Neural Network and Deep Learning—ICP6

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Github Link: https://github.com/Avinash-hub1/Neural-Assignment-6.git

Video Link:
https://drive.google.com/file/d/1IS863_IAIEr7V0RYVu3adCfcj_VcjCT9/view?usp=drive_link

Save the model and use the saved model to predict on new text data (ex, “A lot of good things are happening. We are respected again throughout the world, and that's a great thing .@realDonaldTrump”)

```
!pip install tensorflow
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Embedding, LSTM, SpatialDropout1D
from matplotlib import pyplot
from sklearn.model_selection import train_test_split
from tensorflow.keras.utils import to_categorical # Updated import
import re

from sklearn.preprocessing import LabelEncoder

data = pd.read_csv('Sentiment.csv.csv')
# Keeping only the neccessary columns
data = data[['text','sentiment']]

data['text'] = data['text'].apply(lambda x: x.lower())
data['text'] = data['text'].apply((lambda x: re.sub('[^a-zA-z0-9\s]', '', x)))

for idx, row in data.iterrows():
    row[0] = row[0].replace('rt', ' ')

max_fatures = 2000
tokenizer = Tokenizer(num_words=max_fatures, split=' ')
tokenizer.fit_on_texts(data['text'].values)
X = tokenizer.texts_to_sequences(data['text'].values)

X = pad_sequences(X)

embed_dim = 128
lstm_out = 196
def createmodel():
    model = Sequential()
    model.add(Embedding(max_fatures, embed_dim,input_length = X.shape[1]))
```

```
    model.add(Embedding(max_fatures, embed_dim,input_length = X.shape[1]))
    model.add(LSTM(lstm_out, dropout=0.2, recurrent_dