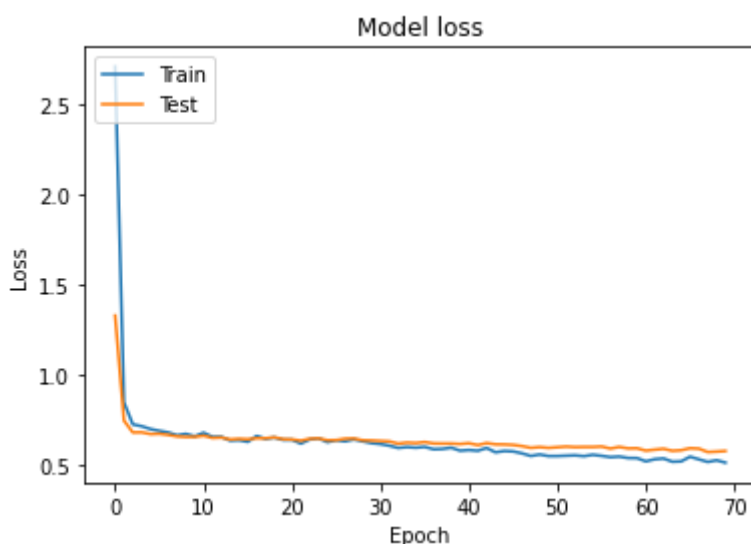
```
epoch 3/70
1444/1444 [=====] - 0s 330us/step - loss: 0.7248 - mae:
Epoch 4/70
1444/1444 [=====] - 0s 338us/step - loss: 0.7146 - mae:
Epoch 5/70
1444/1444 [=====] - 0s 345us/step - loss: 0.6988 - mae:
Epoch 6/70
1444/1444 [=====] - 1s 361us/step - loss: 0.6887 - mae:
Epoch 7/70
1444/1444 [=====] - 0s 337us/step - loss: 0.6800 - mae:
Epoch 8/70
1444/1444 [=====] - 0s 345us/step - loss: 0.6642 - mae:
Epoch 9/70
1444/1444 [=====] - 0s 346us/step - loss: 0.6720 - mae:
Epoch 10/70
1444/1444 [=====] - 0s 341us/step - loss: 0.6586 - mae:
Epoch 11/70
1444/1444 [=====] - 1s 375us/step - loss: 0.6783 - mae:
Epoch 12/70
1444/1444 [=====] - 0s 343us/step - loss: 0.6555 - mae:
Epoch 13/70
1444/1444 [=====] - 1s 361us/step - loss: 0.6557 - mae:
Epoch 14/70
1444/1444 [=====] - 0s 327us/step - loss: 0.6348 - mae:
Epoch 15/70
1444/1444 [=====] - 1s 360us/step - loss: 0.6369 - mae:
Epoch 16/70
1444/1444 [=====] - 0s 343us/step - loss: 0.6281 - mae:
Epoch 17/70
1444/1444 [=====] - 1s 355us/step - loss: 0.6604 - mae:
Epoch 18/70
1444/1444 [=====] - 1s 362us/step - loss: 0.6447 - mae:
Epoch 19/70
1444/1444 [=====] - 1s 347us/step - loss: 0.6518 - mae:
Epoch 20/70
1444/1444 [=====] - 0s 315us/step - loss: 0.6386 - mae:
Epoch 21/70
1444/1444 [=====] - 0s 342us/step - loss: 0.6391 - mae:
Epoch 22/70
1444/1444 [=====] - 0s 328us/step - loss: 0.6181 - mae:
Epoch 23/70
1444/1444 [=====] - 0s 319us/step - loss: 0.6411 - mae:
Epoch 24/70
1444/1444 [=====] - 0s 342us/step - loss: 0.6477 - mae:
Epoch 25/70
1444/1444 [=====] - 0s 345us/step - loss: 0.6259 - mae:
Epoch 26/70
1444/1444 [=====] - 0s 297us/step - loss: 0.6369 - mae:
Epoch 27/70
1444/1444 [=====] - 0s 312us/step - loss: 0.6308 - mae:
Epoch 28/70
1444/1444 [=====] - 0s 303us/step - loss: 0.6412 - mae:
Epoch 29/70
1444/1444 [=====] - 0s 330us/step - loss: 0.6306 - mae:
Epoch 30/70
1444/1444 [=====] - 1s 348us/step - loss: 0.6205 - mae:
Epoch 31/70
1444/1444 [=====] - 0s 313us/step - loss: 0.6155 - mae:
```

```
Epoch 32/70
1444/1444 [=====] - 0s 334us/step - loss: 0.6064 - mae:
Epoch 33/70
1444/1444 [=====] - 1s 363us/step - loss: 0.5940 - mae:
Epoch 34/70
1444/1444 [=====] - 1s 360us/step - loss: 0.5989 - mae:
Epoch 35/70
1444/1444 [=====] - 1s 350us/step - loss: 0.5955 - mae:
Epoch 36/70
1444/1444 [=====] - 0s 320us/step - loss: 0.5998 - mae:
Epoch 37/70
1444/1444 [=====] - 0s 304us/step - loss: 0.5867 - mae:
Epoch 38/70
1444/1444 [=====] - 0s 339us/step - loss: 0.5883 - mae:
Epoch 39/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5954 - mae:
Epoch 40/70
1444/1444 [=====] - 0s 321us/step - loss: 0.5786 - mae:
Epoch 41/70
1444/1444 [=====] - 0s 304us/step - loss: 0.5823 - mae:
Epoch 42/70
1444/1444 [=====] - 0s 315us/step - loss: 0.5781 - mae:
Epoch 43/70
1444/1444 [=====] - 1s 366us/step - loss: 0.5937 - mae:
Epoch 44/70
1444/1444 [=====] - 0s 316us/step - loss: 0.5697 - mae:
Epoch 45/70
1444/1444 [=====] - 0s 337us/step - loss: 0.5769 - mae:
Epoch 46/70
1444/1444 [=====] - 0s 331us/step - loss: 0.5745 - mae:
Epoch 47/70
1444/1444 [=====] - 0s 308us/step - loss: 0.5637 - mae:
Epoch 48/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5494 - mae:
Epoch 49/70
1444/1444 [=====] - 0s 324us/step - loss: 0.5574 - mae:
Epoch 50/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5488 - mae:
Epoch 51/70
1444/1444 [=====] - 0s 323us/step - loss: 0.5489 - mae:
Epoch 52/70
1444/1444 [=====] - 1s 360us/step - loss: 0.5509 - mae:
Epoch 53/70
1444/1444 [=====] - 0s 340us/step - loss: 0.5528 - mae:
Epoch 54/70
1444/1444 [=====] - 1s 351us/step - loss: 0.5482 - mae:
Epoch 55/70
1444/1444 [=====] - 1s 349us/step - loss: 0.5558 - mae:
Epoch 56/70
1444/1444 [=====] - 0s 335us/step - loss: 0.5500 - mae:
Epoch 57/70
1444/1444 [=====] - 0s 326us/step - loss: 0.5429 - mae:
Epoch 58/70
1444/1444 [=====] - 0s 334us/step - loss: 0.5458 - mae:
Epoch 59/70
1444/1444 [=====] - 0s 331us/step - loss: 0.5379 - mae:
Epoch 60/70
1444/1444 [=====] - 0s 340us/step - loss: 0.5373 - mae:
```

```

Epoch 61/70
1444/1444 [=====] - 0s 323us/step - loss: 0.5195 - mae:
Epoch 62/70
1444/1444 [=====] - 0s 335us/step - loss: 0.5311 - mae:
Epoch 63/70
1444/1444 [=====] - 0s 313us/step - loss: 0.5352 - mae:
Epoch 64/70
1444/1444 [=====] - 0s 341us/step - loss: 0.5174 - mae:
Epoch 65/70
1444/1444 [=====] - 0s 312us/step - loss: 0.5193 - mae:
Epoch 66/70
1444/1444 [=====] - 0s 297us/step - loss: 0.5451 - mae:
Epoch 67/70
1444/1444 [=====] - 0s 335us/step - loss: 0.5306 - mae:
Epoch 68/70
1444/1444 [=====] - 0s 311us/step - loss: 0.5163 - mae:
Epoch 69/70
1444/1444 [=====] - 0s 298us/step - loss: 0.5253 - mae:
Epoch 70/70
1444/1444 [=====] - 0s 309us/step - loss: 0.5122 - mae:

```



Kappa Score: 0.5271833588143604

-----Fold 3-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.10084843635559082 sec
Time to train the word2vec model: 2.571183204650879 mins
Model: "sequential_23"

```

Layer (type)	Output Shape	Param #
=====		
bidirectional_45 (Bidirectio	(None, 1, 600)	1682400
bidirectional_46 (Bidirectio	(None, 200)	560800
dropout_23 (Dropout)	(None, 200)	0
dense_23 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

---

Epoch 1/70

1444/1444 [=====] - 2s 1ms/step - loss: 2.7633 - mae: 1.

Epoch 2/70

1444/1444 [=====] - 0s 338us/step - loss: 0.8210 - mae:

Epoch 3/70

1444/1444 [=====] - 0s 307us/step - loss: 0.7074 - mae:

Epoch 4/70

1444/1444 [=====] - 0s 333us/step - loss: 0.6917 - mae:

Epoch 5/70

1444/1444 [=====] - 1s 349us/step - loss: 0.6913 - mae:

Epoch 6/70

1444/1444 [=====] - 0s 340us/step - loss: 0.6827 - mae:

Epoch 7/70

1444/1444 [=====] - 0s 321us/step - loss: 0.6680 - mae:

Epoch 8/70

1444/1444 [=====] - 0s 313us/step - loss: 0.6655 - mae:

Epoch 9/70

1444/1444 [=====] - 1s 352us/step - loss: 0.6461 - mae:

Epoch 10/70

1444/1444 [=====] - 1s 353us/step - loss: 0.6564 - mae:

Epoch 11/70

1444/1444 [=====] - 0s 343us/step - loss: 0.6616 - mae:

Epoch 12/70

1444/1444 [=====] - 0s 337us/step - loss: 0.6596 - mae:

Epoch 13/70

1444/1444 [=====] - 0s 340us/step - loss: 0.6405 - mae:

Epoch 14/70

1444/1444 [=====] - 0s 335us/step - loss: 0.6414 - mae:

Epoch 15/70

1444/1444 [=====] - 0s 318us/step - loss: 0.6385 - mae:

Epoch 16/70

1444/1444 [=====] - 0s 340us/step - loss: 0.6376 - mae:

Epoch 17/70

1444/1444 [=====] - 0s 332us/step - loss: 0.6499 - mae:

Epoch 18/70

1444/1444 [=====] - 0s 300us/step - loss: 0.6662 - mae:

Epoch 19/70

1444/1444 [=====] - 0s 309us/step - loss: 0.6364 - mae:

Epoch 20/70

1444/1444 [=====] - 0s 338us/step - loss: 0.6140 - mae:

Epoch 21/70

1444/1444 [=====] - 1s 360us/step - loss: 0.6328 - mae:

Epoch 22/70

1444/1444 [=====] - 1s 354us/step - loss: 0.6267 - mae:

Epoch 23/70

1444/1444 [=====] - 0s 342us/step - loss: 0.6353 - mae:

Epoch 24/70

1444/1444 [=====] - 0s 335us/step - loss: 0.6290 - mae:

Epoch 25/70

1444/1444 [=====] - 0s 330us/step - loss: 0.6252 - mae:

Epoch 26/70

1444/1444 [=====] - 1s 349us/step - loss: 0.6365 - mae:

Epoch 27/70

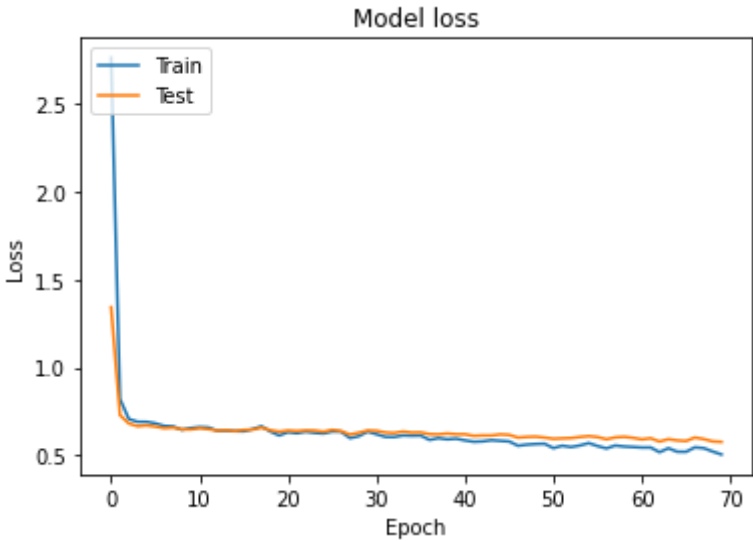
1444/1444 [=====] - 0s 332us/step - loss: 0.6354 - mae:

```
Epoch 28/70
1444/1444 [=====] - 1s 361us/step - loss: 0.5986 - mae:
Epoch 29/70
1444/1444 [=====] - 1s 352us/step - loss: 0.6098 - mae:
Epoch 30/70
1444/1444 [=====] - 1s 349us/step - loss: 0.6361 - mae:
Epoch 31/70
1444/1444 [=====] - 0s 319us/step - loss: 0.6210 - mae:
Epoch 32/70
1444/1444 [=====] - 0s 312us/step - loss: 0.6061 - mae:
Epoch 33/70
1444/1444 [=====] - 0s 326us/step - loss: 0.6054 - mae:
Epoch 34/70
1444/1444 [=====] - 0s 312us/step - loss: 0.6141 - mae:
Epoch 35/70
1444/1444 [=====] - 0s 330us/step - loss: 0.6124 - mae:
Epoch 36/70
1444/1444 [=====] - 0s 340us/step - loss: 0.6135 - mae:
Epoch 37/70
1444/1444 [=====] - 1s 359us/step - loss: 0.5887 - mae:
Epoch 38/70
1444/1444 [=====] - 0s 316us/step - loss: 0.5988 - mae:
Epoch 39/70
1444/1444 [=====] - 1s 347us/step - loss: 0.5920 - mae:
Epoch 40/70
1444/1444 [=====] - 0s 314us/step - loss: 0.5957 - mae:
Epoch 41/70
1444/1444 [=====] - 0s 324us/step - loss: 0.5859 - mae:
Epoch 42/70
1444/1444 [=====] - 1s 358us/step - loss: 0.5782 - mae:
Epoch 43/70
1444/1444 [=====] - 0s 333us/step - loss: 0.5804 - mae:
Epoch 44/70
1444/1444 [=====] - 0s 345us/step - loss: 0.5868 - mae:
Epoch 45/70
1444/1444 [=====] - 1s 356us/step - loss: 0.5833 - mae:
Epoch 46/70
1444/1444 [=====] - 0s 324us/step - loss: 0.5800 - mae:
Epoch 47/70
1444/1444 [=====] - 0s 311us/step - loss: 0.5556 - mae:
Epoch 48/70
1444/1444 [=====] - 1s 353us/step - loss: 0.5618 - mae:
Epoch 49/70
1444/1444 [=====] - 0s 343us/step - loss: 0.5652 - mae:
Epoch 50/70
1444/1444 [=====] - 0s 326us/step - loss: 0.5667 - mae:
Epoch 51/70
1444/1444 [=====] - 0s 313us/step - loss: 0.5420 - mae:
Epoch 52/70
1444/1444 [=====] - 0s 322us/step - loss: 0.5554 - mae:
Epoch 53/70
1444/1444 [=====] - 1s 359us/step - loss: 0.5482 - mae:
Epoch 54/70
1444/1444 [=====] - 1s 361us/step - loss: 0.5570 - mae:
Epoch 55/70
1444/1444 [=====] - 0s 341us/step - loss: 0.5704 - mae:
Epoch 56/70
1444/1444 [=====] - 1s 362us/step - loss: 0.5536 - mae:
```

4/22/2020

AES.ipynb - Colaboratory

```
1444/1444 [=====] - 1s 302us/step - loss: 0.5330 - mae:
Epoch 57/70
1444/1444 [=====] - 0s 344us/step - loss: 0.5403 - mae:
Epoch 58/70
1444/1444 [=====] - 1s 348us/step - loss: 0.5567 - mae:
Epoch 59/70
1444/1444 [=====] - 1s 350us/step - loss: 0.5510 - mae:
Epoch 60/70
1444/1444 [=====] - 0s 306us/step - loss: 0.5483 - mae:
Epoch 61/70
1444/1444 [=====] - 0s 301us/step - loss: 0.5453 - mae:
Epoch 62/70
1444/1444 [=====] - 1s 349us/step - loss: 0.5455 - mae:
Epoch 63/70
1444/1444 [=====] - 1s 356us/step - loss: 0.5186 - mae:
Epoch 64/70
1444/1444 [=====] - 0s 318us/step - loss: 0.5412 - mae:
Epoch 65/70
1444/1444 [=====] - 0s 331us/step - loss: 0.5215 - mae:
Epoch 66/70
1444/1444 [=====] - 1s 347us/step - loss: 0.5209 - mae:
Epoch 67/70
1444/1444 [=====] - 1s 358us/step - loss: 0.5463 - mae:
Epoch 68/70
1444/1444 [=====] - 0s 327us/step - loss: 0.5417 - mae:
Epoch 69/70
1444/1444 [=====] - 0s 345us/step - loss: 0.5228 - mae:
Epoch 70/70
1444/1444 [=====] - 0s 325us/step - loss: 0.5057 - mae:
```



Kappa Score: 0.5436060998704276

-----Fold 4-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.10166358947753906 sec  
Time to train the word2vec model: 2.61022686958313 mins  
Model: "sequential\_24"

Layer (type)	Output Shape	Param #
=====		

bidirectional_47 (Bidirectional)	(None, 1, 600)	1682400
----------------------------------	----------------	---------

bidirectional_48 (Bidirectional)	(None, 200)	560800
----------------------------------	-------------	--------

dropout_24 (Dropout)	(None, 200)	0
----------------------	-------------	---

dense_24 (Dense)	(None, 1)	201
------------------	-----------	-----

=====  
Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1444/1444 [=====] - 2s 1ms/step - loss: 2.8986 - mae: 1.

Epoch 2/70

1444/1444 [=====] - 0s 342us/step - loss: 0.8371 - mae:

Epoch 3/70

1444/1444 [=====] - 0s 340us/step - loss: 0.7426 - mae:

Epoch 4/70

1444/1444 [=====] - 0s 317us/step - loss: 0.7005 - mae:

Epoch 5/70

1444/1444 [=====] - 1s 347us/step - loss: 0.6915 - mae:

Epoch 6/70

1444/1444 [=====] - 0s 323us/step - loss: 0.6941 - mae:

Epoch 7/70

1444/1444 [=====] - 0s 301us/step - loss: 0.6849 - mae:

Epoch 8/70

1444/1444 [=====] - 1s 351us/step - loss: 0.6719 - mae:

Epoch 9/70

1444/1444 [=====] - 0s 328us/step - loss: 0.6766 - mae:

Epoch 10/70

1444/1444 [=====] - 0s 335us/step - loss: 0.6861 - mae:

Epoch 11/70

1444/1444 [=====] - 0s 323us/step - loss: 0.6516 - mae:

Epoch 12/70

1444/1444 [=====] - 1s 347us/step - loss: 0.6888 - mae:

Epoch 13/70

1444/1444 [=====] - 0s 319us/step - loss: 0.6606 - mae:

Epoch 14/70

1444/1444 [=====] - 1s 354us/step - loss: 0.6719 - mae:

Epoch 15/70

1444/1444 [=====] - 0s 333us/step - loss: 0.6631 - mae:

Epoch 16/70

1444/1444 [=====] - 1s 353us/step - loss: 0.6503 - mae:

Epoch 17/70

1444/1444 [=====] - 1s 350us/step - loss: 0.6533 - mae:

Epoch 18/70

1444/1444 [=====] - 1s 361us/step - loss: 0.6445 - mae:

Epoch 19/70

1444/1444 [=====] - 0s 340us/step - loss: 0.6443 - mae:

Epoch 20/70

1444/1444 [=====] - 0s 345us/step - loss: 0.6651 - mae:

Epoch 21/70

1444/1444 [=====] - 1s 356us/step - loss: 0.6605 - mae:

Epoch 22/70

1444/1444 [=====] - 1s 369us/step - loss: 0.6413 - mae:

Epoch 23/70

1444/1444 [=====] - 1s 362us/step - loss: 0.6409 - mae:

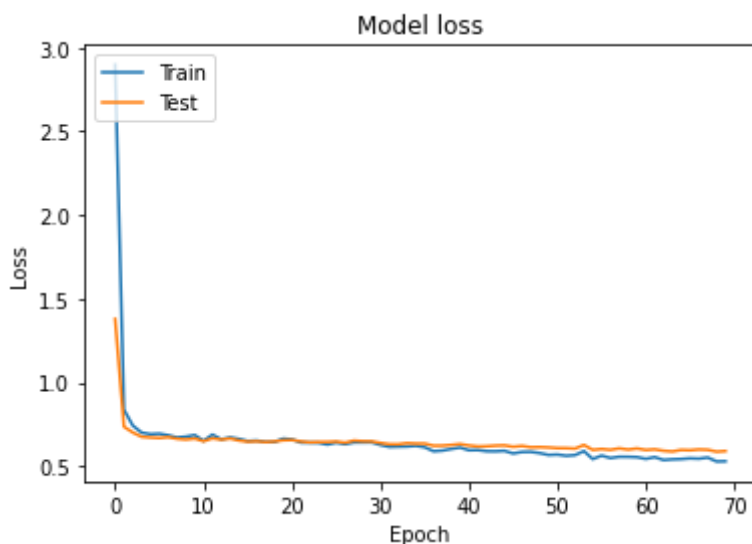
```
Epoch 24/70
1444/1444 [=====] - 0s 339us/step - loss: 0.6397 - mae:
Epoch 25/70
1444/1444 [=====] - 0s 329us/step - loss: 0.6296 - mae:
Epoch 26/70
1444/1444 [=====] - 1s 359us/step - loss: 0.6408 - mae:
Epoch 27/70
1444/1444 [=====] - 0s 313us/step - loss: 0.6319 - mae:
Epoch 28/70
1444/1444 [=====] - 1s 354us/step - loss: 0.6423 - mae:
Epoch 29/70
1444/1444 [=====] - 1s 355us/step - loss: 0.6423 - mae:
Epoch 30/70
1444/1444 [=====] - 0s 345us/step - loss: 0.6429 - mae:
Epoch 31/70
1444/1444 [=====] - 1s 350us/step - loss: 0.6270 - mae:
Epoch 32/70
1444/1444 [=====] - 0s 341us/step - loss: 0.6157 - mae:
Epoch 33/70
1444/1444 [=====] - 0s 324us/step - loss: 0.6170 - mae:
Epoch 34/70
1444/1444 [=====] - 1s 355us/step - loss: 0.6180 - mae:
Epoch 35/70
1444/1444 [=====] - 1s 365us/step - loss: 0.6221 - mae:
Epoch 36/70
1444/1444 [=====] - 0s 321us/step - loss: 0.6137 - mae:
Epoch 37/70
1444/1444 [=====] - 0s 337us/step - loss: 0.5896 - mae:
Epoch 38/70
1444/1444 [=====] - 1s 352us/step - loss: 0.5934 - mae:
Epoch 39/70
1444/1444 [=====] - 1s 363us/step - loss: 0.6032 - mae:
Epoch 40/70
1444/1444 [=====] - 0s 346us/step - loss: 0.6117 - mae:
Epoch 41/70
1444/1444 [=====] - 0s 333us/step - loss: 0.5956 - mae:
Epoch 42/70
1444/1444 [=====] - 1s 367us/step - loss: 0.5967 - mae:
Epoch 43/70
1444/1444 [=====] - 1s 365us/step - loss: 0.5898 - mae:
Epoch 44/70
1444/1444 [=====] - 1s 352us/step - loss: 0.5892 - mae:
Epoch 45/70
1444/1444 [=====] - 1s 362us/step - loss: 0.5920 - mae:
Epoch 46/70
1444/1444 [=====] - 1s 371us/step - loss: 0.5763 - mae:
Epoch 47/70
1444/1444 [=====] - 1s 363us/step - loss: 0.5853 - mae:
Epoch 48/70
1444/1444 [=====] - 1s 369us/step - loss: 0.5859 - mae:
Epoch 49/70
1444/1444 [=====] - 1s 352us/step - loss: 0.5785 - mae:
Epoch 50/70
1444/1444 [=====] - 1s 392us/step - loss: 0.5674 - mae:
Epoch 51/70
1444/1444 [=====] - 1s 366us/step - loss: 0.5696 - mae:
Epoch 52/70
1444/1444 [=====] - 0s 324us/step - loss: 0.5625 - mae:
```



```

1444/1444 [=====] - 0s 334us/step - loss: 0.5625 - mae:
Epoch 53/70
1444/1444 [=====] - 0s 345us/step - loss: 0.5664 - mae:
Epoch 54/70
1444/1444 [=====] - 1s 364us/step - loss: 0.5904 - mae:
Epoch 55/70
1444/1444 [=====] - 0s 346us/step - loss: 0.5430 - mae:
Epoch 56/70
1444/1444 [=====] - 0s 345us/step - loss: 0.5634 - mae:
Epoch 57/70
1444/1444 [=====] - 1s 370us/step - loss: 0.5490 - mae:
Epoch 58/70
1444/1444 [=====] - 1s 366us/step - loss: 0.5563 - mae:
Epoch 59/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5561 - mae:
Epoch 60/70
1444/1444 [=====] - 0s 320us/step - loss: 0.5543 - mae:
Epoch 61/70
1444/1444 [=====] - 1s 347us/step - loss: 0.5440 - mae:
Epoch 62/70
1444/1444 [=====] - 1s 356us/step - loss: 0.5543 - mae:
Epoch 63/70
1444/1444 [=====] - 1s 350us/step - loss: 0.5373 - mae:
Epoch 64/70
1444/1444 [=====] - 0s 332us/step - loss: 0.5411 - mae:
Epoch 65/70
1444/1444 [=====] - 1s 358us/step - loss: 0.5429 - mae:
Epoch 66/70
1444/1444 [=====] - 1s 366us/step - loss: 0.5472 - mae:
Epoch 67/70
1444/1444 [=====] - 1s 356us/step - loss: 0.5451 - mae:
Epoch 68/70
1444/1444 [=====] - 0s 323us/step - loss: 0.5518 - mae:
Epoch 69/70
1444/1444 [=====] - 0s 331us/step - loss: 0.5284 - mae:
Epoch 70/70
1444/1444 [=====] - 0s 320us/step - loss: 0.5296 - mae:

```



Kappa Score: 0.5346952103252121

-----Fold 5-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.10695171356201172 sec
Time to train the word2vec model: 2.609471321105957 mins
Model: "sequential_25"

```

Layer (type)	Output Shape	Param #
bidirectional_49 (Bidirectio	(None, 1, 600)	1682400
bidirectional_50 (Bidirectio	(None, 200)	560800
dropout_25 (Dropout)	(None, 200)	0
dense_25 (Dense)	(None, 1)	201

```

Total params: 2,243,401
Trainable params: 2,243,401
Non-trainable params: 0

```

```

Epoch 1/70
1444/1444 [=====] - 2s 1ms/step - loss: 2.7834 - mae: 1.
Epoch 2/70
1444/1444 [=====] - 0s 314us/step - loss: 0.8297 - mae:
Epoch 3/70
1444/1444 [=====] - 0s 326us/step - loss: 0.7483 - mae:
Epoch 4/70
1444/1444 [=====] - 0s 312us/step - loss: 0.7139 - mae:
Epoch 5/70
1444/1444 [=====] - 0s 326us/step - loss: 0.7223 - mae:
Epoch 6/70
1444/1444 [=====] - 1s 360us/step - loss: 0.7040 - mae:
Epoch 7/70
1444/1444 [=====] - 0s 336us/step - loss: 0.7040 - mae:
Epoch 8/70
1444/1444 [=====] - 1s 350us/step - loss: 0.6815 - mae:
Epoch 9/70
1444/1444 [=====] - 0s 335us/step - loss: 0.7167 - mae:
Epoch 10/70
1444/1444 [=====] - 0s 324us/step - loss: 0.6644 - mae:
Epoch 11/70
1444/1444 [=====] - 0s 333us/step - loss: 0.6781 - mae:
Epoch 12/70
1444/1444 [=====] - 1s 353us/step - loss: 0.6698 - mae:
Epoch 13/70
1444/1444 [=====] - 1s 374us/step - loss: 0.6746 - mae:
Epoch 14/70
1444/1444 [=====] - 0s 314us/step - loss: 0.6864 - mae:
Epoch 15/70
1444/1444 [=====] - 0s 318us/step - loss: 0.6666 - mae:
Epoch 16/70
1444/1444 [=====] - 1s 357us/step - loss: 0.6667 - mae:
Epoch 17/70
1444/1444 [=====] - 1s 355us/step - loss: 0.6698 - mae:
Epoch 18/70
1444/1444 [=====] - 0s 331us/step - loss: 0.6747 - mae:
Epoch 19/70
1444/1444 [=====] - 0s 328us/step - loss: 0.6802 - mae:

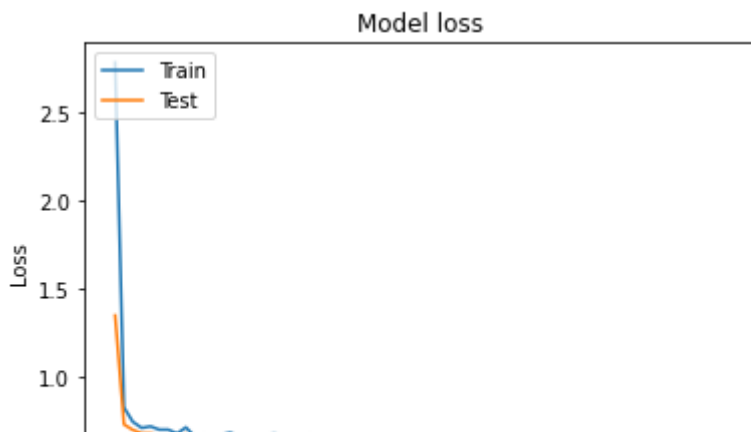
```

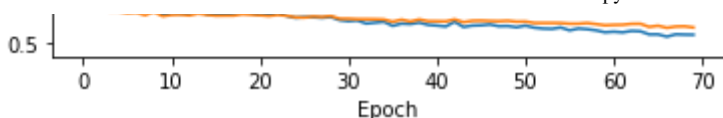
```
1444/1444 [=====] - 0s 328us/step - loss: 0.6802 - mae:  
Epoch 20/70  
1444/1444 [=====] - 0s 308us/step - loss: 0.6730 - mae:  
Epoch 21/70  
1444/1444 [=====] - 0s 325us/step - loss: 0.6636 - mae:  
Epoch 22/70  
1444/1444 [=====] - 0s 318us/step - loss: 0.6672 - mae:  
Epoch 23/70  
1444/1444 [=====] - 1s 356us/step - loss: 0.6782 - mae:  
Epoch 24/70  
1444/1444 [=====] - 0s 344us/step - loss: 0.6578 - mae:  
Epoch 25/70  
1444/1444 [=====] - 0s 330us/step - loss: 0.6467 - mae:  
Epoch 26/70  
1444/1444 [=====] - 1s 347us/step - loss: 0.6503 - mae:  
Epoch 27/70  
1444/1444 [=====] - 0s 338us/step - loss: 0.6502 - mae:  
Epoch 28/70  
1444/1444 [=====] - 1s 374us/step - loss: 0.6468 - mae:  
Epoch 29/70  
1444/1444 [=====] - 1s 368us/step - loss: 0.6516 - mae:  
Epoch 30/70  
1444/1444 [=====] - 1s 360us/step - loss: 0.6332 - mae:  
Epoch 31/70  
1444/1444 [=====] - 1s 351us/step - loss: 0.6278 - mae:  
Epoch 32/70  
1444/1444 [=====] - 1s 358us/step - loss: 0.6314 - mae:  
Epoch 33/70  
1444/1444 [=====] - 1s 370us/step - loss: 0.6143 - mae:  
Epoch 34/70  
1444/1444 [=====] - 1s 349us/step - loss: 0.6191 - mae:  
Epoch 35/70  
1444/1444 [=====] - 0s 331us/step - loss: 0.6242 - mae:  
Epoch 36/70  
1444/1444 [=====] - 0s 318us/step - loss: 0.6009 - mae:  
Epoch 37/70  
1444/1444 [=====] - 1s 369us/step - loss: 0.6138 - mae:  
Epoch 38/70  
1444/1444 [=====] - 0s 312us/step - loss: 0.6114 - mae:  
Epoch 39/70  
1444/1444 [=====] - 0s 334us/step - loss: 0.6194 - mae:  
Epoch 40/70  
1444/1444 [=====] - 0s 336us/step - loss: 0.6066 - mae:  
Epoch 41/70  
1444/1444 [=====] - 1s 347us/step - loss: 0.6027 - mae:  
Epoch 42/70  
1444/1444 [=====] - 1s 355us/step - loss: 0.5972 - mae:  
Epoch 43/70  
1444/1444 [=====] - 0s 339us/step - loss: 0.6244 - mae:  
Epoch 44/70  
1444/1444 [=====] - 0s 328us/step - loss: 0.5945 - mae:  
Epoch 45/70  
1444/1444 [=====] - 0s 323us/step - loss: 0.6027 - mae:  
Epoch 46/70  
1444/1444 [=====] - 0s 315us/step - loss: 0.6044 - mae:  
Epoch 47/70  
1444/1444 [=====] - 0s 328us/step - loss: 0.6088 - mae:  
Epoch 48/70
```

```

1444/1444 [=====] - 0s 325us/step - loss: 0.5990 - mae:
Epoch 49/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5999 - mae:
Epoch 50/70
1444/1444 [=====] - 0s 322us/step - loss: 0.5931 - mae:
Epoch 51/70
1444/1444 [=====] - 1s 364us/step - loss: 0.6024 - mae:
Epoch 52/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5906 - mae:
Epoch 53/70
1444/1444 [=====] - 1s 351us/step - loss: 0.5855 - mae:
Epoch 54/70
1444/1444 [=====] - 0s 342us/step - loss: 0.5840 - mae:
Epoch 55/70
1444/1444 [=====] - 1s 362us/step - loss: 0.5917 - mae:
Epoch 56/70
1444/1444 [=====] - 0s 334us/step - loss: 0.5754 - mae:
Epoch 57/70
1444/1444 [=====] - 1s 349us/step - loss: 0.5857 - mae:
Epoch 58/70
1444/1444 [=====] - 0s 330us/step - loss: 0.5821 - mae:
Epoch 59/70
1444/1444 [=====] - 1s 353us/step - loss: 0.5753 - mae:
Epoch 60/70
1444/1444 [=====] - 0s 344us/step - loss: 0.5643 - mae:
Epoch 61/70
1444/1444 [=====] - 0s 346us/step - loss: 0.5679 - mae:
Epoch 62/70
1444/1444 [=====] - 0s 326us/step - loss: 0.5640 - mae:
Epoch 63/70
1444/1444 [=====] - 0s 320us/step - loss: 0.5723 - mae:
Epoch 64/70
1444/1444 [=====] - 0s 344us/step - loss: 0.5703 - mae:
Epoch 65/70
1444/1444 [=====] - 1s 347us/step - loss: 0.5524 - mae:
Epoch 66/70
1444/1444 [=====] - 0s 346us/step - loss: 0.5526 - mae:
Epoch 67/70
1444/1444 [=====] - 1s 367us/step - loss: 0.5398 - mae:
Epoch 68/70
1444/1444 [=====] - 1s 353us/step - loss: 0.5530 - mae:
Epoch 69/70
1444/1444 [=====] - 1s 372us/step - loss: 0.5513 - mae:
Epoch 70/70
1444/1444 [=====] - 1s 367us/step - loss: 0.5505 - mae:

```





Kappa Score: 0.5960593529554852

Average kappa score value is : 0.5505353484668758

-----SET 6-----

(1800, 4)

(1800,)

-----Fold 1-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.11388039588928223 sec

Time to train the word2vec model: 3.7647345066070557 mins

Model: "sequential\_26"

Layer (type)	Output Shape	Param #
=====		
bidirectional_51 (Bidirectio	(None, 1, 600)	1682400
bidirectional_52 (Bidirectio	(None, 200)	560800
dropout_26 (Dropout)	(None, 200)	0
dense_26 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

1440/1440 [=====] - 2s 1ms/step - loss: 3.5885 - mae: 1.

Epoch 2/70

1440/1440 [=====] - 1s 357us/step - loss: 0.9123 - mae:

Epoch 3/70

1440/1440 [=====] - 0s 338us/step - loss: 0.7440 - mae:

Epoch 4/70

1440/1440 [=====] - 0s 324us/step - loss: 0.6710 - mae:

Epoch 5/70

1440/1440 [=====] - 0s 323us/step - loss: 0.6637 - mae:

Epoch 6/70

1440/1440 [=====] - 0s 340us/step - loss: 0.6402 - mae:

Epoch 7/70

1440/1440 [=====] - 0s 315us/step - loss: 0.6249 - mae:

Epoch 8/70

1440/1440 [=====] - 1s 352us/step - loss: 0.6232 - mae:

Epoch 9/70

1440/1440 [=====] - 0s 327us/step - loss: 0.6214 - mae:

Epoch 10/70

1440/1440 [=====] - 1s 359us/step - loss: 0.5980 - mae:

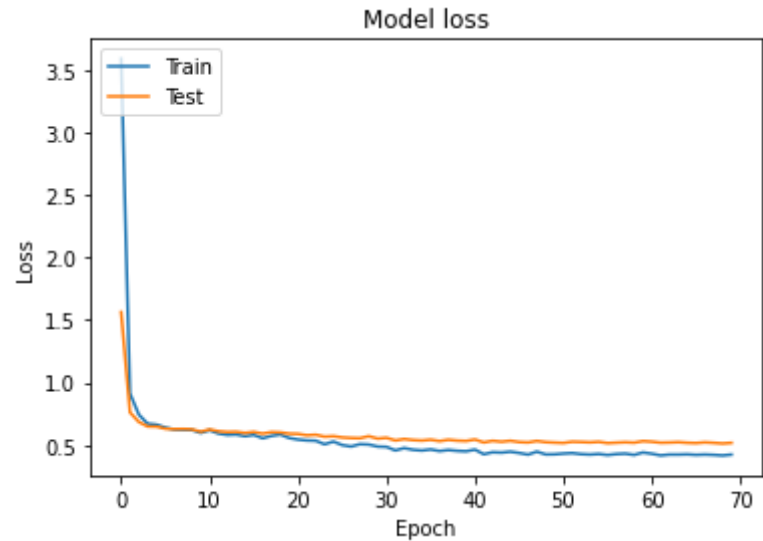
Epoch 11/70

1440/1440 [=====] - 0s 327us/step - loss: 0.6190 - mae:

Epoch 12/70

```
1440/1440 [=====] - 0s 345us/step - loss: 0.5925 - mae:
Epoch 13/70
1440/1440 [=====] - 0s 338us/step - loss: 0.5816 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 346us/step - loss: 0.5844 - mae:
Epoch 15/70
1440/1440 [=====] - 0s 322us/step - loss: 0.5717 - mae:
Epoch 16/70
1440/1440 [=====] - 0s 336us/step - loss: 0.5816 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 343us/step - loss: 0.5548 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 321us/step - loss: 0.5738 - mae:
Epoch 19/70
1440/1440 [=====] - 1s 371us/step - loss: 0.5847 - mae:
Epoch 20/70
1440/1440 [=====] - 1s 365us/step - loss: 0.5568 - mae:
Epoch 21/70
1440/1440 [=====] - 1s 349us/step - loss: 0.5442 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 312us/step - loss: 0.5373 - mae:
Epoch 23/70
1440/1440 [=====] - 1s 351us/step - loss: 0.5351 - mae:
Epoch 24/70
1440/1440 [=====] - 1s 370us/step - loss: 0.5068 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 349us/step - loss: 0.5283 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 320us/step - loss: 0.5002 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4886 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 342us/step - loss: 0.5075 - mae:
Epoch 29/70
1440/1440 [=====] - 1s 352us/step - loss: 0.5045 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4883 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4859 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4576 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4762 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4625 - mae:
Epoch 35/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4570 - mae:
Epoch 36/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4653 - mae:
Epoch 37/70
1440/1440 [=====] - 1s 359us/step - loss: 0.4526 - mae:
Epoch 38/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4609 - mae:
Epoch 39/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4540 - mae:
Epoch 40/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4505 - mae:
Epoch 41/70
```

```
1440/1440 [=====] - 1s 369us/step - loss: 0.4638 - mae:
Epoch 42/70
1440/1440 [=====] - 1s 364us/step - loss: 0.4272 - mae:
Epoch 43/70
1440/1440 [=====] - 1s 364us/step - loss: 0.4429 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4400 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4473 - mae:
Epoch 46/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4371 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4242 - mae:
Epoch 48/70
1440/1440 [=====] - 0s 323us/step - loss: 0.4477 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 315us/step - loss: 0.4256 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4265 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4323 - mae:
Epoch 52/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4361 - mae:
Epoch 53/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4281 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 347us/step - loss: 0.4246 - mae:
Epoch 55/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4292 - mae:
Epoch 56/70
1440/1440 [=====] - 1s 365us/step - loss: 0.4209 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4285 - mae:
Epoch 58/70
1440/1440 [=====] - 1s 366us/step - loss: 0.4318 - mae:
Epoch 59/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4216 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 301us/step - loss: 0.4410 - mae:
Epoch 61/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4310 - mae:
Epoch 62/70
1440/1440 [=====] - 1s 366us/step - loss: 0.4175 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 318us/step - loss: 0.4244 - mae:
Epoch 64/70
1440/1440 [=====] - 0s 309us/step - loss: 0.4242 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 355us/step - loss: 0.4262 - mae:
Epoch 66/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4219 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4245 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 313us/step - loss: 0.4217 - mae:
Epoch 69/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4172 - mae:
Epoch 70/70
```



Kappa Score: 0.6844032624979193

-----Fold 2-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.11828279495239258 sec  
Time to train the word2vec model: 3.745845317840576 mins  
Model: "sequential\_27"

Layer (type)	Output Shape	Param #
=====		
bidirectional_53 (Bidirectio	(None, 1, 600)	1682400
bidirectional_54 (Bidirectio	(None, 200)	560800
dropout_27 (Dropout)	(None, 200)	0
dense_27 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

Epoch 1/70  
1440/1440 [=====] - 2s 1ms/step - loss: 3.5551 - mae: 1.  
Epoch 2/70  
1440/1440 [=====] - 0s 324us/step - loss: 0.9311 - mae:  
Epoch 3/70  
1440/1440 [=====] - 0s 325us/step - loss: 0.7311 - mae:  
Epoch 4/70  
1440/1440 [=====] - 1s 353us/step - loss: 0.6887 - mae:  
Epoch 5/70  
1440/1440 [=====] - 0s 316us/step - loss: 0.6257 - mae:  
Epoch 6/70  
1440/1440 [=====] - 0s 343us/step - loss: 0.6147 - mae:  
Epoch 7/70  
1440/1440 [=====] - 1s 357us/step - loss: 0.6080 - mae:  
Epoch 8/70



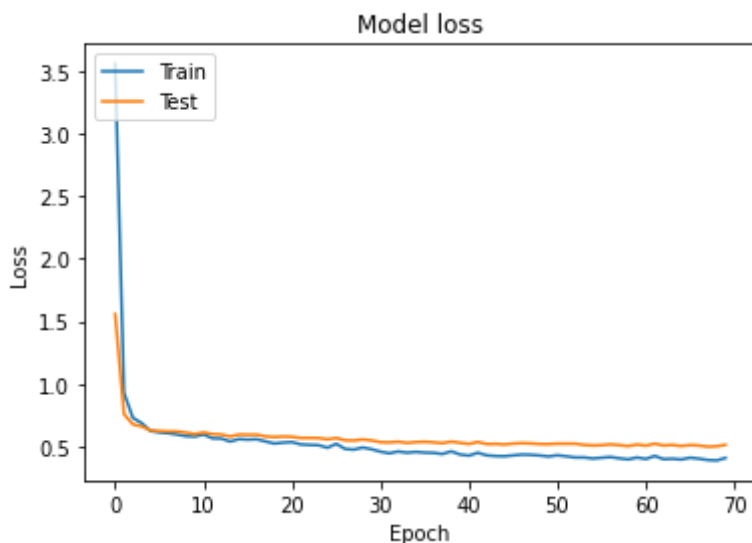
```
1440/1440 [=====] - 1s 373us/step - loss: 0.5977 - mae:
Epoch 9/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5850 - mae:
Epoch 10/70
1440/1440 [=====] - 0s 317us/step - loss: 0.5814 - mae:
Epoch 11/70
1440/1440 [=====] - 1s 362us/step - loss: 0.5976 - mae:
Epoch 12/70
1440/1440 [=====] - 1s 350us/step - loss: 0.5674 - mae:
Epoch 13/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5654 - mae:
Epoch 14/70
1440/1440 [=====] - 1s 359us/step - loss: 0.5418 - mae:
Epoch 15/70
1440/1440 [=====] - 0s 329us/step - loss: 0.5611 - mae:
Epoch 16/70
1440/1440 [=====] - 1s 357us/step - loss: 0.5570 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 340us/step - loss: 0.5598 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 333us/step - loss: 0.5425 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 309us/step - loss: 0.5260 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 303us/step - loss: 0.5331 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 321us/step - loss: 0.5371 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 326us/step - loss: 0.5184 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 341us/step - loss: 0.5148 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 317us/step - loss: 0.5126 - mae:
Epoch 25/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4920 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 333us/step - loss: 0.5232 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4829 - mae:
Epoch 28/70
1440/1440 [=====] - 1s 359us/step - loss: 0.4774 - mae:
Epoch 29/70
1440/1440 [=====] - 0s 343us/step - loss: 0.4938 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4801 - mae:
Epoch 31/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4609 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 319us/step - loss: 0.4477 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4624 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 313us/step - loss: 0.4527 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4590 - mae:
Epoch 36/70
1440/1440 [=====] - 0s 309us/step - loss: 0.4531 - mae:
Epoch 37/70
```

```
Epoch 37/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4514 - mae:
Epoch 38/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4425 - mae:
Epoch 39/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4631 - mae:
Epoch 40/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4381 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4293 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 306us/step - loss: 0.4518 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 301us/step - loss: 0.4316 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4262 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4245 - mae:
Epoch 46/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4311 - mae:
Epoch 47/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4374 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 364us/step - loss: 0.4355 - mae:
Epoch 49/70
1440/1440 [=====] - 1s 353us/step - loss: 0.4306 - mae:
Epoch 50/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4226 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4320 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4241 - mae:
Epoch 53/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4147 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 304us/step - loss: 0.4147 - mae:
Epoch 55/70
1440/1440 [=====] - 1s 360us/step - loss: 0.4063 - mae:
Epoch 56/70
1440/1440 [=====] - 0s 325us/step - loss: 0.4124 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4181 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 330us/step - loss: 0.4077 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 345us/step - loss: 0.3993 - mae:
Epoch 60/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4143 - mae:
Epoch 61/70
1440/1440 [=====] - 1s 366us/step - loss: 0.4025 - mae:
Epoch 62/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4266 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4015 - mae:
Epoch 64/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4044 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 359us/step - loss: 0.3987 - mae:
Epoch 66/70
```

```

Epoch 66/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4125 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4049 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 334us/step - loss: 0.3944 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 314us/step - loss: 0.3905 - mae:
Epoch 70/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4104 - mae:

```



Kappa Score: 0.6516764839148165

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.11356282234191895 sec

Time to train the word2vec model: 3.746948719024658 mins

Model: "sequential\_28"

Layer (type)	Output Shape	Param #
=====		
bidirectional_55 (Bidirectio	(None, 1, 600)	1682400
bidirectional_56 (Bidirectio	(None, 200)	560800
dropout_28 (Dropout)	(None, 200)	0
dense_28 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

```

Epoch 1/70
1440/1440 [=====] - 2s 1ms/step - loss: 3.5486 - mae: 1.
Epoch 2/70
1440/1440 [=====] - 0s 341us/step - loss: 0.8841 - mae:
Epoch 3/70
1440/1440 [=====] - 1s 359us/step - loss: 0.7375 - mae:
Epoch 4/70

```

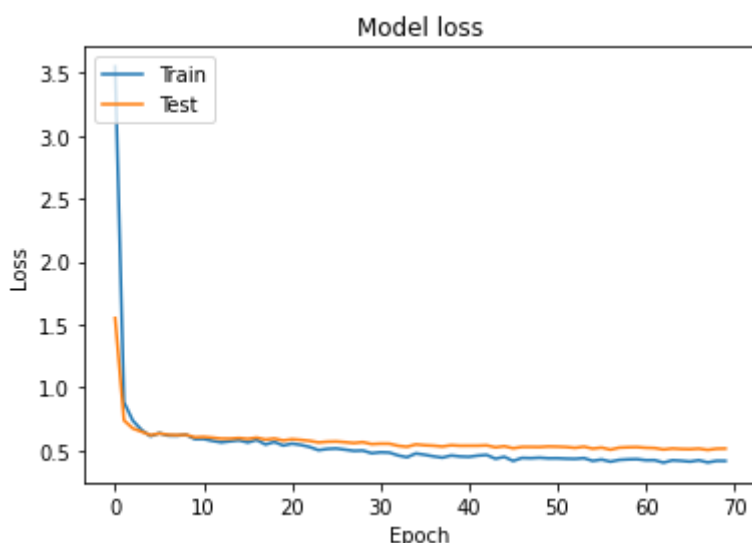
```
1440/1440 [=====] - 0s 335us/step - loss: 0.6632 - mae:
Epoch 5/70
1440/1440 [=====] - 0s 341us/step - loss: 0.6143 - mae:
Epoch 6/70
1440/1440 [=====] - 0s 330us/step - loss: 0.6389 - mae:
Epoch 7/70
1440/1440 [=====] - 0s 337us/step - loss: 0.6190 - mae:
Epoch 8/70
1440/1440 [=====] - 1s 348us/step - loss: 0.6182 - mae:
Epoch 9/70
1440/1440 [=====] - 1s 353us/step - loss: 0.6269 - mae:
Epoch 10/70
1440/1440 [=====] - 0s 332us/step - loss: 0.5917 - mae:
Epoch 11/70
1440/1440 [=====] - 1s 348us/step - loss: 0.5922 - mae:
Epoch 12/70
1440/1440 [=====] - 0s 340us/step - loss: 0.5775 - mae:
Epoch 13/70
1440/1440 [=====] - 0s 297us/step - loss: 0.5657 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 327us/step - loss: 0.5742 - mae:
Epoch 15/70
1440/1440 [=====] - 1s 359us/step - loss: 0.5816 - mae:
Epoch 16/70
1440/1440 [=====] - 0s 334us/step - loss: 0.5646 - mae:
Epoch 17/70
1440/1440 [=====] - 0s 318us/step - loss: 0.5851 - mae:
Epoch 18/70
1440/1440 [=====] - 1s 351us/step - loss: 0.5484 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 329us/step - loss: 0.5690 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 345us/step - loss: 0.5405 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 306us/step - loss: 0.5554 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 344us/step - loss: 0.5451 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 311us/step - loss: 0.5288 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 341us/step - loss: 0.5035 - mae:
Epoch 25/70
1440/1440 [=====] - 0s 303us/step - loss: 0.5135 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 338us/step - loss: 0.5168 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 320us/step - loss: 0.5075 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4981 - mae:
Epoch 29/70
1440/1440 [=====] - 0s 321us/step - loss: 0.5005 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 344us/step - loss: 0.4795 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4869 - mae:
Epoch 32/70
1440/1440 [=====] - 1s 362us/step - loss: 0.4845 - mae:
Epoch 33/70
```

```
Epoch 33/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4616 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4473 - mae:
Epoch 35/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4775 - mae:
Epoch 36/70
1440/1440 [=====] - 1s 355us/step - loss: 0.4669 - mae:
Epoch 37/70
1440/1440 [=====] - 1s 384us/step - loss: 0.4544 - mae:
Epoch 38/70
1440/1440 [=====] - 1s 377us/step - loss: 0.4444 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4615 - mae:
Epoch 40/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4535 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 335us/step - loss: 0.4508 - mae:
Epoch 42/70
1440/1440 [=====] - 1s 388us/step - loss: 0.4604 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4658 - mae:
Epoch 44/70
1440/1440 [=====] - 1s 362us/step - loss: 0.4354 - mae:
Epoch 45/70
1440/1440 [=====] - 0s 323us/step - loss: 0.4507 - mae:
Epoch 46/70
1440/1440 [=====] - 0s 310us/step - loss: 0.4179 - mae:
Epoch 47/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4420 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 367us/step - loss: 0.4398 - mae:
Epoch 49/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4437 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4388 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 308us/step - loss: 0.4392 - mae:
Epoch 52/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4361 - mae:
Epoch 53/70
1440/1440 [=====] - 0s 341us/step - loss: 0.4347 - mae:
Epoch 54/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4405 - mae:
Epoch 55/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4184 - mae:
Epoch 56/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4293 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4123 - mae:
Epoch 58/70
1440/1440 [=====] - 0s 299us/step - loss: 0.4263 - mae:
Epoch 59/70
1440/1440 [=====] - 0s 316us/step - loss: 0.4305 - mae:
Epoch 60/70
1440/1440 [=====] - 1s 379us/step - loss: 0.4323 - mae:
Epoch 61/70
1440/1440 [=====] - 0s 345us/step - loss: 0.4236 - mae:
```

```

Epoch 62/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4241 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 347us/step - loss: 0.4045 - mae:
Epoch 64/70
1440/1440 [=====] - 1s 360us/step - loss: 0.4232 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4192 - mae:
Epoch 66/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4128 - mae:
Epoch 67/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4236 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4061 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 313us/step - loss: 0.4190 - mae:
Epoch 70/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4182 - mae:

```



Kappa Score: 0.6902627511591963

-----Fold 4-----

Converting sentences to word2vec model

```

4 cores using
Time to build vocab using word2vec: 0.11386537551879883 sec
Time to train the word2vec model: 3.760929822921753 mins
Model: "sequential_29"

```

Layer (type)	Output Shape	Param #
=====		
bidirectional_57 (Bidirectio	(None, 1, 600)	1682400
bidirectional_58 (Bidirectio	(None, 200)	560800
dropout_29 (Dropout)	(None, 200)	0
dense_29 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non trainable params: 0

non-trainable params: 0

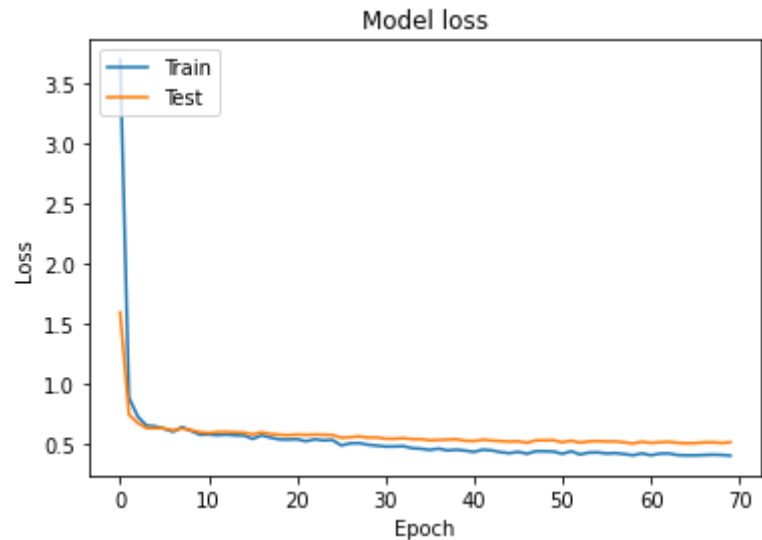
---

```
Epoch 1/70
1440/1440 [=====] - 2s 1ms/step - loss: 3.7033 - mae: 1.
Epoch 2/70
1440/1440 [=====] - 0s 311us/step - loss: 0.8887 - mae:
Epoch 3/70
1440/1440 [=====] - 1s 366us/step - loss: 0.7315 - mae:
Epoch 4/70
1440/1440 [=====] - 1s 367us/step - loss: 0.6562 - mae:
Epoch 5/70
1440/1440 [=====] - 1s 374us/step - loss: 0.6507 - mae:
Epoch 6/70
1440/1440 [=====] - 1s 349us/step - loss: 0.6303 - mae:
Epoch 7/70
1440/1440 [=====] - 1s 360us/step - loss: 0.6053 - mae:
Epoch 8/70
1440/1440 [=====] - 1s 365us/step - loss: 0.6447 - mae:
Epoch 9/70
1440/1440 [=====] - 1s 364us/step - loss: 0.6140 - mae:
Epoch 10/70
1440/1440 [=====] - 1s 382us/step - loss: 0.5814 - mae:
Epoch 11/70
1440/1440 [=====] - 1s 362us/step - loss: 0.5830 - mae:
Epoch 12/70
1440/1440 [=====] - 0s 342us/step - loss: 0.5778 - mae:
Epoch 13/70
1440/1440 [=====] - 1s 350us/step - loss: 0.5820 - mae:
Epoch 14/70
1440/1440 [=====] - 0s 327us/step - loss: 0.5762 - mae:
Epoch 15/70
1440/1440 [=====] - 1s 355us/step - loss: 0.5742 - mae:
Epoch 16/70
1440/1440 [=====] - 1s 363us/step - loss: 0.5468 - mae:
Epoch 17/70
1440/1440 [=====] - 1s 365us/step - loss: 0.5765 - mae:
Epoch 18/70
1440/1440 [=====] - 0s 345us/step - loss: 0.5568 - mae:
Epoch 19/70
1440/1440 [=====] - 0s 346us/step - loss: 0.5420 - mae:
Epoch 20/70
1440/1440 [=====] - 0s 344us/step - loss: 0.5408 - mae:
Epoch 21/70
1440/1440 [=====] - 0s 346us/step - loss: 0.5437 - mae:
Epoch 22/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5268 - mae:
Epoch 23/70
1440/1440 [=====] - 0s 306us/step - loss: 0.5427 - mae:
Epoch 24/70
1440/1440 [=====] - 0s 336us/step - loss: 0.5338 - mae:
Epoch 25/70
1440/1440 [=====] - 1s 352us/step - loss: 0.5376 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4917 - mae:
Epoch 27/70
1440/1440 [=====] - 1s 350us/step - loss: 0.5092 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 331us/step - loss: 0.5113 - mae:
```

```
Epoch 29/70
1440/1440 [=====] - 1s 351us/step - loss: 0.4976 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 322us/step - loss: 0.4901 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 337us/step - loss: 0.4827 - mae:
Epoch 32/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4830 - mae:
Epoch 33/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4857 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 342us/step - loss: 0.4688 - mae:
Epoch 35/70
1440/1440 [=====] - 1s 363us/step - loss: 0.4648 - mae:
Epoch 36/70
1440/1440 [=====] - 1s 373us/step - loss: 0.4542 - mae:
Epoch 37/70
1440/1440 [=====] - 1s 369us/step - loss: 0.4656 - mae:
Epoch 38/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4502 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 323us/step - loss: 0.4559 - mae:
Epoch 40/70
1440/1440 [=====] - 1s 364us/step - loss: 0.4488 - mae:
Epoch 41/70
1440/1440 [=====] - 1s 364us/step - loss: 0.4378 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4563 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4503 - mae:
Epoch 44/70
1440/1440 [=====] - 1s 375us/step - loss: 0.4359 - mae:
Epoch 45/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4272 - mae:
Epoch 46/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4384 - mae:
Epoch 47/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4231 - mae:
Epoch 48/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4436 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4433 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 318us/step - loss: 0.4406 - mae:
Epoch 51/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4218 - mae:
Epoch 52/70
1440/1440 [=====] - 0s 338us/step - loss: 0.4435 - mae:
Epoch 53/70
1440/1440 [=====] - 1s 365us/step - loss: 0.4166 - mae:
Epoch 54/70
1440/1440 [=====] - 0s 324us/step - loss: 0.4324 - mae:
Epoch 55/70
1440/1440 [=====] - 1s 366us/step - loss: 0.4339 - mae:
Epoch 56/70
1440/1440 [=====] - 1s 368us/step - loss: 0.4245 - mae:
Epoch 57/70
1440/1440 [=====] - 1s 355us/step - loss: 0.4280 - mae:
```



```
Epoch 58/70
1440/1440 [=====] - 1s 377us/step - loss: 0.4197 - mae:
Epoch 59/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4101 - mae:
Epoch 60/70
1440/1440 [=====] - 1s 350us/step - loss: 0.4257 - mae:
Epoch 61/70
1440/1440 [=====] - 1s 365us/step - loss: 0.4096 - mae:
Epoch 62/70
1440/1440 [=====] - 1s 356us/step - loss: 0.4233 - mae:
Epoch 63/70
1440/1440 [=====] - 0s 334us/step - loss: 0.4252 - mae:
Epoch 64/70
1440/1440 [=====] - 1s 355us/step - loss: 0.4117 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 376us/step - loss: 0.4094 - mae:
Epoch 66/70
1440/1440 [=====] - 1s 367us/step - loss: 0.4092 - mae:
Epoch 67/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4121 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4148 - mae:
Epoch 69/70
1440/1440 [=====] - 0s 346us/step - loss: 0.4126 - mae:
Epoch 70/70
1440/1440 [=====] - 1s 373us/step - loss: 0.4068 - mae:
```



Kappa Score: 0.6692696371152963

-----Fold 5-----

Converting sentences to word2vec model

```
4 cores using
Time to build vocab using word2vec: 0.11177539825439453 sec
Time to train the word2vec model: 3.74564266204834 mins
Model: "sequential_30"
```

Layer (type)	Output Shape	Param #
bidirectional_59 (Bidirectio	(None, 1, 600)	1682400

bidirectional_60 (Bidirectional)	(None, 200)	560800
----------------------------------	-------------	--------

dropout_30 (Dropout)	(None, 200)	0
----------------------	-------------	---

dense_30 (Dense)	(None, 1)	201
------------------	-----------	-----

=====  
Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1440/1440 [=====] - 2s 2ms/step - loss: 3.5968 - mae: 1.

Epoch 2/70

1440/1440 [=====] - 1s 362us/step - loss: 0.9056 - mae:

Epoch 3/70

1440/1440 [=====] - 0s 320us/step - loss: 0.7637 - mae:

Epoch 4/70

1440/1440 [=====] - 0s 321us/step - loss: 0.6741 - mae:

Epoch 5/70

1440/1440 [=====] - 1s 358us/step - loss: 0.6708 - mae:

Epoch 6/70

1440/1440 [=====] - 0s 331us/step - loss: 0.6515 - mae:

Epoch 7/70

1440/1440 [=====] - 0s 347us/step - loss: 0.6506 - mae:

Epoch 8/70

1440/1440 [=====] - 0s 325us/step - loss: 0.6169 - mae:

Epoch 9/70

1440/1440 [=====] - 0s 336us/step - loss: 0.5958 - mae:

Epoch 10/70

1440/1440 [=====] - 0s 334us/step - loss: 0.5900 - mae:

Epoch 11/70

1440/1440 [=====] - 0s 308us/step - loss: 0.6093 - mae:

Epoch 12/70

1440/1440 [=====] - 0s 335us/step - loss: 0.5778 - mae:

Epoch 13/70

1440/1440 [=====] - 0s 313us/step - loss: 0.5985 - mae:

Epoch 14/70

1440/1440 [=====] - 0s 345us/step - loss: 0.5570 - mae:

Epoch 15/70

1440/1440 [=====] - 0s 314us/step - loss: 0.5730 - mae:

Epoch 16/70

1440/1440 [=====] - 0s 333us/step - loss: 0.5786 - mae:

Epoch 17/70

1440/1440 [=====] - 1s 381us/step - loss: 0.5594 - mae:

Epoch 18/70

1440/1440 [=====] - 0s 328us/step - loss: 0.5789 - mae:

Epoch 19/70

1440/1440 [=====] - 0s 332us/step - loss: 0.5406 - mae:

Epoch 20/70

1440/1440 [=====] - 0s 317us/step - loss: 0.5720 - mae:

Epoch 21/70

1440/1440 [=====] - 0s 318us/step - loss: 0.5556 - mae:

Epoch 22/70

1440/1440 [=====] - 0s 317us/step - loss: 0.5270 - mae:

Epoch 23/70

1440/1440 [=====] - 1s 370us/step - loss: 0.5415 - mae:

Epoch 24/70

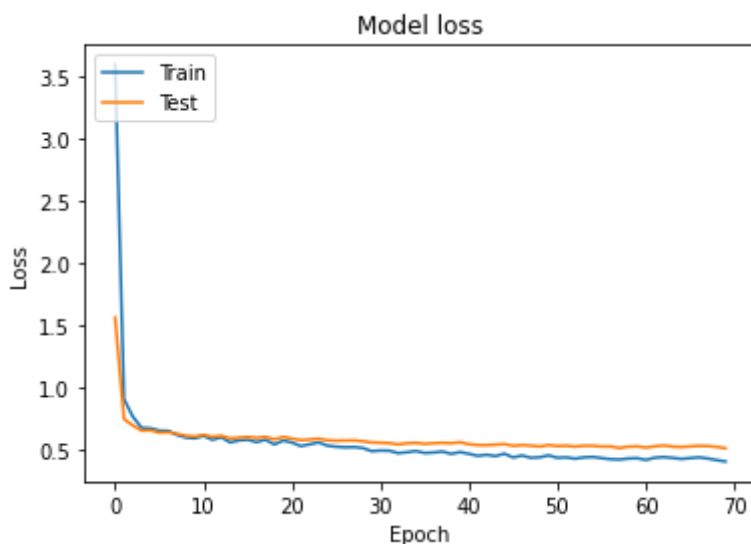
1440/1440 [=====] - 0s 326us/step - loss: 0.5572 - mae:

```
Epoch 25/70
1440/1440 [=====] - 0s 342us/step - loss: 0.5304 - mae:
Epoch 26/70
1440/1440 [=====] - 0s 309us/step - loss: 0.5223 - mae:
Epoch 27/70
1440/1440 [=====] - 0s 335us/step - loss: 0.5175 - mae:
Epoch 28/70
1440/1440 [=====] - 0s 329us/step - loss: 0.5194 - mae:
Epoch 29/70
1440/1440 [=====] - 0s 316us/step - loss: 0.5117 - mae:
Epoch 30/70
1440/1440 [=====] - 0s 321us/step - loss: 0.4866 - mae:
Epoch 31/70
1440/1440 [=====] - 0s 317us/step - loss: 0.4915 - mae:
Epoch 32/70
1440/1440 [=====] - 0s 311us/step - loss: 0.4898 - mae:
Epoch 33/70
1440/1440 [=====] - 1s 354us/step - loss: 0.4705 - mae:
Epoch 34/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4776 - mae:
Epoch 35/70
1440/1440 [=====] - 0s 339us/step - loss: 0.4875 - mae:
Epoch 36/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4717 - mae:
Epoch 37/70
1440/1440 [=====] - 0s 340us/step - loss: 0.4753 - mae:
Epoch 38/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4833 - mae:
Epoch 39/70
1440/1440 [=====] - 0s 320us/step - loss: 0.4647 - mae:
Epoch 40/70
1440/1440 [=====] - 1s 359us/step - loss: 0.4792 - mae:
Epoch 41/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4647 - mae:
Epoch 42/70
1440/1440 [=====] - 0s 314us/step - loss: 0.4488 - mae:
Epoch 43/70
1440/1440 [=====] - 0s 331us/step - loss: 0.4571 - mae:
Epoch 44/70
1440/1440 [=====] - 0s 329us/step - loss: 0.4468 - mae:
Epoch 45/70
1440/1440 [=====] - 1s 357us/step - loss: 0.4655 - mae:
Epoch 46/70
1440/1440 [=====] - 1s 371us/step - loss: 0.4360 - mae:
Epoch 47/70
1440/1440 [=====] - 1s 348us/step - loss: 0.4512 - mae:
Epoch 48/70
1440/1440 [=====] - 0s 311us/step - loss: 0.4331 - mae:
Epoch 49/70
1440/1440 [=====] - 0s 333us/step - loss: 0.4368 - mae:
Epoch 50/70
1440/1440 [=====] - 0s 336us/step - loss: 0.4525 - mae:
Epoch 51/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4333 - mae:
Epoch 52/70
1440/1440 [=====] - 1s 407us/step - loss: 0.4361 - mae:
Epoch 53/70
1440/1440 [=====] - 1s 358us/step - loss: 0.4259 - mae:
```

```

Epoch 54/70
1440/1440 [=====] - 0s 332us/step - loss: 0.4363 - mae:
Epoch 55/70
1440/1440 [=====] - 1s 349us/step - loss: 0.4396 - mae:
Epoch 56/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4302 - mae:
Epoch 57/70
1440/1440 [=====] - 0s 328us/step - loss: 0.4218 - mae:
Epoch 58/70
1440/1440 [=====] - 1s 383us/step - loss: 0.4191 - mae:
Epoch 59/70
1440/1440 [=====] - 1s 371us/step - loss: 0.4269 - mae:
Epoch 60/70
1440/1440 [=====] - 1s 368us/step - loss: 0.4298 - mae:
Epoch 61/70
1440/1440 [=====] - 1s 361us/step - loss: 0.4158 - mae:
Epoch 62/70
1440/1440 [=====] - 1s 362us/step - loss: 0.4333 - mae:
Epoch 63/70
1440/1440 [=====] - 1s 368us/step - loss: 0.4388 - mae:
Epoch 64/70
1440/1440 [=====] - 1s 352us/step - loss: 0.4322 - mae:
Epoch 65/70
1440/1440 [=====] - 1s 385us/step - loss: 0.4240 - mae:
Epoch 66/70
1440/1440 [=====] - 1s 384us/step - loss: 0.4303 - mae:
Epoch 67/70
1440/1440 [=====] - 0s 326us/step - loss: 0.4367 - mae:
Epoch 68/70
1440/1440 [=====] - 0s 327us/step - loss: 0.4274 - mae:
Epoch 69/70
1440/1440 [=====] - 1s 387us/step - loss: 0.4147 - mae:
Epoch 70/70
1440/1440 [=====] - 1s 382us/step - loss: 0.4033 - mae:

```



Kappa Score: 0.6854368932038835

Average kappa score value is : 0.6762098055782224

-----SET 7-----

(1569, 12)

(1569, )

-----Fold 1-----

Converting sentences to word2vec model

4 cores using  
 Time to build vocab using word2vec: 0.11403012275695801 sec  
 Time to train the word2vec model: 2.6068851947784424 mins  
 Model: "sequential\_31"

Layer (type)	Output Shape	Param #
bidirectional_61 (Bidirectio	(None, 1, 600)	1682400
bidirectional_62 (Bidirectio	(None, 200)	560800
dropout_31 (Dropout)	(None, 200)	0
dense_31 (Dense)	(None, 1)	201

=====  
 Total params: 2,243,401  
 Trainable params: 2,243,401  
 Non-trainable params: 0

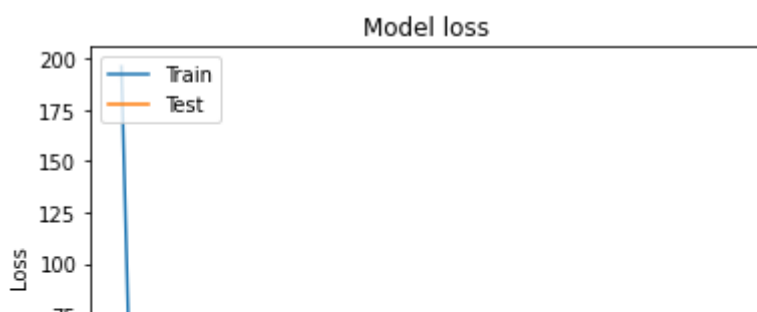
Epoch 1/70	1255/1255 [=====] - 2s 2ms/step - loss: 196.0264 - mae:
Epoch 2/70	1255/1255 [=====] - 0s 341us/step - loss: 36.4018 - mae:
Epoch 3/70	1255/1255 [=====] - 0s 350us/step - loss: 19.6492 - mae:
Epoch 4/70	1255/1255 [=====] - 0s 343us/step - loss: 18.6754 - mae:
Epoch 5/70	1255/1255 [=====] - 0s 374us/step - loss: 17.0479 - mae:
Epoch 6/70	1255/1255 [=====] - 0s 343us/step - loss: 16.2363 - mae:
Epoch 7/70	1255/1255 [=====] - 0s 374us/step - loss: 15.9890 - mae:
Epoch 8/70	1255/1255 [=====] - 0s 374us/step - loss: 16.3631 - mae:
Epoch 9/70	1255/1255 [=====] - 0s 357us/step - loss: 15.9958 - mae:
Epoch 10/70	1255/1255 [=====] - 0s 345us/step - loss: 15.3541 - mae:
Epoch 11/70	1255/1255 [=====] - 0s 343us/step - loss: 15.9210 - mae:
Epoch 12/70	1255/1255 [=====] - 0s 310us/step - loss: 15.8335 - mae:
Epoch 13/70	1255/1255 [=====] - 0s 325us/step - loss: 15.5142 - mae:
Epoch 14/70	1255/1255 [=====] - 0s 323us/step - loss: 15.3851 - mae:
Epoch 15/70	1255/1255 [=====] - 0s 379us/step - loss: 14.9834 - mae:
Epoch 16/70	1255/1255 [=====] - 0s 359us/step - loss: 15.5737 - mae:
Epoch 17/70	1255/1255 [=====] - 0s 350us/step - loss: 15.5496 - mae:

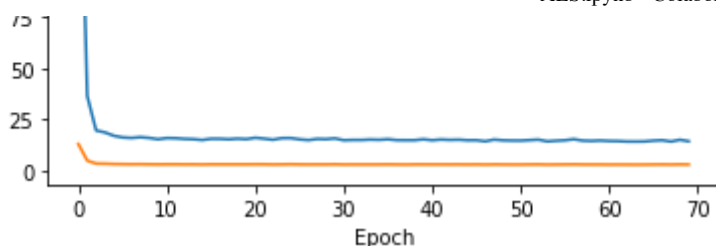
```
-----
Epoch 18/70
1255/1255 [=====] - 0s 342us/step - loss: 15.3378 - mae:
Epoch 19/70
1255/1255 [=====] - 0s 346us/step - loss: 15.6273 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 308us/step - loss: 15.4097 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 329us/step - loss: 16.0700 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 318us/step - loss: 15.6384 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 349us/step - loss: 15.1107 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 346us/step - loss: 15.8834 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 340us/step - loss: 15.9208 - mae:
Epoch 26/70
1255/1255 [=====] - 0s 333us/step - loss: 15.3048 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 378us/step - loss: 14.9328 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 347us/step - loss: 15.5041 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 316us/step - loss: 15.3942 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 319us/step - loss: 15.7741 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 340us/step - loss: 14.8558 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 364us/step - loss: 15.0012 - mae:
Epoch 33/70
1255/1255 [=====] - 0s 315us/step - loss: 14.9886 - mae:
Epoch 34/70
1255/1255 [=====] - 0s 330us/step - loss: 15.2043 - mae:
Epoch 35/70
1255/1255 [=====] - 0s 353us/step - loss: 15.0823 - mae:
Epoch 36/70
1255/1255 [=====] - 0s 339us/step - loss: 15.3584 - mae:
Epoch 37/70
1255/1255 [=====] - 0s 362us/step - loss: 14.9059 - mae:
Epoch 38/70
1255/1255 [=====] - 0s 368us/step - loss: 14.8810 - mae:
Epoch 39/70
1255/1255 [=====] - 0s 368us/step - loss: 14.8833 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 326us/step - loss: 15.3385 - mae:
Epoch 41/70
1255/1255 [=====] - 0s 334us/step - loss: 14.8640 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 322us/step - loss: 15.2246 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 354us/step - loss: 15.0315 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 373us/step - loss: 15.1338 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 321us/step - loss: 14.8479 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 317us/step - loss: 14.8600 - mae:
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```

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1255/1255 [=====] - 0s 317us/step - loss: 14.8699 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 373us/step - loss: 14.3410 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 366us/step - loss: 15.1804 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 357us/step - loss: 14.8149 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 355us/step - loss: 14.7091 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 331us/step - loss: 14.6772 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 370us/step - loss: 14.9146 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 358us/step - loss: 15.1582 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 340us/step - loss: 14.3167 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 349us/step - loss: 14.6173 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 320us/step - loss: 14.8348 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 316us/step - loss: 15.3824 - mae:
Epoch 58/70
1255/1255 [=====] - 0s 320us/step - loss: 14.6739 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 322us/step - loss: 14.5451 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 363us/step - loss: 14.7184 - mae:
Epoch 61/70
1255/1255 [=====] - 0s 367us/step - loss: 14.5098 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 367us/step - loss: 14.4504 - mae:
Epoch 63/70
1255/1255 [=====] - 0s 340us/step - loss: 14.2440 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 323us/step - loss: 14.2235 - mae:
Epoch 65/70
1255/1255 [=====] - 0s 326us/step - loss: 14.2752 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 338us/step - loss: 14.6515 - mae:
Epoch 67/70
1255/1255 [=====] - 0s 340us/step - loss: 14.8737 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 363us/step - loss: 14.2282 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 362us/step - loss: 15.0827 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 316us/step - loss: 14.3714 - mae:

```





Kappa Score: 0.5722448373531612

-----Fold 2-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.11784553527832031 sec

Time to train the word2vec model: 2.6329636573791504 mins

Model: "sequential\_32"

Layer (type)	Output Shape	Param #
bidirectional_63 (Bidirectio	(None, 1, 600)	1682400
bidirectional_64 (Bidirectio	(None, 200)	560800
dropout_32 (Dropout)	(None, 200)	0
dense_32 (Dense)	(None, 1)	201

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1255/1255 [=====] - 2s 1ms/step - loss: 201.6108 - mae:

Epoch 2/70

1255/1255 [=====] - 0s 351us/step - loss: 40.0594 - mae:

Epoch 3/70

1255/1255 [=====] - 0s 331us/step - loss: 20.9013 - mae:

Epoch 4/70

1255/1255 [=====] - 0s 333us/step - loss: 17.4731 - mae:

Epoch 5/70

1255/1255 [=====] - 0s 323us/step - loss: 16.3301 - mae:

Epoch 6/70

1255/1255 [=====] - 0s 325us/step - loss: 15.6673 - mae:

Epoch 7/70

1255/1255 [=====] - 0s 351us/step - loss: 15.6274 - mae:

Epoch 8/70

1255/1255 [=====] - 0s 365us/step - loss: 15.3976 - mae:

Epoch 9/70

1255/1255 [=====] - 0s 341us/step - loss: 14.8253 - mae:

Epoch 10/70

1255/1255 [=====] - 0s 361us/step - loss: 14.8871 - mae:

Epoch 11/70

1255/1255 [=====] - 0s 352us/step - loss: 14.5321 - mae:

Epoch 12/70

1255/1255 [=====] - 0s 354us/step - loss: 14.9428 - mae:

Epoch 13/70

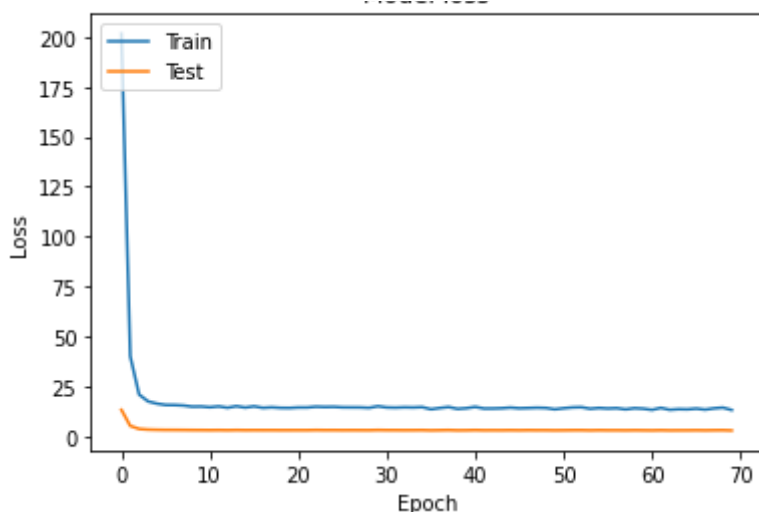
1255/1255 [=====] - 0s 341us/step - loss: 14.2838 - mae:



```
1255/1255 [-----] - 0s 341us/step - loss: 14.2030 - mae:  
Epoch 14/70  
1255/1255 [=====] - 0s 349us/step - loss: 15.0497 - mae:  
Epoch 15/70  
1255/1255 [=====] - 0s 312us/step - loss: 14.3715 - mae:  
Epoch 16/70  
1255/1255 [=====] - 0s 341us/step - loss: 14.9792 - mae:  
Epoch 17/70  
1255/1255 [=====] - 0s 328us/step - loss: 14.2245 - mae:  
Epoch 18/70  
1255/1255 [=====] - 0s 341us/step - loss: 14.4954 - mae:  
Epoch 19/70  
1255/1255 [=====] - 0s 362us/step - loss: 14.2029 - mae:  
Epoch 20/70  
1255/1255 [=====] - 0s 353us/step - loss: 14.1587 - mae:  
Epoch 21/70  
1255/1255 [=====] - 0s 353us/step - loss: 14.4098 - mae:  
Epoch 22/70  
1255/1255 [=====] - 0s 349us/step - loss: 14.4061 - mae:  
Epoch 23/70  
1255/1255 [=====] - 0s 354us/step - loss: 14.7904 - mae:  
Epoch 24/70  
1255/1255 [=====] - 0s 376us/step - loss: 14.6458 - mae:  
Epoch 25/70  
1255/1255 [=====] - 0s 336us/step - loss: 14.7229 - mae:  
Epoch 26/70  
1255/1255 [=====] - 0s 364us/step - loss: 14.4791 - mae:  
Epoch 27/70  
1255/1255 [=====] - 0s 381us/step - loss: 14.4523 - mae:  
Epoch 28/70  
1255/1255 [=====] - 0s 315us/step - loss: 14.4358 - mae:  
Epoch 29/70  
1255/1255 [=====] - 0s 317us/step - loss: 14.2203 - mae:  
Epoch 30/70  
1255/1255 [=====] - 0s 323us/step - loss: 15.0275 - mae:  
Epoch 31/70  
1255/1255 [=====] - 0s 381us/step - loss: 14.4148 - mae:  
Epoch 32/70  
1255/1255 [=====] - 0s 369us/step - loss: 14.3238 - mae:  
Epoch 33/70  
1255/1255 [=====] - 0s 335us/step - loss: 14.4926 - mae:  
Epoch 34/70  
1255/1255 [=====] - 0s 336us/step - loss: 14.4100 - mae:  
Epoch 35/70  
1255/1255 [=====] - 0s 326us/step - loss: 14.5971 - mae:  
Epoch 36/70  
1255/1255 [=====] - 0s 334us/step - loss: 13.5066 - mae:  
Epoch 37/70  
1255/1255 [=====] - 0s 350us/step - loss: 14.1292 - mae:  
Epoch 38/70  
1255/1255 [=====] - 0s 344us/step - loss: 14.6459 - mae:  
Epoch 39/70  
1255/1255 [=====] - 0s 374us/step - loss: 13.7037 - mae:  
Epoch 40/70  
1255/1255 [=====] - 0s 378us/step - loss: 14.0266 - mae:  
Epoch 41/70  
1255/1255 [=====] - 0s 376us/step - loss: 14.7067 - mae:  
Epoch 42/70
```

```
1255/1255 [=====] - 0s 366us/step - loss: 13.8639 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 336us/step - loss: 13.8796 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 371us/step - loss: 14.0227 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 335us/step - loss: 14.3510 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 358us/step - loss: 13.9901 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 354us/step - loss: 14.1200 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 343us/step - loss: 14.2753 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 318us/step - loss: 14.1499 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 361us/step - loss: 13.4862 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 350us/step - loss: 14.0178 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 365us/step - loss: 14.4230 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 392us/step - loss: 14.5424 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 368us/step - loss: 13.7669 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 370us/step - loss: 14.1414 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 369us/step - loss: 13.8883 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 321us/step - loss: 14.0562 - mae:
Epoch 58/70
1255/1255 [=====] - 0s 366us/step - loss: 13.4643 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 358us/step - loss: 14.0324 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 377us/step - loss: 13.8034 - mae:
Epoch 61/70
1255/1255 [=====] - 0s 335us/step - loss: 13.2120 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 313us/step - loss: 14.2024 - mae:
Epoch 63/70
1255/1255 [=====] - 0s 324us/step - loss: 13.2493 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 318us/step - loss: 13.5605 - mae:
Epoch 65/70
1255/1255 [=====] - 0s 343us/step - loss: 13.4713 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 331us/step - loss: 13.8380 - mae:
Epoch 67/70
1255/1255 [=====] - 0s 320us/step - loss: 13.3354 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 338us/step - loss: 13.9677 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 351us/step - loss: 14.3341 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 341us/step - loss: 13.1301 - mae:
```

**Model loss**



Kappa Score: 0.5305514870967014

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.11901736259460449 sec

Time to train the word2vec model: 2.6486480236053467 mins

Model: "sequential\_33"

Layer (type)	Output Shape	Param #
=====		
bidirectional_65 (Bidirectio	(None, 1, 600)	1682400
bidirectional_66 (Bidirectio	(None, 200)	560800
dropout_33 (Dropout)	(None, 200)	0
dense_33 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

1255/1255 [=====] - 2s 1ms/step - loss: 201.6254 - mae:

Epoch 2/70

1255/1255 [=====] - 0s 336us/step - loss: 38.5414 - mae:

Epoch 3/70

1255/1255 [=====] - 0s 360us/step - loss: 20.0670 - mae:

Epoch 4/70

1255/1255 [=====] - 0s 326us/step - loss: 17.7807 - mae:

Epoch 5/70

1255/1255 [=====] - 0s 375us/step - loss: 16.9334 - mae:

Epoch 6/70

1255/1255 [=====] - 0s 330us/step - loss: 15.7420 - mae:

Epoch 7/70

1255/1255 [=====] - 0s 336us/step - loss: 15.5814 - mae:

Epoch 8/70

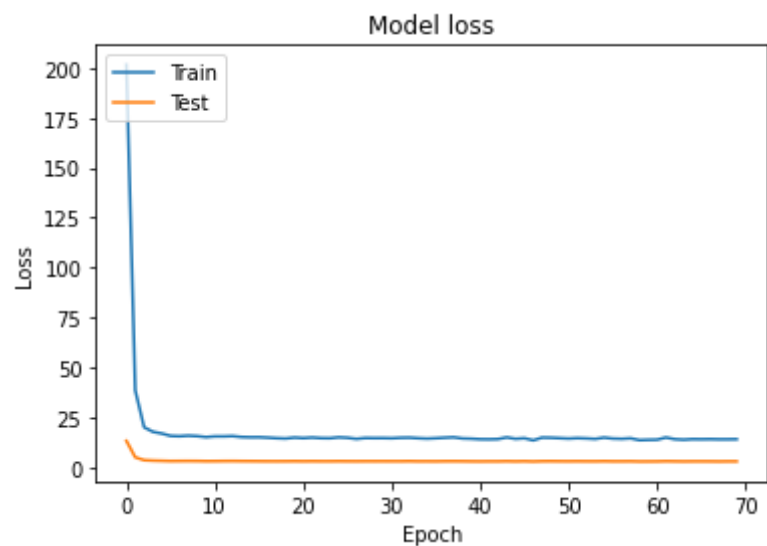
1255/1255 [=====] - 0s 340us/step - loss: 15.8499 - mae:

Epoch 9/70

```
1255/1255 [=====] - 0s 310us/step - loss: 15.6271 - mae:
Epoch 10/70
1255/1255 [=====] - 0s 373us/step - loss: 15.1399 - mae:
Epoch 11/70
1255/1255 [=====] - 0s 350us/step - loss: 15.4987 - mae:
Epoch 12/70
1255/1255 [=====] - 0s 334us/step - loss: 15.4975 - mae:
Epoch 13/70
1255/1255 [=====] - 0s 351us/step - loss: 15.6409 - mae:
Epoch 14/70
1255/1255 [=====] - 0s 325us/step - loss: 15.1809 - mae:
Epoch 15/70
1255/1255 [=====] - 0s 316us/step - loss: 15.0544 - mae:
Epoch 16/70
1255/1255 [=====] - 0s 326us/step - loss: 15.0755 - mae:
Epoch 17/70
1255/1255 [=====] - 0s 326us/step - loss: 14.8594 - mae:
Epoch 18/70
1255/1255 [=====] - 0s 372us/step - loss: 14.5831 - mae:
Epoch 19/70
1255/1255 [=====] - 0s 360us/step - loss: 14.4309 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 329us/step - loss: 14.8920 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 340us/step - loss: 14.6371 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 360us/step - loss: 14.9128 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 315us/step - loss: 14.6275 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 367us/step - loss: 14.5775 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 335us/step - loss: 15.0184 - mae:
Epoch 26/70
1255/1255 [=====] - 0s 365us/step - loss: 14.7974 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 338us/step - loss: 14.2364 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 315us/step - loss: 14.6820 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 323us/step - loss: 14.6357 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 357us/step - loss: 14.6503 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 367us/step - loss: 14.5650 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 361us/step - loss: 14.7895 - mae:
Epoch 33/70
1255/1255 [=====] - 0s 370us/step - loss: 14.8571 - mae:
Epoch 34/70
1255/1255 [=====] - 0s 350us/step - loss: 14.5721 - mae:
Epoch 35/70
1255/1255 [=====] - 0s 368us/step - loss: 14.3868 - mae:
Epoch 36/70
1255/1255 [=====] - 0s 362us/step - loss: 14.5861 - mae:
Epoch 37/70
1255/1255 [=====] - 0s 373us/step - loss: 14.8350 - mae:
Epoch 38/70
```

```
1255/1255 [=====] - 0s 336us/step - loss: 15.0438 - mae:
Epoch 39/70
1255/1255 [=====] - 0s 322us/step - loss: 14.4568 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 375us/step - loss: 14.3246 - mae:
Epoch 41/70
1255/1255 [=====] - 0s 362us/step - loss: 14.0700 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 368us/step - loss: 14.0320 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 338us/step - loss: 14.1357 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 344us/step - loss: 14.9959 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 351us/step - loss: 14.2669 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 358us/step - loss: 14.5768 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 339us/step - loss: 13.5179 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 317us/step - loss: 14.8883 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 318us/step - loss: 14.8078 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 321us/step - loss: 14.6082 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 314us/step - loss: 14.4026 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 353us/step - loss: 14.6295 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 367us/step - loss: 14.4757 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 371us/step - loss: 14.2233 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 301us/step - loss: 14.8879 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 354us/step - loss: 14.4036 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 326us/step - loss: 14.2677 - mae:
Epoch 58/70
1255/1255 [=====] - 0s 317us/step - loss: 14.5367 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 349us/step - loss: 13.6160 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 331us/step - loss: 13.7640 - mae:
Epoch 61/70
1255/1255 [=====] - 0s 365us/step - loss: 13.8340 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 336us/step - loss: 14.9361 - mae:
Epoch 63/70
1255/1255 [=====] - 0s 373us/step - loss: 14.0855 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 308us/step - loss: 13.8430 - mae:
Epoch 65/70
1255/1255 [=====] - 0s 305us/step - loss: 14.1000 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 348us/step - loss: 14.0486 - mae:
Epoch 67/70
```

```
Epoch 67/70
1255/1255 [=====] - 0s 350us/step - loss: 14.1041 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 317us/step - loss: 14.0203 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 370us/step - loss: 14.0282 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 316us/step - loss: 14.0738 - mae:
```



Kappa Score: 0.4939329354097284

-----Fold 4-----

Converting sentences to word2vec model

```
4 cores using
Time to build vocab using word2vec: 0.11491894721984863 sec
Time to train the word2vec model: 2.6387171745300293 mins
Model: "sequential_34"
```

Layer (type)	Output Shape	Param #
=====		
bidirectional_67 (Bidirectio	(None, 1, 600)	1682400
bidirectional_68 (Bidirectio	(None, 200)	560800
dropout_34 (Dropout)	(None, 200)	0
dense_34 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

```
Epoch 1/70
1255/1255 [=====] - 2s 1ms/step - loss: 200.4403 - mae:
Epoch 2/70
1255/1255 [=====] - 0s 324us/step - loss: 38.1876 - mae:
Epoch 3/70
1255/1255 [=====] - 0s 333us/step - loss: 20.4950 - mae:
Epoch 4/70
1255/1255 [=====] - 0s 354us/step - loss: 18.8211 - mae:
Epoch 5/70
```

```
1255/1255 [=====] - 0s 320us/step - loss: 17.3818 - mae:
Epoch 6/70
1255/1255 [=====] - 0s 362us/step - loss: 16.5936 - mae:
Epoch 7/70
1255/1255 [=====] - 0s 342us/step - loss: 15.7931 - mae:
Epoch 8/70
1255/1255 [=====] - 0s 367us/step - loss: 16.1030 - mae:
Epoch 9/70
1255/1255 [=====] - 0s 308us/step - loss: 15.9192 - mae:
Epoch 10/70
1255/1255 [=====] - 0s 319us/step - loss: 15.2845 - mae:
Epoch 11/70
1255/1255 [=====] - 0s 339us/step - loss: 15.6114 - mae:
Epoch 12/70
1255/1255 [=====] - 0s 375us/step - loss: 15.4029 - mae:
Epoch 13/70
1255/1255 [=====] - 0s 353us/step - loss: 15.1294 - mae:
Epoch 14/70
1255/1255 [=====] - 0s 331us/step - loss: 15.2200 - mae:
Epoch 15/70
1255/1255 [=====] - 0s 349us/step - loss: 15.4171 - mae:
Epoch 16/70
1255/1255 [=====] - 0s 331us/step - loss: 15.6999 - mae:
Epoch 17/70
1255/1255 [=====] - 0s 360us/step - loss: 15.2118 - mae:
Epoch 18/70
1255/1255 [=====] - 0s 348us/step - loss: 15.3737 - mae:
Epoch 19/70
1255/1255 [=====] - 0s 356us/step - loss: 16.0832 - mae:
Epoch 20/70
1255/1255 [=====] - 0s 358us/step - loss: 15.0948 - mae:
Epoch 21/70
1255/1255 [=====] - 0s 343us/step - loss: 15.3206 - mae:
Epoch 22/70
1255/1255 [=====] - 0s 351us/step - loss: 15.6337 - mae:
Epoch 23/70
1255/1255 [=====] - 0s 326us/step - loss: 15.0683 - mae:
Epoch 24/70
1255/1255 [=====] - 0s 336us/step - loss: 15.5103 - mae:
Epoch 25/70
1255/1255 [=====] - 0s 343us/step - loss: 14.8278 - mae:
Epoch 26/70
1255/1255 [=====] - 0s 309us/step - loss: 14.9179 - mae:
Epoch 27/70
1255/1255 [=====] - 0s 351us/step - loss: 14.9551 - mae:
Epoch 28/70
1255/1255 [=====] - 0s 366us/step - loss: 14.9199 - mae:
Epoch 29/70
1255/1255 [=====] - 0s 347us/step - loss: 15.5023 - mae:
Epoch 30/70
1255/1255 [=====] - 0s 356us/step - loss: 15.3312 - mae:
Epoch 31/70
1255/1255 [=====] - 0s 361us/step - loss: 14.6272 - mae:
Epoch 32/70
1255/1255 [=====] - 0s 351us/step - loss: 15.2414 - mae:
Epoch 33/70
1255/1255 [=====] - 0s 354us/step - loss: 14.7266 - mae:
Epoch 34/70
```

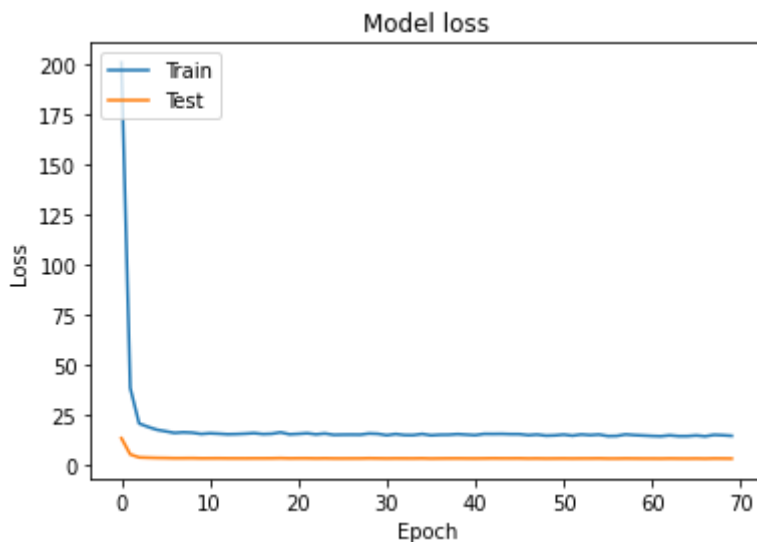
```
1255/1255 [=====] - 0s 326us/step - loss: 14.6872 - mae:
Epoch 35/70
1255/1255 [=====] - 0s 342us/step - loss: 15.2789 - mae:
Epoch 36/70
1255/1255 [=====] - 0s 362us/step - loss: 14.5961 - mae:
Epoch 37/70
1255/1255 [=====] - 0s 351us/step - loss: 14.8541 - mae:
Epoch 38/70
1255/1255 [=====] - 0s 332us/step - loss: 14.8972 - mae:
Epoch 39/70
1255/1255 [=====] - 0s 340us/step - loss: 15.1956 - mae:
Epoch 40/70
1255/1255 [=====] - 0s 335us/step - loss: 14.9266 - mae:
Epoch 41/70
1255/1255 [=====] - 0s 358us/step - loss: 14.6764 - mae:
Epoch 42/70
1255/1255 [=====] - 0s 342us/step - loss: 15.3037 - mae:
Epoch 43/70
1255/1255 [=====] - 0s 322us/step - loss: 15.2723 - mae:
Epoch 44/70
1255/1255 [=====] - 0s 350us/step - loss: 15.3133 - mae:
Epoch 45/70
1255/1255 [=====] - 0s 340us/step - loss: 15.1842 - mae:
Epoch 46/70
1255/1255 [=====] - 0s 339us/step - loss: 15.1695 - mae:
Epoch 47/70
1255/1255 [=====] - 0s 344us/step - loss: 14.6809 - mae:
Epoch 48/70
1255/1255 [=====] - 0s 374us/step - loss: 14.9682 - mae:
Epoch 49/70
1255/1255 [=====] - 0s 344us/step - loss: 14.4319 - mae:
Epoch 50/70
1255/1255 [=====] - 0s 336us/step - loss: 14.5672 - mae:
Epoch 51/70
1255/1255 [=====] - 0s 324us/step - loss: 14.9611 - mae:
Epoch 52/70
1255/1255 [=====] - 0s 330us/step - loss: 14.4337 - mae:
Epoch 53/70
1255/1255 [=====] - 0s 356us/step - loss: 15.0235 - mae:
Epoch 54/70
1255/1255 [=====] - 0s 344us/step - loss: 14.7133 - mae:
Epoch 55/70
1255/1255 [=====] - 0s 308us/step - loss: 14.9860 - mae:
Epoch 56/70
1255/1255 [=====] - 0s 360us/step - loss: 14.2188 - mae:
Epoch 57/70
1255/1255 [=====] - 0s 324us/step - loss: 14.2864 - mae:
Epoch 58/70
1255/1255 [=====] - 0s 364us/step - loss: 15.0412 - mae:
Epoch 59/70
1255/1255 [=====] - 0s 354us/step - loss: 14.7144 - mae:
Epoch 60/70
1255/1255 [=====] - 0s 343us/step - loss: 14.5014 - mae:
Epoch 61/70
1255/1255 [=====] - 0s 358us/step - loss: 14.2727 - mae:
Epoch 62/70
1255/1255 [=====] - 0s 311us/step - loss: 14.1369 - mae:
Epoch 63/70
```



```

Epoch 63/70
1255/1255 [=====] - 0s 311us/step - loss: 14.6002 - mae:
Epoch 64/70
1255/1255 [=====] - 0s 309us/step - loss: 14.1816 - mae:
Epoch 65/70
1255/1255 [=====] - 0s 313us/step - loss: 14.1980 - mae:
Epoch 66/70
1255/1255 [=====] - 0s 331us/step - loss: 14.5377 - mae:
Epoch 67/70
1255/1255 [=====] - 0s 355us/step - loss: 14.0982 - mae:
Epoch 68/70
1255/1255 [=====] - 0s 354us/step - loss: 14.8232 - mae:
Epoch 69/70
1255/1255 [=====] - 0s 353us/step - loss: 14.6381 - mae:
Epoch 70/70
1255/1255 [=====] - 0s 365us/step - loss: 14.3406 - mae:

```



Kappa Score: 0.5686159728088649

-----Fold 5-----

Converting sentences to word2vec model

4 cores using  
 Time to build vocab using word2vec: 0.11940550804138184 sec  
 Time to train the word2vec model: 2.646247148513794 mins  
 Model: "sequential\_35"

Layer (type)	Output Shape	Param #
=====		
bidirectional_69 (Bidirectio	(None, 1, 600)	1682400
bidirectional_70 (Bidirectio	(None, 200)	560800
dropout_35 (Dropout)	(None, 200)	0
dense_35 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
 Trainable params: 2,243,401  
 Non-trainable params: 0

Epoch 1/70

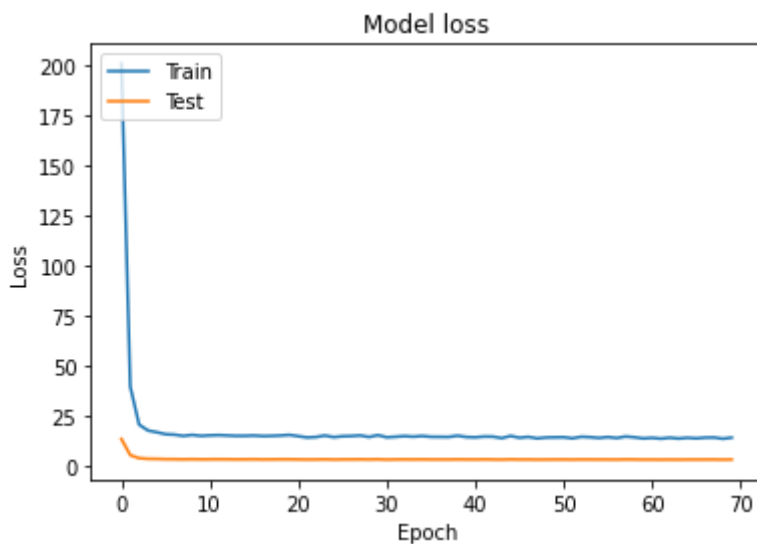
```
1256/1256 [=====] - 2s 1ms/step - loss: 200.7286 - mae:
Epoch 2/70
1256/1256 [=====] - 0s 355us/step - loss: 39.4444 - mae:
Epoch 3/70
1256/1256 [=====] - 0s 391us/step - loss: 20.3868 - mae:
Epoch 4/70
1256/1256 [=====] - 0s 355us/step - loss: 17.4545 - mae:
Epoch 5/70
1256/1256 [=====] - 0s 348us/step - loss: 16.5796 - mae:
Epoch 6/70
1256/1256 [=====] - 0s 333us/step - loss: 15.5926 - mae:
Epoch 7/70
1256/1256 [=====] - 0s 335us/step - loss: 15.3677 - mae:
Epoch 8/70
1256/1256 [=====] - 0s 345us/step - loss: 14.7387 - mae:
Epoch 9/70
1256/1256 [=====] - 0s 323us/step - loss: 15.2514 - mae:
Epoch 10/70
1256/1256 [=====] - 0s 371us/step - loss: 14.7599 - mae:
Epoch 11/70
1256/1256 [=====] - 0s 327us/step - loss: 15.0227 - mae:
Epoch 12/70
1256/1256 [=====] - 0s 325us/step - loss: 15.1498 - mae:
Epoch 13/70
1256/1256 [=====] - 0s 337us/step - loss: 14.9497 - mae:
Epoch 14/70
1256/1256 [=====] - 0s 369us/step - loss: 14.7678 - mae:
Epoch 15/70
1256/1256 [=====] - 0s 354us/step - loss: 14.7875 - mae:
Epoch 16/70
1256/1256 [=====] - 0s 329us/step - loss: 14.9423 - mae:
Epoch 17/70
1256/1256 [=====] - 0s 374us/step - loss: 14.6634 - mae:
Epoch 18/70
1256/1256 [=====] - 0s 321us/step - loss: 14.7620 - mae:
Epoch 19/70
1256/1256 [=====] - 0s 323us/step - loss: 14.9513 - mae:
Epoch 20/70
1256/1256 [=====] - 0s 325us/step - loss: 15.2459 - mae:
Epoch 21/70
1256/1256 [=====] - 0s 319us/step - loss: 14.6055 - mae:
Epoch 22/70
1256/1256 [=====] - 0s 360us/step - loss: 13.9693 - mae:
Epoch 23/70
1256/1256 [=====] - 0s 367us/step - loss: 14.1845 - mae:
Epoch 24/70
1256/1256 [=====] - 0s 361us/step - loss: 14.9292 - mae:
Epoch 25/70
1256/1256 [=====] - 0s 356us/step - loss: 14.1257 - mae:
Epoch 26/70
1256/1256 [=====] - 0s 352us/step - loss: 14.5745 - mae:
Epoch 27/70
1256/1256 [=====] - 0s 361us/step - loss: 14.6943 - mae:
Epoch 28/70
1256/1256 [=====] - 0s 374us/step - loss: 14.9804 - mae:
Epoch 29/70
1256/1256 [=====] - 0s 344us/step - loss: 14.1958 - mae:
Epoch 30/70
```

```
Epoch 30/70
1256/1256 [=====] - 0s 345us/step - loss: 15.1310 - mae:
Epoch 31/70
1256/1256 [=====] - 0s 358us/step - loss: 14.0558 - mae:
Epoch 32/70
1256/1256 [=====] - 0s 345us/step - loss: 14.3195 - mae:
Epoch 33/70
1256/1256 [=====] - 0s 364us/step - loss: 14.6629 - mae:
Epoch 34/70
1256/1256 [=====] - 0s 355us/step - loss: 14.3649 - mae:
Epoch 35/70
1256/1256 [=====] - 0s 344us/step - loss: 14.7117 - mae:
Epoch 36/70
1256/1256 [=====] - 0s 338us/step - loss: 14.2908 - mae:
Epoch 37/70
1256/1256 [=====] - 0s 350us/step - loss: 14.2681 - mae:
Epoch 38/70
1256/1256 [=====] - 0s 339us/step - loss: 14.2268 - mae:
Epoch 39/70
1256/1256 [=====] - 0s 321us/step - loss: 14.8548 - mae:
Epoch 40/70
1256/1256 [=====] - 0s 359us/step - loss: 14.1973 - mae:
Epoch 41/70
1256/1256 [=====] - 0s 353us/step - loss: 14.0557 - mae:
Epoch 42/70
1256/1256 [=====] - 0s 338us/step - loss: 14.4238 - mae:
Epoch 43/70
1256/1256 [=====] - 0s 340us/step - loss: 14.3824 - mae:
Epoch 44/70
1256/1256 [=====] - 0s 362us/step - loss: 13.6263 - mae:
Epoch 45/70
1256/1256 [=====] - 0s 354us/step - loss: 14.7353 - mae:
Epoch 46/70
1256/1256 [=====] - 0s 336us/step - loss: 13.8220 - mae:
Epoch 47/70
1256/1256 [=====] - 0s 363us/step - loss: 14.2625 - mae:
Epoch 48/70
1256/1256 [=====] - 0s 336us/step - loss: 13.5004 - mae:
Epoch 49/70
1256/1256 [=====] - 0s 364us/step - loss: 13.9285 - mae:
Epoch 50/70
1256/1256 [=====] - 0s 336us/step - loss: 14.0247 - mae:
Epoch 51/70
1256/1256 [=====] - 0s 360us/step - loss: 14.0956 - mae:
Epoch 52/70
1256/1256 [=====] - 0s 324us/step - loss: 13.5397 - mae:
Epoch 53/70
1256/1256 [=====] - 0s 309us/step - loss: 14.3147 - mae:
Epoch 54/70
1256/1256 [=====] - 0s 345us/step - loss: 14.1188 - mae:
Epoch 55/70
1256/1256 [=====] - 0s 316us/step - loss: 13.7262 - mae:
Epoch 56/70
1256/1256 [=====] - 0s 306us/step - loss: 14.1666 - mae:
Epoch 57/70
1256/1256 [=====] - 0s 350us/step - loss: 13.6885 - mae:
Epoch 58/70
1256/1256 [=====] - 0s 320us/step - loss: 14.4490 - mae:
```

```

Epoch 59/70
1256/1256 [=====] - 0s 329us/step - loss: 14.0622 - mae:
Epoch 60/70
1256/1256 [=====] - 0s 334us/step - loss: 13.4856 - mae:
Epoch 61/70
1256/1256 [=====] - 0s 346us/step - loss: 13.7703 - mae:
Epoch 62/70
1256/1256 [=====] - 0s 357us/step - loss: 13.3672 - mae:
Epoch 63/70
1256/1256 [=====] - 0s 352us/step - loss: 13.8471 - mae:
Epoch 64/70
1256/1256 [=====] - 0s 333us/step - loss: 13.4227 - mae:
Epoch 65/70
1256/1256 [=====] - 0s 336us/step - loss: 13.8047 - mae:
Epoch 66/70
1256/1256 [=====] - 0s 323us/step - loss: 13.5245 - mae:
Epoch 67/70
1256/1256 [=====] - 0s 360us/step - loss: 13.8717 - mae:
Epoch 68/70
1256/1256 [=====] - 0s 365us/step - loss: 13.9549 - mae:
Epoch 69/70
1256/1256 [=====] - 0s 366us/step - loss: 13.3369 - mae:
Epoch 70/70
1256/1256 [=====] - 0s 355us/step - loss: 13.8773 - mae:

```



Kappa Score: 0.4923584460109499

Average kappa score value is : 0.5315407357358811

-----SET 8-----

(723, 16)

(723,)

-----Fold 1-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 2.5109870433807373 sec

Time to train the word2vec model: 5.419142246246338 mins

Model: "sequential\_36"

Layer (type)	Output Shape	Param #
--------------	--------------	---------

Layer (type)	Output shape	Param #
bidirectional_71 (Bidirectional)	(None, 1, 600)	1682400
bidirectional_72 (Bidirectional)	(None, 200)	560800
dropout_36 (Dropout)	(None, 200)	0
dense_36 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

578/578 [=====] - 2s 3ms/step - loss: 1373.4154 - mae: 3

Epoch 2/70

578/578 [=====] - 0s 397us/step - loss: 1166.7572 - mae:

Epoch 3/70

578/578 [=====] - 0s 396us/step - loss: 833.3136 - mae:

Epoch 4/70

578/578 [=====] - 0s 383us/step - loss: 571.8035 - mae:

Epoch 5/70

578/578 [=====] - 0s 423us/step - loss: 402.4288 - mae:

Epoch 6/70

578/578 [=====] - 0s 421us/step - loss: 295.4078 - mae:

Epoch 7/70

578/578 [=====] - 0s 407us/step - loss: 221.3558 - mae:

Epoch 8/70

578/578 [=====] - 0s 381us/step - loss: 168.7003 - mae:

Epoch 9/70

578/578 [=====] - 0s 337us/step - loss: 130.5938 - mae:

Epoch 10/70

578/578 [=====] - 0s 357us/step - loss: 102.7721 - mae:

Epoch 11/70

578/578 [=====] - 0s 373us/step - loss: 82.5618 - mae: 7

Epoch 12/70

578/578 [=====] - 0s 401us/step - loss: 66.7911 - mae: 6

Epoch 13/70

578/578 [=====] - 0s 346us/step - loss: 55.6692 - mae: 5

Epoch 14/70

578/578 [=====] - 0s 393us/step - loss: 51.2155 - mae: 5

Epoch 15/70

578/578 [=====] - 0s 398us/step - loss: 42.8587 - mae: 5

Epoch 16/70

578/578 [=====] - 0s 415us/step - loss: 40.4166 - mae: 4

Epoch 17/70

578/578 [=====] - 0s 398us/step - loss: 42.0686 - mae: 5

Epoch 18/70

578/578 [=====] - 0s 344us/step - loss: 41.6147 - mae: 5

Epoch 19/70

578/578 [=====] - 0s 363us/step - loss: 40.7844 - mae: 5

Epoch 20/70

578/578 [=====] - 0s 353us/step - loss: 42.4223 - mae: 5

Epoch 21/70

578/578 [=====] - 0s 406us/step - loss: 43.3382 - mae: 5

Epoch 22/70

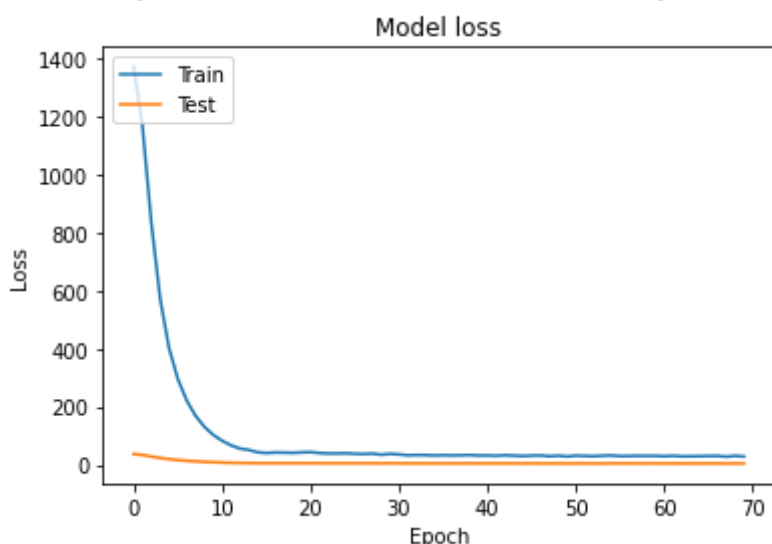
578/578 [=====] - 0s 406us/step - loss: 40.1957 - mae: 4

```
Epoch 23/70
578/578 [=====] - 0s 349us/step - loss: 38.6227 - mae: 4
Epoch 24/70
578/578 [=====] - 0s 398us/step - loss: 38.8791 - mae: 4
Epoch 25/70
578/578 [=====] - 0s 398us/step - loss: 39.3646 - mae: 4
Epoch 26/70
578/578 [=====] - 0s 393us/step - loss: 37.7280 - mae: 4
Epoch 27/70
578/578 [=====] - 0s 353us/step - loss: 36.7942 - mae: 4
Epoch 28/70
578/578 [=====] - 0s 384us/step - loss: 38.3760 - mae: 4
Epoch 29/70
578/578 [=====] - 0s 409us/step - loss: 34.3496 - mae: 4
Epoch 30/70
578/578 [=====] - 0s 383us/step - loss: 37.3849 - mae: 4
Epoch 31/70
578/578 [=====] - 0s 346us/step - loss: 35.4908 - mae: 4
Epoch 32/70
578/578 [=====] - 0s 385us/step - loss: 32.4069 - mae: 4
Epoch 33/70
578/578 [=====] - 0s 403us/step - loss: 33.3479 - mae: 4
Epoch 34/70
578/578 [=====] - 0s 381us/step - loss: 32.9984 - mae: 4
Epoch 35/70
578/578 [=====] - 0s 394us/step - loss: 31.7086 - mae: 4
Epoch 36/70
578/578 [=====] - 0s 382us/step - loss: 32.7271 - mae: 4
Epoch 37/70
578/578 [=====] - 0s 365us/step - loss: 31.9526 - mae: 4
Epoch 38/70
578/578 [=====] - 0s 344us/step - loss: 32.4590 - mae: 4
Epoch 39/70
578/578 [=====] - 0s 338us/step - loss: 33.2808 - mae: 4
Epoch 40/70
578/578 [=====] - 0s 344us/step - loss: 31.6950 - mae: 4
Epoch 41/70
578/578 [=====] - 0s 342us/step - loss: 31.9155 - mae: 4
Epoch 42/70
578/578 [=====] - 0s 348us/step - loss: 30.8759 - mae: 4
Epoch 43/70
578/578 [=====] - 0s 334us/step - loss: 32.7645 - mae: 4
Epoch 44/70
578/578 [=====] - 0s 346us/step - loss: 31.1708 - mae: 4
Epoch 45/70
578/578 [=====] - 0s 354us/step - loss: 29.9215 - mae: 4
Epoch 46/70
578/578 [=====] - 0s 384us/step - loss: 31.3533 - mae: 4
Epoch 47/70
578/578 [=====] - 0s 428us/step - loss: 32.0148 - mae: 4
Epoch 48/70
578/578 [=====] - 0s 388us/step - loss: 29.2231 - mae: 4
Epoch 49/70
578/578 [=====] - 0s 406us/step - loss: 30.9273 - mae: 4
Epoch 50/70
578/578 [=====] - 0s 376us/step - loss: 28.4468 - mae: 4
Epoch 51/70
578/578 [=====] - 0s 416us/step - loss: 31.1476 - mae: 4
```

```

Epoch 52/70
578/578 [=====] - 0s 382us/step - loss: 30.2947 - mae: 4
Epoch 53/70
578/578 [=====] - 0s 397us/step - loss: 29.3532 - mae: 4
Epoch 54/70
578/578 [=====] - 0s 381us/step - loss: 30.8723 - mae: 4
Epoch 55/70
578/578 [=====] - 0s 368us/step - loss: 31.9211 - mae: 4
Epoch 56/70
578/578 [=====] - 0s 383us/step - loss: 29.6348 - mae: 4
Epoch 57/70
578/578 [=====] - 0s 378us/step - loss: 30.0667 - mae: 4
Epoch 58/70
578/578 [=====] - 0s 360us/step - loss: 30.7426 - mae: 4
Epoch 59/70
578/578 [=====] - 0s 362us/step - loss: 30.2723 - mae: 4
Epoch 60/70
578/578 [=====] - 0s 355us/step - loss: 30.5328 - mae: 4
Epoch 61/70
578/578 [=====] - 0s 423us/step - loss: 29.1882 - mae: 4
Epoch 62/70
578/578 [=====] - 0s 383us/step - loss: 30.6736 - mae: 4
Epoch 63/70
578/578 [=====] - 0s 345us/step - loss: 28.8655 - mae: 4
Epoch 64/70
578/578 [=====] - 0s 352us/step - loss: 29.0710 - mae: 4
Epoch 65/70
578/578 [=====] - 0s 364us/step - loss: 29.5100 - mae: 4
Epoch 66/70
578/578 [=====] - 0s 416us/step - loss: 30.0922 - mae: 4
Epoch 67/70
578/578 [=====] - 0s 385us/step - loss: 30.2469 - mae: 4
Epoch 68/70
578/578 [=====] - 0s 385us/step - loss: 27.7507 - mae: 4
Epoch 69/70
578/578 [=====] - 0s 371us/step - loss: 30.5858 - mae: 4
Epoch 70/70
578/578 [=====] - 0s 366us/step - loss: 28.1574 - mae: 4

```



Kappa Score: 0.3679723400168441

-----Fold 2-----

Converting sentences to word2vec model

4 cores using  
 Time to build vocab using word2vec: 0.1986532211303711 sec  
 Time to train the word2vec model: 5.398674964904785 mins  
 Model: "sequential\_37"

Layer (type)	Output Shape	Param #
bidirectional_73 (Bidirectio	(None, 1, 600)	1682400
bidirectional_74 (Bidirectio	(None, 200)	560800
dropout_37 (Dropout)	(None, 200)	0
dense_37 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70  
 578/578 [=====] - 2s 3ms/step - loss: 1362.5891 - mae: 3  
 Epoch 2/70  
 578/578 [=====] - 0s 351us/step - loss: 1137.4664 - mae:  
 Epoch 3/70  
 578/578 [=====] - 0s 411us/step - loss: 784.8236 - mae:  
 Epoch 4/70  
 578/578 [=====] - 0s 384us/step - loss: 504.1074 - mae:  
 Epoch 5/70  
 578/578 [=====] - 0s 407us/step - loss: 340.1072 - mae:  
 Epoch 6/70  
 578/578 [=====] - 0s 395us/step - loss: 237.4725 - mae:  
 Epoch 7/70  
 578/578 [=====] - 0s 383us/step - loss: 165.3600 - mae:  
 Epoch 8/70  
 578/578 [=====] - 0s 385us/step - loss: 124.3932 - mae:  
 Epoch 9/70  
 578/578 [=====] - 0s 361us/step - loss: 97.1937 - mae: 8  
 Epoch 10/70  
 578/578 [=====] - 0s 348us/step - loss: 74.3830 - mae: 7  
 Epoch 11/70  
 578/578 [=====] - 0s 387us/step - loss: 58.5199 - mae: 6  
 Epoch 12/70  
 578/578 [=====] - 0s 381us/step - loss: 51.0228 - mae: 5  
 Epoch 13/70  
 578/578 [=====] - 0s 411us/step - loss: 44.4210 - mae: 5  
 Epoch 14/70  
 578/578 [=====] - 0s 404us/step - loss: 39.4727 - mae: 5  
 Epoch 15/70  
 578/578 [=====] - 0s 352us/step - loss: 39.5283 - mae: 4  
 Epoch 16/70  
 578/578 [=====] - 0s 403us/step - loss: 39.7880 - mae: 4  
 Epoch 17/70  
 578/578 [=====] - 0s 392us/step - loss: 38.3955 - mae: 4  
 Epoch 18/70  
 578/578 [=====] - 0s 380us/step - loss: 40.3645 - mae: 4

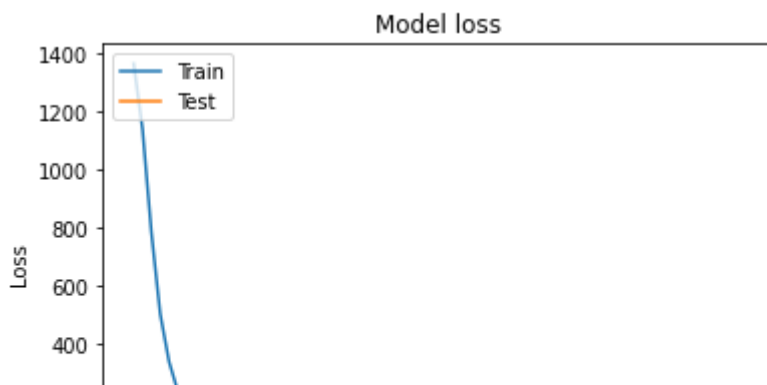


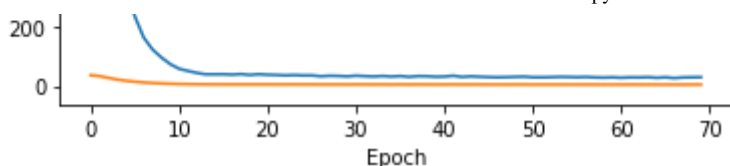
```
Epoch 19/70
578/578 [=====] - 0s 395us/step - loss: 37.3686 - mae: 4
Epoch 20/70
578/578 [=====] - 0s 365us/step - loss: 39.8765 - mae: 4
Epoch 21/70
578/578 [=====] - 0s 401us/step - loss: 38.0021 - mae: 4
Epoch 22/70
578/578 [=====] - 0s 400us/step - loss: 37.3365 - mae: 4
Epoch 23/70
578/578 [=====] - 0s 402us/step - loss: 35.8548 - mae: 4
Epoch 24/70
578/578 [=====] - 0s 382us/step - loss: 36.9031 - mae: 4
Epoch 25/70
578/578 [=====] - 0s 347us/step - loss: 35.6614 - mae: 4
Epoch 26/70
578/578 [=====] - 0s 336us/step - loss: 35.8490 - mae: 4
Epoch 27/70
578/578 [=====] - 0s 360us/step - loss: 32.7791 - mae: 4
Epoch 28/70
578/578 [=====] - 0s 358us/step - loss: 34.4217 - mae: 4
Epoch 29/70
578/578 [=====] - 0s 353us/step - loss: 33.9396 - mae: 4
Epoch 30/70
578/578 [=====] - 0s 366us/step - loss: 32.3765 - mae: 4
Epoch 31/70
578/578 [=====] - 0s 413us/step - loss: 34.7606 - mae: 4
Epoch 32/70
578/578 [=====] - 0s 403us/step - loss: 33.2323 - mae: 4
Epoch 33/70
578/578 [=====] - 0s 392us/step - loss: 32.0112 - mae: 4
Epoch 34/70
578/578 [=====] - 0s 342us/step - loss: 33.7583 - mae: 4
Epoch 35/70
578/578 [=====] - 0s 340us/step - loss: 31.8075 - mae: 4
Epoch 36/70
578/578 [=====] - 0s 341us/step - loss: 33.5739 - mae: 4
Epoch 37/70
578/578 [=====] - 0s 345us/step - loss: 30.7968 - mae: 4
Epoch 38/70
578/578 [=====] - 0s 349us/step - loss: 33.3322 - mae: 4
Epoch 39/70
578/578 [=====] - 0s 356us/step - loss: 32.9394 - mae: 4
Epoch 40/70
578/578 [=====] - 0s 348us/step - loss: 31.2059 - mae: 4
Epoch 41/70
578/578 [=====] - 0s 370us/step - loss: 31.7754 - mae: 4
Epoch 42/70
578/578 [=====] - 0s 349us/step - loss: 34.6163 - mae: 4
Epoch 43/70
578/578 [=====] - 0s 378us/step - loss: 30.5529 - mae: 4
Epoch 44/70
578/578 [=====] - 0s 368us/step - loss: 32.6156 - mae: 4
Epoch 45/70
578/578 [=====] - 0s 386us/step - loss: 31.1914 - mae: 4
Epoch 46/70
578/578 [=====] - 0s 383us/step - loss: 30.0158 - mae: 4
Epoch 47/70
578/578 [=====] - 0s 371us/step - loss: 29.3727 - mae: 4
```

```

Epoch 48/70
578/578 [=====] - 0s 390us/step - loss: 29.8598 - mae: 4
Epoch 49/70
578/578 [=====] - 0s 391us/step - loss: 30.8011 - mae: 4
Epoch 50/70
578/578 [=====] - 0s 371us/step - loss: 31.4880 - mae: 4
Epoch 51/70
578/578 [=====] - 0s 362us/step - loss: 29.3925 - mae: 4
Epoch 52/70
578/578 [=====] - 0s 374us/step - loss: 29.2289 - mae: 4
Epoch 53/70
578/578 [=====] - 0s 380us/step - loss: 29.8138 - mae: 4
Epoch 54/70
578/578 [=====] - 0s 392us/step - loss: 30.7995 - mae: 4
Epoch 55/70
578/578 [=====] - 0s 395us/step - loss: 30.3515 - mae: 4
Epoch 56/70
578/578 [=====] - 0s 352us/step - loss: 29.6534 - mae: 4
Epoch 57/70
578/578 [=====] - 0s 344us/step - loss: 30.4195 - mae: 4
Epoch 58/70
578/578 [=====] - 0s 335us/step - loss: 28.9754 - mae: 4
Epoch 59/70
578/578 [=====] - 0s 333us/step - loss: 28.2524 - mae: 4
Epoch 60/70
578/578 [=====] - 0s 348us/step - loss: 29.2186 - mae: 4
Epoch 61/70
578/578 [=====] - 0s 367us/step - loss: 27.8466 - mae: 4
Epoch 62/70
578/578 [=====] - 0s 347us/step - loss: 29.1430 - mae: 4
Epoch 63/70
578/578 [=====] - 0s 344us/step - loss: 28.8264 - mae: 4
Epoch 64/70
578/578 [=====] - 0s 353us/step - loss: 29.7786 - mae: 4
Epoch 65/70
578/578 [=====] - 0s 364us/step - loss: 27.6678 - mae: 4
Epoch 66/70
578/578 [=====] - 0s 394us/step - loss: 29.2951 - mae: 4
Epoch 67/70
578/578 [=====] - 0s 394us/step - loss: 26.5786 - mae: 4
Epoch 68/70
578/578 [=====] - 0s 372us/step - loss: 28.8649 - mae: 4
Epoch 69/70
578/578 [=====] - 0s 378us/step - loss: 29.2811 - mae: 4
Epoch 70/70
578/578 [=====] - 0s 356us/step - loss: 29.5433 - mae: 4

```





Kappa Score: 0.39736449631321513

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.18714141845703125 sec

Time to train the word2vec model: 5.236833095550537 mins

Model: "sequential\_38"

Layer (type)	Output Shape	Param #
bidirectional_75 (Bidirectio	(None, 1, 600)	1682400
bidirectional_76 (Bidirectio	(None, 200)	560800
dropout_38 (Dropout)	(None, 200)	0
dense_38 (Dense)	(None, 1)	201

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

578/578 [=====] - 2s 3ms/step - loss: 1357.7189 - mae: 3

Epoch 2/70

578/578 [=====] - 0s 400us/step - loss: 1137.9158 - mae:

Epoch 3/70

578/578 [=====] - 0s 383us/step - loss: 790.7660 - mae:

Epoch 4/70

578/578 [=====] - 0s 367us/step - loss: 525.5218 - mae:

Epoch 5/70

578/578 [=====] - 0s 326us/step - loss: 365.7216 - mae:

Epoch 6/70

578/578 [=====] - 0s 318us/step - loss: 257.4264 - mae:

Epoch 7/70

578/578 [=====] - 0s 389us/step - loss: 194.4922 - mae:

Epoch 8/70

578/578 [=====] - 0s 344us/step - loss: 147.6647 - mae:

Epoch 9/70

578/578 [=====] - 0s 391us/step - loss: 111.2665 - mae:

Epoch 10/70

578/578 [=====] - 0s 377us/step - loss: 93.0423 - mae: 8

Epoch 11/70

578/578 [=====] - 0s 368us/step - loss: 73.8746 - mae: 7

Epoch 12/70

578/578 [=====] - 0s 378us/step - loss: 60.6799 - mae: 6

Epoch 13/70

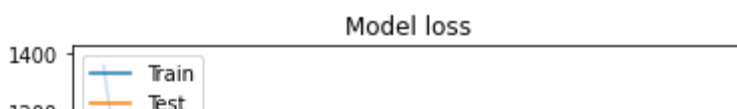
578/578 [=====] - 0s 346us/step - loss: 50.7600 - mae: 5

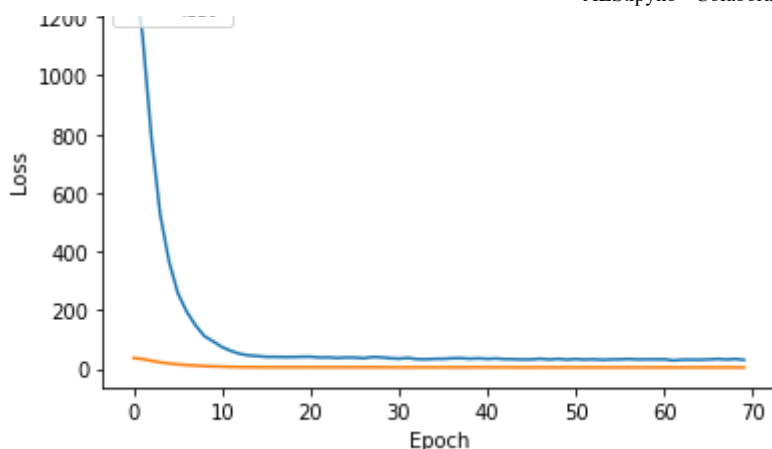
Epoch 14/70

578/578 [=====] - 0s 331us/step - loss: 45.5073 - mae: 5

```
Epoch 15/70
578/578 [=====] - 0s 332us/step - loss: 43.2491 - mae: 5
Epoch 16/70
578/578 [=====] - 0s 384us/step - loss: 40.3059 - mae: 4
Epoch 17/70
578/578 [=====] - 0s 368us/step - loss: 40.4540 - mae: 4
Epoch 18/70
578/578 [=====] - 0s 380us/step - loss: 39.8814 - mae: 4
Epoch 19/70
578/578 [=====] - 0s 422us/step - loss: 39.8476 - mae: 4
Epoch 20/70
578/578 [=====] - 0s 359us/step - loss: 40.6928 - mae: 4
Epoch 21/70
578/578 [=====] - 0s 372us/step - loss: 40.9087 - mae: 5
Epoch 22/70
578/578 [=====] - 0s 379us/step - loss: 38.1600 - mae: 4
Epoch 23/70
578/578 [=====] - 0s 409us/step - loss: 38.7764 - mae: 4
Epoch 24/70
578/578 [=====] - 0s 411us/step - loss: 36.7683 - mae: 4
Epoch 25/70
578/578 [=====] - 0s 376us/step - loss: 38.2451 - mae: 4
Epoch 26/70
578/578 [=====] - 0s 352us/step - loss: 38.1610 - mae: 4
Epoch 27/70
578/578 [=====] - 0s 395us/step - loss: 35.7295 - mae: 4
Epoch 28/70
578/578 [=====] - 0s 382us/step - loss: 39.9243 - mae: 4
Epoch 29/70
578/578 [=====] - 0s 329us/step - loss: 38.7602 - mae: 4
Epoch 30/70
578/578 [=====] - 0s 351us/step - loss: 35.9416 - mae: 4
Epoch 31/70
578/578 [=====] - 0s 344us/step - loss: 34.2739 - mae: 4
Epoch 32/70
578/578 [=====] - 0s 338us/step - loss: 36.9520 - mae: 4
Epoch 33/70
578/578 [=====] - 0s 333us/step - loss: 32.8720 - mae: 4
Epoch 34/70
578/578 [=====] - 0s 352us/step - loss: 32.0620 - mae: 4
Epoch 35/70
578/578 [=====] - 0s 343us/step - loss: 33.6018 - mae: 4
Epoch 36/70
578/578 [=====] - 0s 376us/step - loss: 33.8165 - mae: 4
Epoch 37/70
578/578 [=====] - 0s 374us/step - loss: 35.5475 - mae: 4
Epoch 38/70
578/578 [=====] - 0s 404us/step - loss: 36.3016 - mae: 4
Epoch 39/70
578/578 [=====] - 0s 412us/step - loss: 33.9866 - mae: 4
Epoch 40/70
578/578 [=====] - 0s 328us/step - loss: 35.5089 - mae: 4
Epoch 41/70
578/578 [=====] - 0s 335us/step - loss: 33.4812 - mae: 4
Epoch 42/70
578/578 [=====] - 0s 348us/step - loss: 34.8984 - mae: 4
Epoch 43/70
578/578 [=====] - 0s 321us/step - loss: 32.5490 - mae: 4
```

```
578/578 [=====] - 0s 321us/step - loss: 32.5430 - mae: 4
Epoch 44/70
578/578 [=====] - 0s 376us/step - loss: 32.5644 - mae: 4
Epoch 45/70
578/578 [=====] - 0s 393us/step - loss: 31.2595 - mae: 4
Epoch 46/70
578/578 [=====] - 0s 367us/step - loss: 31.9691 - mae: 4
Epoch 47/70
578/578 [=====] - 0s 394us/step - loss: 34.0092 - mae: 4
Epoch 48/70
578/578 [=====] - 0s 384us/step - loss: 31.4986 - mae: 4
Epoch 49/70
578/578 [=====] - 0s 406us/step - loss: 33.6337 - mae: 4
Epoch 50/70
578/578 [=====] - 0s 382us/step - loss: 31.0949 - mae: 4
Epoch 51/70
578/578 [=====] - 0s 392us/step - loss: 32.9508 - mae: 4
Epoch 52/70
578/578 [=====] - 0s 401us/step - loss: 31.2728 - mae: 4
Epoch 53/70
578/578 [=====] - 0s 356us/step - loss: 32.0846 - mae: 4
Epoch 54/70
578/578 [=====] - 0s 349us/step - loss: 30.3766 - mae: 4
Epoch 55/70
578/578 [=====] - 0s 327us/step - loss: 31.5111 - mae: 4
Epoch 56/70
578/578 [=====] - 0s 352us/step - loss: 32.1129 - mae: 4
Epoch 57/70
578/578 [=====] - 0s 345us/step - loss: 33.1803 - mae: 4
Epoch 58/70
578/578 [=====] - 0s 363us/step - loss: 31.7130 - mae: 4
Epoch 59/70
578/578 [=====] - 0s 342us/step - loss: 32.0140 - mae: 4
Epoch 60/70
578/578 [=====] - 0s 340us/step - loss: 31.9515 - mae: 4
Epoch 61/70
578/578 [=====] - 0s 341us/step - loss: 32.1226 - mae: 4
Epoch 62/70
578/578 [=====] - 0s 385us/step - loss: 28.3874 - mae: 4
Epoch 63/70
578/578 [=====] - 0s 348us/step - loss: 30.7833 - mae: 4
Epoch 64/70
578/578 [=====] - 0s 364us/step - loss: 30.8520 - mae: 4
Epoch 65/70
578/578 [=====] - 0s 375us/step - loss: 30.5689 - mae: 4
Epoch 66/70
578/578 [=====] - 0s 388us/step - loss: 31.6182 - mae: 4
Epoch 67/70
578/578 [=====] - 0s 375us/step - loss: 33.2672 - mae: 4
Epoch 68/70
578/578 [=====] - 0s 347us/step - loss: 31.3524 - mae: 4
Epoch 69/70
578/578 [=====] - 0s 376us/step - loss: 33.1784 - mae: 4
Epoch 70/70
578/578 [=====] - 0s 419us/step - loss: 30.1103 - mae: 4
```





Kappa Score: 0.4476324370665592

-----Fold 4-----

Converting sentences to word2vec model

4 cores using  
 Time to build vocab using word2vec: 0.19294214248657227 sec  
 Time to train the word2vec model: 5.454136371612549 mins  
 Model: "sequential\_39"

Layer (type)	Output Shape	Param #
bidirectional_77 (Bidirectio	(None, 1, 600)	1682400
bidirectional_78 (Bidirectio	(None, 200)	560800
dropout_39 (Dropout)	(None, 200)	0
dense_39 (Dense)	(None, 1)	201

=====  
 Total params: 2,243,401  
 Trainable params: 2,243,401  
 Non-trainable params: 0

```
Epoch 1/70
579/579 [=====] - 2s 3ms/step - loss: 1374.4552 - mae: 3
Epoch 2/70
579/579 [=====] - 0s 392us/step - loss: 1147.2939 - mae:
Epoch 3/70
579/579 [=====] - 0s 366us/step - loss: 795.4662 - mae:
Epoch 4/70
579/579 [=====] - 0s 383us/step - loss: 534.8188 - mae:
Epoch 5/70
579/579 [=====] - 0s 360us/step - loss: 363.6910 - mae:
Epoch 6/70
579/579 [=====] - 0s 368us/step - loss: 266.6414 - mae:
Epoch 7/70
579/579 [=====] - 0s 411us/step - loss: 195.4865 - mae:
Epoch 8/70
579/579 [=====] - 0s 359us/step - loss: 150.4719 - mae:
Epoch 9/70
579/579 [=====] - 0s 335us/step - loss: 114.8187 - mae:
Epoch 10/70
579/579 [=====] - 0s 382us/step - loss: 85.6587 - mae: 7
```

```
579/579 [=====] - 0s 362us/step - loss: 65.0507 - mae: 6
Epoch 11/70
579/579 [=====] - 0s 388us/step - loss: 67.0536 - mae: 6
Epoch 12/70
579/579 [=====] - 0s 350us/step - loss: 58.7783 - mae: 6
Epoch 13/70
579/579 [=====] - 0s 340us/step - loss: 48.9460 - mae: 5
Epoch 14/70
579/579 [=====] - 0s 336us/step - loss: 45.2756 - mae: 5
Epoch 15/70
579/579 [=====] - 0s 335us/step - loss: 41.6420 - mae: 5
Epoch 16/70
579/579 [=====] - 0s 379us/step - loss: 39.9056 - mae: 5
Epoch 17/70
579/579 [=====] - 0s 379us/step - loss: 42.0800 - mae: 5
Epoch 18/70
579/579 [=====] - 0s 344us/step - loss: 41.5514 - mae: 5
Epoch 19/70
579/579 [=====] - 0s 341us/step - loss: 41.3856 - mae: 5
Epoch 20/70
579/579 [=====] - 0s 407us/step - loss: 39.6631 - mae: 4
Epoch 21/70
579/579 [=====] - 0s 384us/step - loss: 41.0551 - mae: 4
Epoch 22/70
579/579 [=====] - 0s 350us/step - loss: 38.0189 - mae: 4
Epoch 23/70
579/579 [=====] - 0s 390us/step - loss: 37.8419 - mae: 4
Epoch 24/70
579/579 [=====] - 0s 385us/step - loss: 36.3391 - mae: 4
Epoch 25/70
579/579 [=====] - 0s 342us/step - loss: 37.4594 - mae: 4
Epoch 26/70
579/579 [=====] - 0s 336us/step - loss: 34.5284 - mae: 4
Epoch 27/70
579/579 [=====] - 0s 355us/step - loss: 35.0228 - mae: 4
Epoch 28/70
579/579 [=====] - 0s 352us/step - loss: 36.0449 - mae: 4
Epoch 29/70
579/579 [=====] - 0s 336us/step - loss: 33.4355 - mae: 4
Epoch 30/70
579/579 [=====] - 0s 378us/step - loss: 32.0639 - mae: 4
Epoch 31/70
579/579 [=====] - 0s 393us/step - loss: 34.2742 - mae: 4
Epoch 32/70
579/579 [=====] - 0s 384us/step - loss: 34.6835 - mae: 4
Epoch 33/70
579/579 [=====] - 0s 383us/step - loss: 34.5009 - mae: 4
Epoch 34/70
579/579 [=====] - 0s 387us/step - loss: 33.0684 - mae: 4
Epoch 35/70
579/579 [=====] - 0s 414us/step - loss: 32.6826 - mae: 4
Epoch 36/70
579/579 [=====] - 0s 344us/step - loss: 35.0278 - mae: 4
Epoch 37/70
579/579 [=====] - 0s 324us/step - loss: 35.6226 - mae: 4
Epoch 38/70
579/579 [=====] - 0s 341us/step - loss: 33.9512 - mae: 4
Epoch 39/70
```

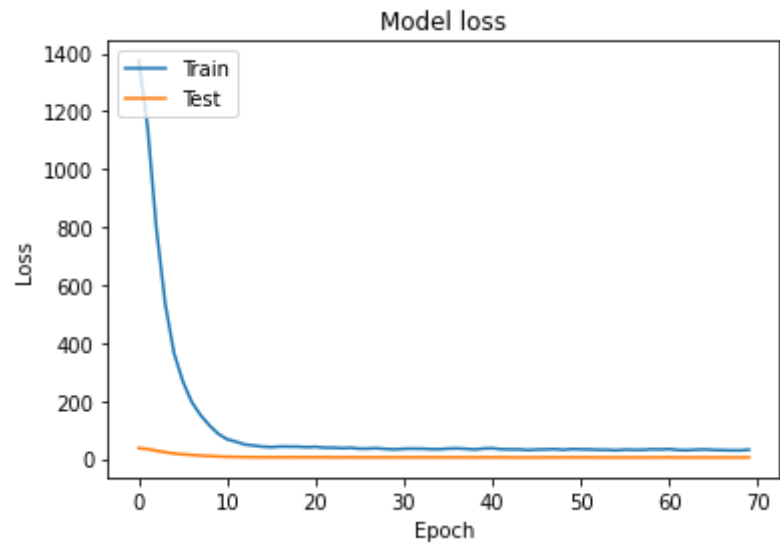
579/579 [=====] - 0s 410us/step - loss: 31.8074 - mae: 4  
Epoch 40/70  
579/579 [=====] - 0s 375us/step - loss: 35.1524 - mae: 4  
Epoch 41/70  
579/579 [=====] - 0s 345us/step - loss: 35.9056 - mae: 4  
Epoch 42/70  
579/579 [=====] - 0s 330us/step - loss: 32.7817 - mae: 4  
Epoch 43/70  
579/579 [=====] - 0s 337us/step - loss: 32.0652 - mae: 4  
Epoch 44/70  
579/579 [=====] - 0s 391us/step - loss: 32.0588 - mae: 4  
Epoch 45/70  
579/579 [=====] - 0s 371us/step - loss: 29.7886 - mae: 4  
Epoch 46/70  
579/579 [=====] - 0s 332us/step - loss: 31.4729 - mae: 4  
Epoch 47/70  
579/579 [=====] - 0s 384us/step - loss: 31.9131 - mae: 4  
Epoch 48/70  
579/579 [=====] - 0s 392us/step - loss: 33.1267 - mae: 4  
Epoch 49/70  
579/579 [=====] - 0s 387us/step - loss: 30.6352 - mae: 4  
Epoch 50/70  
579/579 [=====] - 0s 337us/step - loss: 33.2384 - mae: 4  
Epoch 51/70  
579/579 [=====] - 0s 337us/step - loss: 32.3813 - mae: 4  
Epoch 52/70  
579/579 [=====] - 0s 334us/step - loss: 31.8550 - mae: 4  
Epoch 53/70  
579/579 [=====] - 0s 344us/step - loss: 30.8499 - mae: 4  
Epoch 54/70  
579/579 [=====] - 0s 375us/step - loss: 30.5123 - mae: 4  
Epoch 55/70  
579/579 [=====] - 0s 344us/step - loss: 28.9734 - mae: 4  
Epoch 56/70  
579/579 [=====] - 0s 331us/step - loss: 31.3267 - mae: 4  
Epoch 57/70  
579/579 [=====] - 0s 327us/step - loss: 30.5199 - mae: 4  
Epoch 58/70  
579/579 [=====] - 0s 375us/step - loss: 30.4762 - mae: 4  
Epoch 59/70  
579/579 [=====] - 0s 334us/step - loss: 32.6096 - mae: 4  
Epoch 60/70  
579/579 [=====] - 0s 332us/step - loss: 31.8441 - mae: 4  
Epoch 61/70  
579/579 [=====] - 0s 312us/step - loss: 33.4225 - mae: 4  
Epoch 62/70  
579/579 [=====] - 0s 391us/step - loss: 29.9632 - mae: 4  
Epoch 63/70  
579/579 [=====] - 0s 379us/step - loss: 29.2434 - mae: 4  
Epoch 64/70  
579/579 [=====] - 0s 393us/step - loss: 30.8004 - mae: 4  
Epoch 65/70  
579/579 [=====] - 0s 374us/step - loss: 32.0620 - mae: 4  
Epoch 66/70  
579/579 [=====] - 0s 326us/step - loss: 30.0271 - mae: 4  
Epoch 67/70  
579/579 [=====] - 0s 388us/step - loss: 29.4795 - mae: 4  
Epoch 68/70



4/22/2020

AES.ipynb - Colaboratory

579/579 [=====] - 0s 387us/step - loss: 28.7681 - mae: 4  
Epoch 69/70  
579/579 [=====] - 0s 345us/step - loss: 28.6985 - mae: 4  
Epoch 70/70  
579/579 [=====] - 0s 372us/step - loss: 30.9553 - mae: 4



Kappa Score: 0.45641025641025645

-----Fold 5-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.19194602966308594 sec  
Time to train the word2vec model: 5.196256160736084 mins  
Model: "sequential\_40"

Layer (type)	Output Shape	Param #
=====		
bidirectional_79 (Bidirectio	(None, 1, 600)	1682400
bidirectional_80 (Bidirectio	(None, 200)	560800
dropout_40 (Dropout)	(None, 200)	0
dense_40 (Dense)	(None, 1)	201
=====		

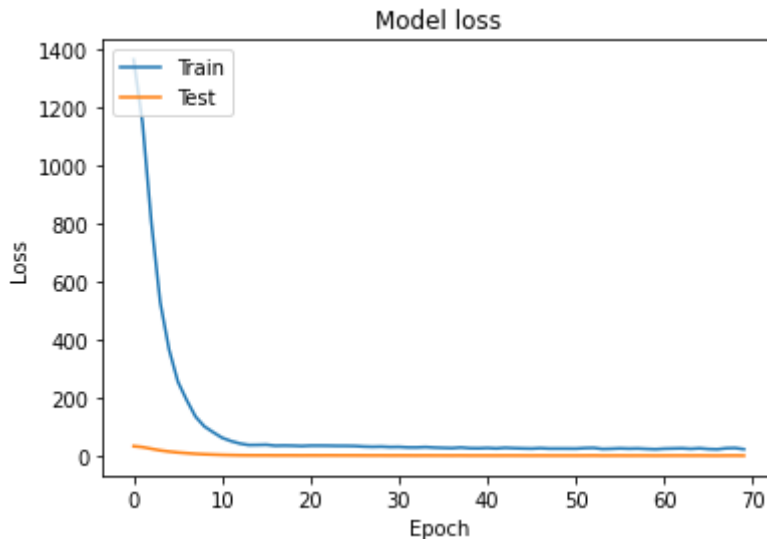
Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

Epoch 1/70  
579/579 [=====] - 2s 3ms/step - loss: 1367.0932 - mae: 3  
Epoch 2/70  
579/579 [=====] - 0s 411us/step - loss: 1149.1914 - mae:  
Epoch 3/70  
579/579 [=====] - 0s 406us/step - loss: 806.8347 - mae:  
Epoch 4/70  
579/579 [=====] - 0s 383us/step - loss: 531.8933 - mae:  
Epoch 5/70  
579/579 [=====] - 0s 358us/step - loss: 369.3567 - mae:  
Epoch 6/70  
579/579 [=====] - 0s 345us/step - loss: 28.7681 - mae: 4

```
579/579 [=====] - 0s 348us/step - loss: 258.2978 - mae:  
Epoch 7/70  
579/579 [=====] - 0s 337us/step - loss: 194.8028 - mae:  
Epoch 8/70  
579/579 [=====] - 0s 355us/step - loss: 137.9333 - mae:  
Epoch 9/70  
579/579 [=====] - 0s 402us/step - loss: 104.4018 - mae:  
Epoch 10/70  
579/579 [=====] - 0s 378us/step - loss: 84.2722 - mae: 7  
Epoch 11/70  
579/579 [=====] - 0s 362us/step - loss: 65.4083 - mae: 6  
Epoch 12/70  
579/579 [=====] - 0s 391us/step - loss: 54.1246 - mae: 5  
Epoch 13/70  
579/579 [=====] - 0s 356us/step - loss: 45.7258 - mae: 5  
Epoch 14/70  
579/579 [=====] - 0s 363us/step - loss: 40.5993 - mae: 5  
Epoch 15/70  
579/579 [=====] - 0s 345us/step - loss: 40.9015 - mae: 5  
Epoch 16/70  
579/579 [=====] - 0s 348us/step - loss: 41.6026 - mae: 5  
Epoch 17/70  
579/579 [=====] - 0s 341us/step - loss: 38.2035 - mae: 4  
Epoch 18/70  
579/579 [=====] - 0s 352us/step - loss: 38.8119 - mae: 4  
Epoch 19/70  
579/579 [=====] - 0s 398us/step - loss: 38.2561 - mae: 4  
Epoch 20/70  
579/579 [=====] - 0s 333us/step - loss: 37.1193 - mae: 4  
Epoch 21/70  
579/579 [=====] - 0s 385us/step - loss: 38.5035 - mae: 4  
Epoch 22/70  
579/579 [=====] - 0s 367us/step - loss: 38.5037 - mae: 4  
Epoch 23/70  
579/579 [=====] - 0s 341us/step - loss: 38.2842 - mae: 4  
Epoch 24/70  
579/579 [=====] - 0s 373us/step - loss: 37.6921 - mae: 4  
Epoch 25/70  
579/579 [=====] - 0s 354us/step - loss: 37.6265 - mae: 4  
Epoch 26/70  
579/579 [=====] - 0s 358us/step - loss: 37.1092 - mae: 4  
Epoch 27/70  
579/579 [=====] - 0s 392us/step - loss: 35.3318 - mae: 4  
Epoch 28/70  
579/579 [=====] - 0s 400us/step - loss: 34.4387 - mae: 4  
Epoch 29/70  
579/579 [=====] - 0s 371us/step - loss: 35.1282 - mae: 4  
Epoch 30/70  
579/579 [=====] - 0s 350us/step - loss: 33.6295 - mae: 4  
Epoch 31/70  
579/579 [=====] - 0s 342us/step - loss: 34.0398 - mae: 4  
Epoch 32/70  
579/579 [=====] - 0s 401us/step - loss: 32.3947 - mae: 4  
Epoch 33/70  
579/579 [=====] - 0s 399us/step - loss: 32.3347 - mae: 4  
Epoch 34/70  
579/579 [=====] - 0s 399us/step - loss: 33.5560 - mae: 4  
Epoch 35/70
```

```
579/579 [=====] - 0s 409us/step - loss: 31.7470 - mae: 4
Epoch 36/70
579/579 [=====] - 0s 382us/step - loss: 30.7365 - mae: 4
Epoch 37/70
579/579 [=====] - 0s 373us/step - loss: 29.9107 - mae: 4
Epoch 38/70
579/579 [=====] - 0s 374us/step - loss: 32.0782 - mae: 4
Epoch 39/70
579/579 [=====] - 0s 327us/step - loss: 29.6555 - mae: 4
Epoch 40/70
579/579 [=====] - 0s 347us/step - loss: 29.2675 - mae: 4
Epoch 41/70
579/579 [=====] - 0s 342us/step - loss: 30.4006 - mae: 4
Epoch 42/70
579/579 [=====] - 0s 374us/step - loss: 28.8916 - mae: 4
Epoch 43/70
579/579 [=====] - 0s 355us/step - loss: 31.0615 - mae: 4
Epoch 44/70
579/579 [=====] - 0s 367us/step - loss: 29.7793 - mae: 4
Epoch 45/70
579/579 [=====] - 0s 364us/step - loss: 28.9213 - mae: 4
Epoch 46/70
579/579 [=====] - 0s 379us/step - loss: 28.3035 - mae: 4
Epoch 47/70
579/579 [=====] - 0s 358us/step - loss: 29.9052 - mae: 4
Epoch 48/70
579/579 [=====] - 0s 337us/step - loss: 28.3375 - mae: 4
Epoch 49/70
579/579 [=====] - 0s 334us/step - loss: 28.4560 - mae: 4
Epoch 50/70
579/579 [=====] - 0s 329us/step - loss: 28.3621 - mae: 4
Epoch 51/70
579/579 [=====] - 0s 349us/step - loss: 28.2107 - mae: 4
Epoch 52/70
579/579 [=====] - 0s 396us/step - loss: 29.9744 - mae: 4
Epoch 53/70
579/579 [=====] - 0s 362us/step - loss: 30.7744 - mae: 4
Epoch 54/70
579/579 [=====] - 0s 365us/step - loss: 27.0405 - mae: 4
Epoch 55/70
579/579 [=====] - 0s 357us/step - loss: 27.7922 - mae: 4
Epoch 56/70
579/579 [=====] - 0s 343us/step - loss: 29.1754 - mae: 4
Epoch 57/70
579/579 [=====] - 0s 365us/step - loss: 28.1547 - mae: 4
Epoch 58/70
579/579 [=====] - 0s 340us/step - loss: 28.7658 - mae: 4
Epoch 59/70
579/579 [=====] - 0s 378us/step - loss: 27.2318 - mae: 4
Epoch 60/70
579/579 [=====] - 0s 402us/step - loss: 26.0876 - mae: 4
Epoch 61/70
579/579 [=====] - 0s 370us/step - loss: 28.0144 - mae: 4
Epoch 62/70
579/579 [=====] - 0s 344us/step - loss: 28.7165 - mae: 4
Epoch 63/70
579/579 [=====] - 0s 339us/step - loss: 29.3903 - mae: 4
Epoch 64/70
```

```
579/579 [=====] - 0s 326us/step - loss: 27.5665 - mae: 4  
Epoch 65/70  
579/579 [=====] - 0s 340us/step - loss: 29.4472 - mae: 4  
Epoch 66/70  
579/579 [=====] - 0s 387us/step - loss: 26.7616 - mae: 4  
Epoch 67/70  
579/579 [=====] - 0s 386us/step - loss: 25.8397 - mae: 3  
Epoch 68/70  
579/579 [=====] - 0s 399us/step - loss: 29.5245 - mae: 4  
Epoch 69/70  
579/579 [=====] - 0s 392us/step - loss: 30.3417 - mae: 4  
Epoch 70/70  
579/579 [=====] - 0s 387us/step - loss: 26.1344 - mae: 4
```



Kappa Score: 0.4067490531964879

Average kappa score value is : 0.41522571660067253





Below method is for running the model on whole dataset using the word2vec model.

Below method is for running the word2vec model.

```
# Whole Dataset Word2vec
```

```

X= data
y = data['domain1_score']
import time
import torch
import transformers as ppb
import warnings
warnings.filterwarnings('ignore')
set_count = 1
all_sets_score = []
# Hyperparameters for word2vec
num_features = 400
min_word_count = 40
num_workers = 4
context = 10
downsampling = 1e-3
epochs = 30

# Hyperparameters for LSTM
Hidden_dim1=300
Hidden_dim2=100
return_sequences = True
dropout=0.5
recurrent_dropout=0.4
input_size=400
activation='relu'
bidirectional = True
batch_size = 64
epoch = 70
#####
####
import tensorflow as tf
tf.keras.backend.clear_session()
cv = KFold(n_splits=5, shuffle=True)
#X, y = prepare_data(dataset_path=dataset_path)
cv_data = cv.split(X)
results = []
prediction_list = []
fold_count =1
# hyperparameters for word2vec
most_common_words= []
print(X.shape)
print(y.shape)
for traincv, testcv in cv_data:
    print("\n-----Fold {}-----\n".format(fold_count))
    # get the train and test from the dataset.
    X_train, X_test, y_train, y_test = X.iloc[traincv], X.iloc[testcv], y.iloc[traincv], y.iloc[testcv]
    train_essays = X_train['essay']
    #print("y_train",y_train)
    test_essays = X_test['essay']
    #y_train = torch.tensor(y_train, dtype=torch.long)
    train_sentences = []
    # print("train_essay ",train_essays.shape)

```

```

#print(X_train.shape,y_train.shape)
for essay in train_essays:
    # get all the sentences from the essay
    train_sentences.append(essay_to_wordlist(essay, remove_stopwords = True))

# word2vec embedding
print("Converting sentences to word2vec model")
model,_ = build_word2vec(train_sentences, num_workers, num_features, min_word_cc
                        downsampling)
top10 = collections.defaultdict(int)

# print("train_sentencesshap",len(train_sentences))
trainDataVecs = np.array(getAvgFeatureVecs(train_sentences, model, num_features))
test_sentences = []
for essay_v in test_essays:
    test_sentences.append(essay_to_wordlist(essay_v, remove_stopwords=True))
testDataVecs = np.array(getAvgFeatureVecs(test_sentences, model, num_features))
trainDataVectors = np.reshape(trainDataVecs, (trainDataVecs.shape[0], 1, trainDataVecs.shape[1]))
testDataVectors = np.reshape(testDataVecs, (testDataVecs.shape[0], 1, testDataVecs.shape[1]))
lstm_model = get_model_lstm(Hidden_dim1=Hidden_dim1, Hidden_dim2=Hidden_dim2, recurrent_dropout=recurrent_dropout, ir
                             dropout=dropout, recurrent_dropout=recurrent_dropout, ir
                             activation=activation, bidirectional=bidirectional)
# print(trainDataVectors.shape)
# print(y_train.shape)
history = lstm_model.fit(trainDataVectors, y_train, batch_size=batch_size, epoch
plot_accuracy_curve(history)
y_pred = lstm_model.predict(testDataVectors)
y_pred = np.around(y_pred)
np.nan_to_num(y_pred)
result = cohen_kappa_score(y_test.values, y_pred, weights='quadratic')
print("Kappa Score: {}".format(result))
results.append(result)
fold_count += 1

print("Average kappa score value is : {}".format(np.mean(np.asarray(results))))

```





```
(12976, 4)
(12976,)
```

```
-----Fold 1-----
```

```
Converting sentences to word2vec model
```

```
4 cores using
Time to build vocab using word2vec: 0.8619236946105957 sec
Time to train the word2vec model: 48.41549491882324 mins
Model: "sequential_1"
```

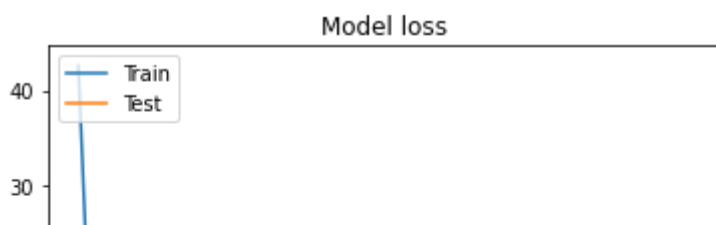
Layer (type)	Output Shape	Param #
=====		
bidirectional_1 (Bidirection (None, 1, 600))		1682400
=====		
bidirectional_2 (Bidirection (None, 200))		560800
=====		
dropout_1 (Dropout)	(None, 200)	0
=====		
dense_1 (Dense)	(None, 1)	201
=====		

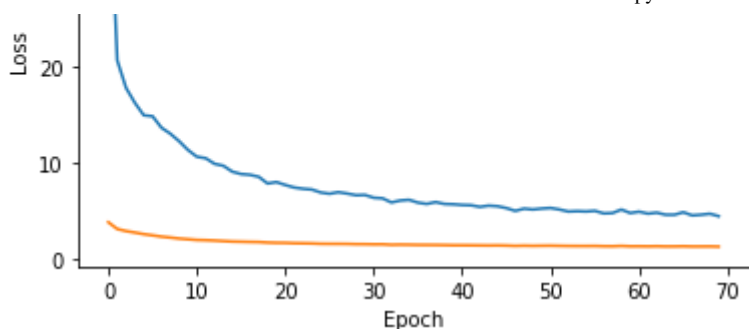
```
Total params: 2,243,401
Trainable params: 2,243,401
Non-trainable params: 0
```

```
Epoch 1/70
10380/10380 [=====] - 5s 508us/step - loss: 42.5984 - ma
Epoch 2/70
10380/10380 [=====] - 4s 345us/step - loss: 20.6864 - ma
Epoch 3/70
10380/10380 [=====] - 3s 328us/step - loss: 17.7978 - ma
Epoch 4/70
10380/10380 [=====] - 3s 333us/step - loss: 16.2342 - ma
Epoch 5/70
10380/10380 [=====] - 4s 340us/step - loss: 14.9415 - ma
Epoch 6/70
10380/10380 [=====] - 4s 346us/step - loss: 14.8358 - ma
Epoch 7/70
10380/10380 [=====] - 4s 338us/step - loss: 13.6413 - ma
Epoch 8/70
10380/10380 [=====] - 4s 343us/step - loss: 13.0183 - ma
Epoch 9/70
10380/10380 [=====] - 3s 332us/step - loss: 12.2311 - ma
Epoch 10/70
10380/10380 [=====] - 3s 331us/step - loss: 11.3129 - ma
Epoch 11/70
10380/10380 [=====] - 4s 351us/step - loss: 10.6119 - ma
Epoch 12/70
10380/10380 [=====] - 4s 346us/step - loss: 10.4534 - ma
Epoch 13/70
10380/10380 [=====] - 3s 336us/step - loss: 9.8684 - mae
Epoch 14/70
10380/10380 [=====] - 4s 343us/step - loss: 9.6651 - mae
Epoch 15/70
10380/10380 [=====] - 3s 326us/step - loss: 9.0525 - mae
Epoch 16/70
10380/10380 [=====] - 3s 326us/step - loss: 9.0525 - mae
```

```
10380/10380 [=====] - 3s 335us/step - loss: 8.8000 - mae
Epoch 17/70
10380/10380 [=====] - 4s 355us/step - loss: 8.7223 - mae
Epoch 18/70
10380/10380 [=====] - 4s 350us/step - loss: 8.5112 - mae
Epoch 19/70
10380/10380 [=====] - 3s 335us/step - loss: 7.8131 - mae
Epoch 20/70
10380/10380 [=====] - 4s 347us/step - loss: 7.9599 - mae
Epoch 21/70
10380/10380 [=====] - 4s 341us/step - loss: 7.6557 - mae
Epoch 22/70
10380/10380 [=====] - 4s 348us/step - loss: 7.3927 - mae
Epoch 23/70
10380/10380 [=====] - 4s 346us/step - loss: 7.2613 - mae
Epoch 24/70
10380/10380 [=====] - 4s 338us/step - loss: 7.1852 - mae
Epoch 25/70
10380/10380 [=====] - 4s 347us/step - loss: 6.8729 - mae
Epoch 26/70
10380/10380 [=====] - 3s 337us/step - loss: 6.7421 - mae
Epoch 27/70
10380/10380 [=====] - 4s 338us/step - loss: 6.9047 - mae
Epoch 28/70
10380/10380 [=====] - 4s 351us/step - loss: 6.7621 - mae
Epoch 29/70
10380/10380 [=====] - 4s 344us/step - loss: 6.5870 - mae
Epoch 30/70
10380/10380 [=====] - 4s 340us/step - loss: 6.6151 - mae
Epoch 31/70
10380/10380 [=====] - 4s 345us/step - loss: 6.3212 - mae
Epoch 32/70
10380/10380 [=====] - 4s 347us/step - loss: 6.2627 - mae
Epoch 33/70
10380/10380 [=====] - 3s 335us/step - loss: 5.8308 - mae
Epoch 34/70
10380/10380 [=====] - 3s 330us/step - loss: 6.0347 - mae
Epoch 35/70
10380/10380 [=====] - 3s 334us/step - loss: 6.1036 - mae
Epoch 36/70
10380/10380 [=====] - 3s 335us/step - loss: 5.8121 - mae
Epoch 37/70
10380/10380 [=====] - 3s 333us/step - loss: 5.6787 - mae
Epoch 38/70
10380/10380 [=====] - 3s 334us/step - loss: 5.8696 - mae
Epoch 39/70
10380/10380 [=====] - 4s 342us/step - loss: 5.6723 - mae
Epoch 40/70
10380/10380 [=====] - 4s 345us/step - loss: 5.6398 - mae
Epoch 41/70
10380/10380 [=====] - 3s 317us/step - loss: 5.5684 - mae
Epoch 42/70
10380/10380 [=====] - 3s 330us/step - loss: 5.5403 - mae
Epoch 43/70
10380/10380 [=====] - 3s 327us/step - loss: 5.3688 - mae
Epoch 44/70
10380/10380 [=====] - 4s 347us/step - loss: 5.4982 - mae
Epoch 45/70
```

```
10380/10380 [=====] - 3s 323us/step - loss: 5.4346 - mae
Epoch 46/70
10380/10380 [=====] - 3s 327us/step - loss: 5.2410 - mae
Epoch 47/70
10380/10380 [=====] - 3s 315us/step - loss: 4.9489 - mae
Epoch 48/70
10380/10380 [=====] - 4s 339us/step - loss: 5.1836 - mae
Epoch 49/70
10380/10380 [=====] - 4s 339us/step - loss: 5.0971 - mae
Epoch 50/70
10380/10380 [=====] - 3s 326us/step - loss: 5.1918 - mae
Epoch 51/70
10380/10380 [=====] - 3s 319us/step - loss: 5.2526 - mae
Epoch 52/70
10380/10380 [=====] - 3s 327us/step - loss: 5.0945 - mae
Epoch 53/70
10380/10380 [=====] - 4s 344us/step - loss: 4.8846 - mae
Epoch 54/70
10380/10380 [=====] - 4s 354us/step - loss: 4.9218 - mae
Epoch 55/70
10380/10380 [=====] - 4s 357us/step - loss: 4.8894 - mae
Epoch 56/70
10380/10380 [=====] - 4s 352us/step - loss: 4.9530 - mae
Epoch 57/70
10380/10380 [=====] - 4s 345us/step - loss: 4.6893 - mae
Epoch 58/70
10380/10380 [=====] - 4s 350us/step - loss: 4.7236 - mae
Epoch 59/70
10380/10380 [=====] - 4s 338us/step - loss: 5.0860 - mae
Epoch 60/70
10380/10380 [=====] - 4s 344us/step - loss: 4.7250 - mae
Epoch 61/70
10380/10380 [=====] - 4s 353us/step - loss: 4.8666 - mae
Epoch 62/70
10380/10380 [=====] - 4s 342us/step - loss: 4.6634 - mae
Epoch 63/70
10380/10380 [=====] - 4s 352us/step - loss: 4.7624 - mae
Epoch 64/70
10380/10380 [=====] - 4s 350us/step - loss: 4.5464 - mae
Epoch 65/70
10380/10380 [=====] - 4s 344us/step - loss: 4.5434 - mae
Epoch 66/70
10380/10380 [=====] - 4s 342us/step - loss: 4.8074 - mae
Epoch 67/70
10380/10380 [=====] - 3s 336us/step - loss: 4.4799 - mae
Epoch 68/70
10380/10380 [=====] - 4s 349us/step - loss: 4.5443 - mae
Epoch 69/70
10380/10380 [=====] - 4s 348us/step - loss: 4.6507 - mae
Epoch 70/70
10380/10380 [=====] - 3s 335us/step - loss: 4.3954 - mae
```





Kappa Score: 0.9690772488848252

-----Fold 2-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.8998920917510986 sec

Time to train the word2vec model: 48.410395860672 mins

Model: "sequential\_2"

Layer (type)	Output Shape	Param #
bidirectional_3 (Bidirection (None, 1, 600))		1682400
bidirectional_4 (Bidirection (None, 200))		560800
dropout_2 (Dropout)	(None, 200)	0
dense_2 (Dense)	(None, 1)	201
Total params: 2,243,401		
Trainable params: 2,243,401		
Non-trainable params: 0		

Epoch 1/70

10381/10381 [=====] - 5s 490us/step - loss: 43.2905 - ma

Epoch 2/70

10381/10381 [=====] - 4s 341us/step - loss: 21.9078 - ma

Epoch 3/70

10381/10381 [=====] - 3s 323us/step - loss: 17.8983 - ma

Epoch 4/70

10381/10381 [=====] - 3s 330us/step - loss: 16.5500 - ma

Epoch 5/70

10381/10381 [=====] - 4s 351us/step - loss: 15.7590 - ma

Epoch 6/70

10381/10381 [=====] - 4s 359us/step - loss: 14.7772 - ma

Epoch 7/70

10381/10381 [=====] - 4s 338us/step - loss: 13.7820 - ma

Epoch 8/70

10381/10381 [=====] - 4s 346us/step - loss: 13.3439 - ma

Epoch 9/70

10381/10381 [=====] - 4s 341us/step - loss: 12.0360 - ma

Epoch 10/70

10381/10381 [=====] - 3s 336us/step - loss: 11.2675 - ma

Epoch 11/70

10381/10381 [=====] - 3s 331us/step - loss: 10.3026 - ma

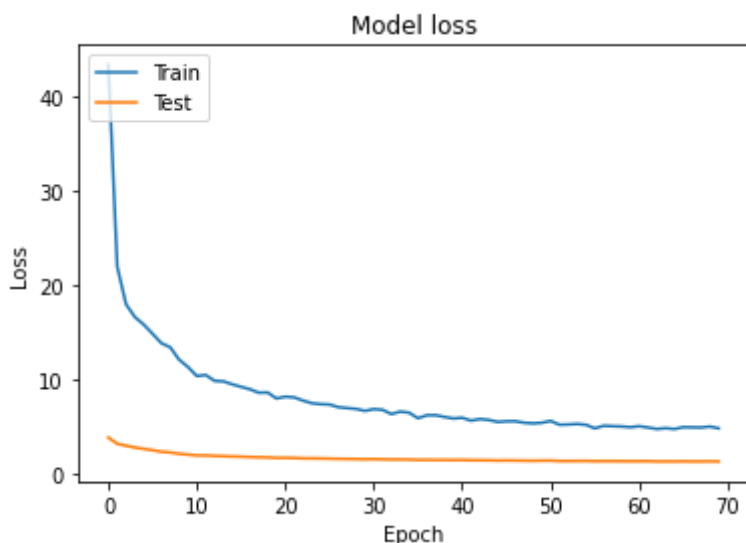
Epoch 12/70

```
10381/10381 [=====] - 3s 332us/step - loss: 10.4144 - ma
Epoch 13/70
10381/10381 [=====] - 4s 340us/step - loss: 9.7947 - mae
Epoch 14/70
10381/10381 [=====] - 3s 326us/step - loss: 9.7373 - mae
Epoch 15/70
10381/10381 [=====] - 4s 348us/step - loss: 9.4296 - mae
Epoch 16/70
10381/10381 [=====] - 3s 328us/step - loss: 9.1572 - mae
Epoch 17/70
10381/10381 [=====] - 3s 337us/step - loss: 8.9045 - mae
Epoch 18/70
10381/10381 [=====] - 4s 344us/step - loss: 8.5354 - mae
Epoch 19/70
10381/10381 [=====] - 3s 333us/step - loss: 8.5645 - mae
Epoch 20/70
10381/10381 [=====] - 3s 329us/step - loss: 7.9230 - mae
Epoch 21/70
10381/10381 [=====] - 4s 338us/step - loss: 8.1125 - mae
Epoch 22/70
10381/10381 [=====] - 3s 324us/step - loss: 8.0425 - mae
Epoch 23/70
10381/10381 [=====] - 3s 325us/step - loss: 7.7020 - mae
Epoch 24/70
10381/10381 [=====] - 3s 334us/step - loss: 7.4197 - mae
Epoch 25/70
10381/10381 [=====] - 4s 340us/step - loss: 7.3224 - mae
Epoch 26/70
10381/10381 [=====] - 4s 339us/step - loss: 7.2843 - mae
Epoch 27/70
10381/10381 [=====] - 4s 338us/step - loss: 7.0019 - mae
Epoch 28/70
10381/10381 [=====] - 3s 336us/step - loss: 6.9048 - mae
Epoch 29/70
10381/10381 [=====] - 3s 326us/step - loss: 6.8243 - mae
Epoch 30/70
10381/10381 [=====] - 4s 346us/step - loss: 6.6108 - mae
Epoch 31/70
10381/10381 [=====] - 3s 336us/step - loss: 6.7962 - mae
Epoch 32/70
10381/10381 [=====] - 4s 344us/step - loss: 6.7250 - mae
Epoch 33/70
10381/10381 [=====] - 4s 345us/step - loss: 6.2699 - mae
Epoch 34/70
10381/10381 [=====] - 4s 350us/step - loss: 6.5363 - mae
Epoch 35/70
10381/10381 [=====] - 4s 343us/step - loss: 6.4184 - mae
Epoch 36/70
10381/10381 [=====] - 4s 340us/step - loss: 5.8300 - mae
Epoch 37/70
10381/10381 [=====] - 3s 337us/step - loss: 6.1443 - mae
Epoch 38/70
10381/10381 [=====] - 4s 337us/step - loss: 6.1535 - mae
Epoch 39/70
10381/10381 [=====] - 3s 328us/step - loss: 5.9672 - mae
Epoch 40/70
10381/10381 [=====] - 4s 342us/step - loss: 5.8053 - mae
Epoch 41/70
```

```
10381/10381 [=====] - 4s 342us/step - loss: 5.8802 - mae
Epoch 42/70
10381/10381 [=====] - 3s 331us/step - loss: 5.5789 - mae
Epoch 43/70
10381/10381 [=====] - 3s 329us/step - loss: 5.7434 - mae
Epoch 44/70
10381/10381 [=====] - 4s 358us/step - loss: 5.6511 - mae
Epoch 45/70
10381/10381 [=====] - 4s 357us/step - loss: 5.4436 - mae
Epoch 46/70
10381/10381 [=====] - 4s 344us/step - loss: 5.5019 - mae
Epoch 47/70
10381/10381 [=====] - 4s 338us/step - loss: 5.5137 - mae
Epoch 48/70
10381/10381 [=====] - 4s 338us/step - loss: 5.3535 - mae
Epoch 49/70
10381/10381 [=====] - 4s 342us/step - loss: 5.2865 - mae
Epoch 50/70
10381/10381 [=====] - 3s 333us/step - loss: 5.3482 - mae
Epoch 51/70
10381/10381 [=====] - 3s 328us/step - loss: 5.5422 - mae
Epoch 52/70
10381/10381 [=====] - 4s 338us/step - loss: 5.1430 - mae
Epoch 53/70
10381/10381 [=====] - 3s 326us/step - loss: 5.1681 - mae
Epoch 54/70
10381/10381 [=====] - 3s 336us/step - loss: 5.2209 - mae
Epoch 55/70
10381/10381 [=====] - 4s 346us/step - loss: 5.1320 - mae
Epoch 56/70
10381/10381 [=====] - 4s 345us/step - loss: 4.7618 - mae
Epoch 57/70
10381/10381 [=====] - 4s 341us/step - loss: 5.0292 - mae
Epoch 58/70
10381/10381 [=====] - 4s 342us/step - loss: 4.9885 - mae
Epoch 59/70
10381/10381 [=====] - 3s 333us/step - loss: 4.9560 - mae
Epoch 60/70
10381/10381 [=====] - 3s 336us/step - loss: 4.8809 - mae
Epoch 61/70
10381/10381 [=====] - 4s 341us/step - loss: 4.9874 - mae
Epoch 62/70
10381/10381 [=====] - 4s 338us/step - loss: 4.8492 - mae
Epoch 63/70
10381/10381 [=====] - 4s 338us/step - loss: 4.6929 - mae
Epoch 64/70
10381/10381 [=====] - 4s 341us/step - loss: 4.7757 - mae
Epoch 65/70
10381/10381 [=====] - 3s 330us/step - loss: 4.6890 - mae
Epoch 66/70
10381/10381 [=====] - 4s 338us/step - loss: 4.8815 - mae
Epoch 67/70
10381/10381 [=====] - 4s 350us/step - loss: 4.8626 - mae
Epoch 68/70
10381/10381 [=====] - 3s 334us/step - loss: 4.8457 - mae
Epoch 69/70
10381/10381 [=====] - 4s 342us/step - loss: 4.9480 - mae
Epoch 70/70
```

Epoch 10/70

10381/10381 [=====] - 4s 341us/step - loss: 4.7586 - mae



Kappa Score: 0.9723570173189542

-----Fold 3-----

Converting sentences to word2vec model

4 cores using

Time to build vocab using word2vec: 0.8663942813873291 sec

Time to train the word2vec model: 47.800869941711426 mins

Model: "sequential\_3"

Layer (type)	Output Shape	Param #
=====		
bidirectional_5 (Bidirection (None, 1, 600))		1682400
bidirectional_6 (Bidirection (None, 200))		560800
dropout_3 (Dropout)	(None, 200)	0
dense_3 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401

Trainable params: 2,243,401

Non-trainable params: 0

Epoch 1/70

10381/10381 [=====] - 5s 448us/step - loss: 42.3202 - ma

Epoch 2/70

10381/10381 [=====] - 3s 329us/step - loss: 21.1263 - ma

Epoch 3/70

10381/10381 [=====] - 3s 337us/step - loss: 17.7268 - ma

Epoch 4/70

10381/10381 [=====] - 3s 331us/step - loss: 16.4625 - ma

Epoch 5/70

10381/10381 [=====] - 3s 335us/step - loss: 15.8672 - ma

Epoch 6/70

10381/10381 [=====] - 4s 340us/step - loss: 15.3171 - ma

Epoch 7/70

10381/10381 [=====] - 4s 338us/step - loss: 13.9266 - ma

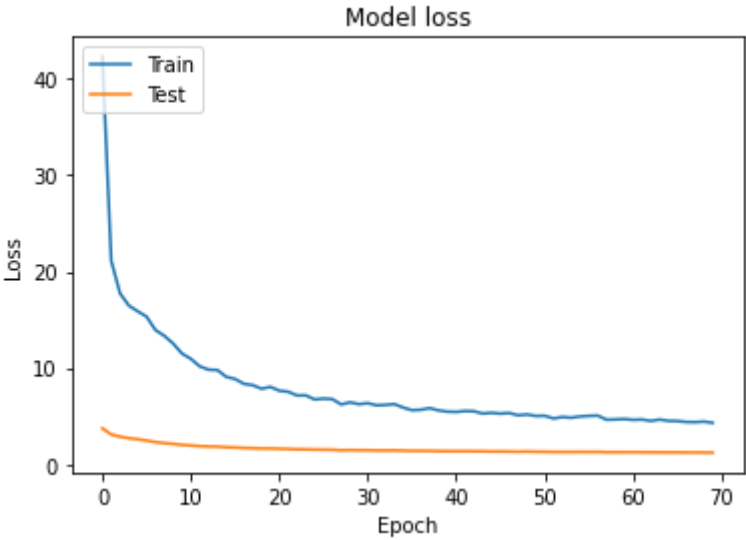
Epoch 8/70

```
10381/10381 [=====] - 3s 336us/step - loss: 13.3262 - ma
Epoch 9/70
10381/10381 [=====] - 3s 328us/step - loss: 12.5304 - ma
Epoch 10/70
10381/10381 [=====] - 3s 334us/step - loss: 11.4871 - ma
Epoch 11/70
10381/10381 [=====] - 3s 324us/step - loss: 10.9372 - ma
Epoch 12/70
10381/10381 [=====] - 3s 319us/step - loss: 10.1587 - ma
Epoch 13/70
10381/10381 [=====] - 3s 322us/step - loss: 9.8108 - mae
Epoch 14/70
10381/10381 [=====] - 3s 326us/step - loss: 9.7741 - mae
Epoch 15/70
10381/10381 [=====] - 3s 332us/step - loss: 9.0683 - mae
Epoch 16/70
10381/10381 [=====] - 3s 316us/step - loss: 8.8437 - mae
Epoch 17/70
10381/10381 [=====] - 3s 319us/step - loss: 8.3409 - mae
Epoch 18/70
10381/10381 [=====] - 3s 323us/step - loss: 8.2042 - mae
Epoch 19/70
10381/10381 [=====] - 3s 326us/step - loss: 7.8291 - mae
Epoch 20/70
10381/10381 [=====] - 3s 320us/step - loss: 8.0229 - mae
Epoch 21/70
10381/10381 [=====] - 3s 334us/step - loss: 7.6254 - mae
Epoch 22/70
10381/10381 [=====] - 4s 338us/step - loss: 7.5214 - mae
Epoch 23/70
10381/10381 [=====] - 3s 321us/step - loss: 7.1346 - mae
Epoch 24/70
10381/10381 [=====] - 4s 338us/step - loss: 7.1461 - mae
Epoch 25/70
10381/10381 [=====] - 3s 324us/step - loss: 6.7167 - mae
Epoch 26/70
10381/10381 [=====] - 3s 308us/step - loss: 6.8070 - mae
Epoch 27/70
10381/10381 [=====] - 3s 327us/step - loss: 6.7530 - mae
Epoch 28/70
10381/10381 [=====] - 3s 334us/step - loss: 6.1973 - mae
Epoch 29/70
10381/10381 [=====] - 4s 339us/step - loss: 6.4204 - mae
Epoch 30/70
10381/10381 [=====] - 3s 319us/step - loss: 6.2272 - mae
Epoch 31/70
10381/10381 [=====] - 3s 326us/step - loss: 6.3297 - mae
Epoch 32/70
10381/10381 [=====] - 3s 333us/step - loss: 6.1112 - mae
Epoch 33/70
10381/10381 [=====] - 3s 335us/step - loss: 6.1525 - mae
Epoch 34/70
10381/10381 [=====] - 3s 313us/step - loss: 6.2360 - mae
Epoch 35/70
10381/10381 [=====] - 3s 334us/step - loss: 5.8809 - mae
Epoch 36/70
10381/10381 [=====] - 4s 338us/step - loss: 5.6028 - mae
Epoch 37/70
```



```
Epoch 37/70
10381/10381 [=====] - 4s 349us/step - loss: 5.6506 - mae
Epoch 38/70
10381/10381 [=====] - 4s 351us/step - loss: 5.8145 - mae
Epoch 39/70
10381/10381 [=====] - 3s 334us/step - loss: 5.5821 - mae
Epoch 40/70
10381/10381 [=====] - 4s 337us/step - loss: 5.4546 - mae
Epoch 41/70
10381/10381 [=====] - 3s 323us/step - loss: 5.4281 - mae
Epoch 42/70
10381/10381 [=====] - 3s 321us/step - loss: 5.5168 - mae
Epoch 43/70
10381/10381 [=====] - 3s 313us/step - loss: 5.4924 - mae
Epoch 44/70
10381/10381 [=====] - 3s 333us/step - loss: 5.2565 - mae
Epoch 45/70
10381/10381 [=====] - 3s 321us/step - loss: 5.3288 - mae
Epoch 46/70
10381/10381 [=====] - 3s 308us/step - loss: 5.2490 - mae
Epoch 47/70
10381/10381 [=====] - 3s 333us/step - loss: 5.3093 - mae
Epoch 48/70
10381/10381 [=====] - 3s 327us/step - loss: 5.0741 - mae
Epoch 49/70
10381/10381 [=====] - 3s 324us/step - loss: 5.1615 - mae
Epoch 50/70
10381/10381 [=====] - 3s 325us/step - loss: 5.0053 - mae
Epoch 51/70
10381/10381 [=====] - 3s 322us/step - loss: 5.0270 - mae
Epoch 52/70
10381/10381 [=====] - 3s 318us/step - loss: 4.7479 - mae
Epoch 53/70
10381/10381 [=====] - 3s 315us/step - loss: 4.8944 - mae
Epoch 54/70
10381/10381 [=====] - 4s 347us/step - loss: 4.8200 - mae
Epoch 55/70
10381/10381 [=====] - 3s 335us/step - loss: 4.9526 - mae
Epoch 56/70
10381/10381 [=====] - 3s 329us/step - loss: 5.0132 - mae
Epoch 57/70
10381/10381 [=====] - 4s 338us/step - loss: 5.0429 - mae
Epoch 58/70
10381/10381 [=====] - 3s 320us/step - loss: 4.6175 - mae
Epoch 59/70
10381/10381 [=====] - 3s 322us/step - loss: 4.6448 - mae
Epoch 60/70
10381/10381 [=====] - 3s 323us/step - loss: 4.6862 - mae
Epoch 61/70
10381/10381 [=====] - 3s 316us/step - loss: 4.6020 - mae
Epoch 62/70
10381/10381 [=====] - 3s 308us/step - loss: 4.6351 - mae
Epoch 63/70
10381/10381 [=====] - 3s 328us/step - loss: 4.4914 - mae
Epoch 64/70
10381/10381 [=====] - 3s 332us/step - loss: 4.6326 - mae
Epoch 65/70
10381/10381 [=====] - 3s 310us/step - loss: 4.4946 - mae
```

```
4/22/2020 AES.ipynb - Colaboratory
Epoch 66/70
10381/10381 [=====] - 3s 328us/step - loss: 4.4782 - mae
Epoch 67/70
10381/10381 [=====] - 4s 338us/step - loss: 4.3806 - mae
Epoch 68/70
10381/10381 [=====] - 3s 322us/step - loss: 4.3630 - mae
Epoch 69/70
10381/10381 [=====] - 3s 324us/step - loss: 4.4186 - mae
Epoch 70/70
10381/10381 [=====] - 3s 330us/step - loss: 4.2912 - mae
```



Kappa Score: 0.9681606637795384

-----Fold 4-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.8679554462432861 sec  
Time to train the word2vec model: 47.314122915267944 mins  
Model: "sequential\_4"

Layer (type)	Output Shape	Param #
=====		
bidirectional_7 (Bidirection	(None, 1, 600)	1682400
bidirectional_8 (Bidirection	(None, 200)	560800
dropout_4 (Dropout)	(None, 200)	0
dense_4 (Dense)	(None, 1)	201
=====		

Total params: 2,243,401  
Trainable params: 2,243,401  
Non-trainable params: 0

```
Epoch 1/70
10381/10381 [=====] - 5s 443us/step - loss: 44.4655 - ma
Epoch 2/70
10381/10381 [=====] - 3s 329us/step - loss: 21.6786 - ma
Epoch 3/70
10381/10381 [=====] - 3s 314us/step - loss: 18.2136 - ma
Epoch 4/70
```

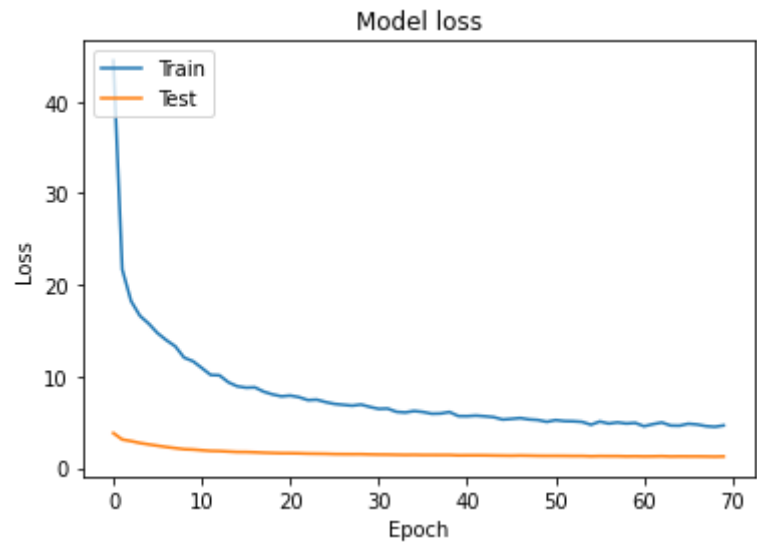
```
Epoch 4/70
10381/10381 [=====] - 3s 320us/step - loss: 16.6122 - ma
Epoch 5/70
10381/10381 [=====] - 3s 333us/step - loss: 15.7487 - ma
Epoch 6/70
10381/10381 [=====] - 3s 329us/step - loss: 14.7132 - ma
Epoch 7/70
10381/10381 [=====] - 3s 321us/step - loss: 13.9426 - ma
Epoch 8/70
10381/10381 [=====] - 3s 336us/step - loss: 13.2778 - ma
Epoch 9/70
10381/10381 [=====] - 3s 308us/step - loss: 12.0411 - ma
Epoch 10/70
10381/10381 [=====] - 3s 335us/step - loss: 11.6503 - ma
Epoch 11/70
10381/10381 [=====] - 3s 327us/step - loss: 10.9120 - ma
Epoch 12/70
10381/10381 [=====] - 3s 331us/step - loss: 10.1524 - ma
Epoch 13/70
10381/10381 [=====] - 4s 341us/step - loss: 10.1091 - ma
Epoch 14/70
10381/10381 [=====] - 3s 329us/step - loss: 9.3538 - mae
Epoch 15/70
10381/10381 [=====] - 3s 335us/step - loss: 8.9124 - mae
Epoch 16/70
10381/10381 [=====] - 3s 315us/step - loss: 8.7638 - mae
Epoch 17/70
10381/10381 [=====] - 3s 328us/step - loss: 8.7962 - mae
Epoch 18/70
10381/10381 [=====] - 3s 305us/step - loss: 8.3256 - mae
Epoch 19/70
10381/10381 [=====] - 3s 334us/step - loss: 8.0258 - mae
Epoch 20/70
10381/10381 [=====] - 3s 326us/step - loss: 7.8178 - mae
Epoch 21/70
10381/10381 [=====] - 3s 318us/step - loss: 7.9001 - mae
Epoch 22/70
10381/10381 [=====] - 3s 315us/step - loss: 7.7244 - mae
Epoch 23/70
10381/10381 [=====] - 3s 326us/step - loss: 7.4033 - mae
Epoch 24/70
10381/10381 [=====] - 3s 321us/step - loss: 7.4531 - mae
Epoch 25/70
10381/10381 [=====] - 3s 333us/step - loss: 7.1874 - mae
Epoch 26/70
10381/10381 [=====] - 3s 331us/step - loss: 6.9866 - mae
Epoch 27/70
10381/10381 [=====] - 3s 326us/step - loss: 6.8912 - mae
Epoch 28/70
10381/10381 [=====] - 3s 320us/step - loss: 6.7994 - mae
Epoch 29/70
10381/10381 [=====] - 3s 327us/step - loss: 6.9200 - mae
Epoch 30/70
10381/10381 [=====] - 3s 320us/step - loss: 6.6621 - mae
Epoch 31/70
10381/10381 [=====] - 4s 351us/step - loss: 6.4472 - mae
Epoch 32/70
10381/10381 [=====] - 4s 339us/step - loss: 6.4824 - mae
```

```
Epoch 33/70
10381/10381 [=====] - 3s 336us/step - loss: 6.1269 - mae
Epoch 34/70
10381/10381 [=====] - 3s 320us/step - loss: 6.0555 - mae
Epoch 35/70
10381/10381 [=====] - 3s 321us/step - loss: 6.2176 - mae
Epoch 36/70
10381/10381 [=====] - 3s 321us/step - loss: 6.1100 - mae
Epoch 37/70
10381/10381 [=====] - 3s 328us/step - loss: 5.9201 - mae
Epoch 38/70
10381/10381 [=====] - 3s 328us/step - loss: 5.9437 - mae
Epoch 39/70
10381/10381 [=====] - 3s 330us/step - loss: 6.1070 - mae
Epoch 40/70
10381/10381 [=====] - 3s 333us/step - loss: 5.6618 - mae
Epoch 41/70
10381/10381 [=====] - 3s 320us/step - loss: 5.6533 - mae
Epoch 42/70
10381/10381 [=====] - 3s 331us/step - loss: 5.7127 - mae
Epoch 43/70
10381/10381 [=====] - 3s 332us/step - loss: 5.6391 - mae
Epoch 44/70
10381/10381 [=====] - 4s 345us/step - loss: 5.5461 - mae
Epoch 45/70
10381/10381 [=====] - 3s 314us/step - loss: 5.2836 - mae
Epoch 46/70
10381/10381 [=====] - 3s 321us/step - loss: 5.3555 - mae
Epoch 47/70
10381/10381 [=====] - 3s 328us/step - loss: 5.4449 - mae
Epoch 48/70
10381/10381 [=====] - 3s 336us/step - loss: 5.2980 - mae
Epoch 49/70
10381/10381 [=====] - 3s 329us/step - loss: 5.2337 - mae
Epoch 50/70
10381/10381 [=====] - 3s 329us/step - loss: 5.0360 - mae
Epoch 51/70
10381/10381 [=====] - 3s 330us/step - loss: 5.2224 - mae
Epoch 52/70
10381/10381 [=====] - 3s 324us/step - loss: 5.1176 - mae
Epoch 53/70
10381/10381 [=====] - 4s 338us/step - loss: 5.0958 - mae
Epoch 54/70
10381/10381 [=====] - 3s 325us/step - loss: 5.0259 - mae
Epoch 55/70
10381/10381 [=====] - 4s 339us/step - loss: 4.7155 - mae
Epoch 56/70
10381/10381 [=====] - 3s 327us/step - loss: 5.0677 - mae
Epoch 57/70
10381/10381 [=====] - 3s 328us/step - loss: 4.8429 - mae
Epoch 58/70
10381/10381 [=====] - 3s 336us/step - loss: 4.9705 - mae
Epoch 59/70
10381/10381 [=====] - 3s 324us/step - loss: 4.8503 - mae
Epoch 60/70
10381/10381 [=====] - 3s 319us/step - loss: 4.9158 - mae
Epoch 61/70
10381/10381 [=====] - 4s 337us/step - loss: 4.5521 - mae
```

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Epoch 62/70  
10381/10381 [=====] - 3s 315us/step - loss: 4.7787 - mae  
Epoch 63/70  
10381/10381 [=====] - 4s 341us/step - loss: 4.9610 - mae  
Epoch 64/70  
10381/10381 [=====] - 4s 338us/step - loss: 4.6316 - mae  
Epoch 65/70  
10381/10381 [=====] - 3s 324us/step - loss: 4.6116 - mae  
Epoch 66/70  
10381/10381 [=====] - 3s 321us/step - loss: 4.8258 - mae  
Epoch 67/70  
10381/10381 [=====] - 3s 322us/step - loss: 4.7419 - mae  
Epoch 68/70  
10381/10381 [=====] - 3s 316us/step - loss: 4.5649 - mae  
Epoch 69/70  
10381/10381 [=====] - 3s 324us/step - loss: 4.4909 - mae  
Epoch 70/70  
10381/10381 [=====] - 3s 335us/step - loss: 4.6396 - mae



Kappa Score: 0.9725130742146156

-----Fold 5-----

Converting sentences to word2vec model

4 cores using  
Time to build vocab using word2vec: 0.8937320709228516 sec  
Time to train the word2vec model: 48.75269365310669 mins  
Model: "sequential\_5"

Layer (type)	Output Shape	Param #
=====		
bidirectional_9 (Bidirection (None, 1, 600)		1682400
=====		
bidirectional_10 (Bidirectio (None, 200)		560800
=====		
dropout_5 (Dropout)	(None, 200)	0
=====		
dense_5 (Dense)	(None, 1)	201
=====		
Total params: 2,243,401		
Trainable params: 2,243,401		

Non-trainable params: 0

---

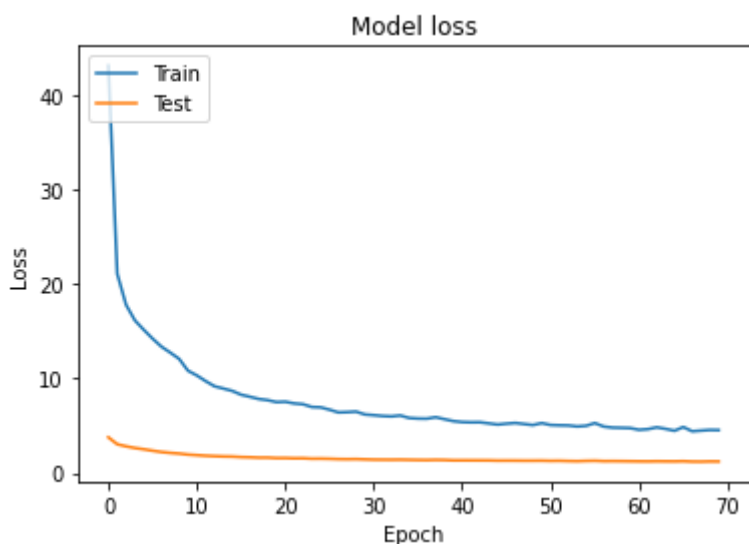
Epoch 1/70	
10381/10381	[=====] - 5s 476us/step - loss: 43.1914 - ma
Epoch 2/70	
10381/10381	[=====] - 4s 341us/step - loss: 21.1221 - ma
Epoch 3/70	
10381/10381	[=====] - 3s 335us/step - loss: 17.8238 - ma
Epoch 4/70	
10381/10381	[=====] - 4s 340us/step - loss: 16.1713 - ma
Epoch 5/70	
10381/10381	[=====] - 3s 329us/step - loss: 15.1795 - ma
Epoch 6/70	
10381/10381	[=====] - 4s 340us/step - loss: 14.2413 - ma
Epoch 7/70	
10381/10381	[=====] - 3s 337us/step - loss: 13.3878 - ma
Epoch 8/70	
10381/10381	[=====] - 3s 332us/step - loss: 12.7572 - ma
Epoch 9/70	
10381/10381	[=====] - 4s 346us/step - loss: 12.0949 - ma
Epoch 10/70	
10381/10381	[=====] - 4s 355us/step - loss: 10.8402 - ma
Epoch 11/70	
10381/10381	[=====] - 4s 350us/step - loss: 10.3375 - ma
Epoch 12/70	
10381/10381	[=====] - 4s 341us/step - loss: 9.7338 - mae
Epoch 13/70	
10381/10381	[=====] - 3s 331us/step - loss: 9.1892 - mae
Epoch 14/70	
10381/10381	[=====] - 4s 340us/step - loss: 8.9490 - mae
Epoch 15/70	
10381/10381	[=====] - 4s 348us/step - loss: 8.6993 - mae
Epoch 16/70	
10381/10381	[=====] - 4s 340us/step - loss: 8.2968 - mae
Epoch 17/70	
10381/10381	[=====] - 3s 329us/step - loss: 8.0755 - mae
Epoch 18/70	
10381/10381	[=====] - 3s 333us/step - loss: 7.8412 - mae
Epoch 19/70	
10381/10381	[=====] - 4s 340us/step - loss: 7.7188 - mae
Epoch 20/70	
10381/10381	[=====] - 3s 332us/step - loss: 7.5133 - mae
Epoch 21/70	
10381/10381	[=====] - 4s 357us/step - loss: 7.5481 - mae
Epoch 22/70	
10381/10381	[=====] - 4s 360us/step - loss: 7.3707 - mae
Epoch 23/70	
10381/10381	[=====] - 4s 354us/step - loss: 7.2888 - mae
Epoch 24/70	
10381/10381	[=====] - 3s 328us/step - loss: 6.9908 - mae
Epoch 25/70	
10381/10381	[=====] - 3s 333us/step - loss: 6.9542 - mae
Epoch 26/70	
10381/10381	[=====] - 4s 356us/step - loss: 6.7066 - mae
Epoch 27/70	
10381/10381	[=====] - 3s 317us/step - loss: 6.4167 - mae
Epoch 28/70	
10381/10381	[=====] - 3s 332us/step - loss: 6.4465 - mae

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Epoch 29/70
10381/10381 [=====] - 3s 334us/step - loss: 6.5005 - mae
Epoch 30/70
10381/10381 [=====] - 4s 353us/step - loss: 6.1980 - mae
Epoch 31/70
10381/10381 [=====] - 4s 342us/step - loss: 6.1259 - mae
Epoch 32/70
10381/10381 [=====] - 3s 334us/step - loss: 6.0367 - mae
Epoch 33/70
10381/10381 [=====] - 3s 335us/step - loss: 5.9954 - mae
Epoch 34/70
10381/10381 [=====] - 4s 338us/step - loss: 6.0919 - mae
Epoch 35/70
10381/10381 [=====] - 4s 341us/step - loss: 5.8262 - mae
Epoch 36/70
10381/10381 [=====] - 4s 344us/step - loss: 5.7666 - mae
Epoch 37/70
10381/10381 [=====] - 4s 343us/step - loss: 5.7545 - mae
Epoch 38/70
10381/10381 [=====] - 3s 334us/step - loss: 5.9078 - mae
Epoch 39/70
10381/10381 [=====] - 3s 324us/step - loss: 5.6993 - mae
Epoch 40/70
10381/10381 [=====] - 3s 325us/step - loss: 5.4928 - mae
Epoch 41/70
10381/10381 [=====] - 3s 328us/step - loss: 5.3943 - mae
Epoch 42/70
10381/10381 [=====] - 4s 344us/step - loss: 5.3650 - mae
Epoch 43/70
10381/10381 [=====] - 4s 342us/step - loss: 5.3732 - mae
Epoch 44/70
10381/10381 [=====] - 4s 342us/step - loss: 5.2540 - mae
Epoch 45/70
10381/10381 [=====] - 3s 337us/step - loss: 5.1312 - mae
Epoch 46/70
10381/10381 [=====] - 4s 344us/step - loss: 5.2216 - mae
Epoch 47/70
10381/10381 [=====] - 4s 339us/step - loss: 5.2981 - mae
Epoch 48/70
10381/10381 [=====] - 4s 342us/step - loss: 5.1866 - mae
Epoch 49/70
10381/10381 [=====] - 3s 334us/step - loss: 5.0786 - mae
Epoch 50/70
10381/10381 [=====] - 4s 343us/step - loss: 5.2822 - mae
Epoch 51/70
10381/10381 [=====] - 4s 338us/step - loss: 5.0833 - mae
Epoch 52/70
10381/10381 [=====] - 4s 340us/step - loss: 5.0520 - mae
Epoch 53/70
10381/10381 [=====] - 4s 340us/step - loss: 5.0339 - mae
Epoch 54/70
10381/10381 [=====] - 3s 324us/step - loss: 4.9292 - mae
Epoch 55/70
10381/10381 [=====] - 4s 346us/step - loss: 4.9943 - mae
Epoch 56/70
10381/10381 [=====] - 4s 353us/step - loss: 5.2853 - mae
Epoch 57/70
10381/10381 [=====] - 3s 327us/step - loss: 4.9175 - mae
```

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Epoch 58/70
10381/10381 [=====] - 3s 336us/step - loss: 4.8046 - mae
Epoch 59/70
10381/10381 [=====] - 3s 337us/step - loss: 4.7809 - mae
Epoch 60/70
10381/10381 [=====] - 3s 332us/step - loss: 4.7552 - mae
Epoch 61/70
10381/10381 [=====] - 3s 318us/step - loss: 4.5740 - mae
Epoch 62/70
10381/10381 [=====] - 4s 347us/step - loss: 4.6429 - mae
Epoch 63/70
10381/10381 [=====] - 4s 340us/step - loss: 4.8346 - mae
Epoch 64/70
10381/10381 [=====] - 4s 346us/step - loss: 4.6747 - mae
Epoch 65/70
10381/10381 [=====] - 3s 337us/step - loss: 4.4722 - mae
Epoch 66/70
10381/10381 [=====] - 4s 342us/step - loss: 4.8665 - mae
Epoch 67/70
10381/10381 [=====] - 4s 340us/step - loss: 4.4181 - mae
Epoch 68/70
10381/10381 [=====] - 4s 348us/step - loss: 4.4892 - mae
Epoch 69/70
10381/10381 [=====] - 4s 345us/step - loss: 4.5558 - mae
Epoch 70/70
10381/10381 [=====] - 3s 332us/step - loss: 4.5409 - mae

```



Kappa Score: 0.9569597144906096

Average kappa score value is : 0.9678135437377084



Double-click (or enter) to edit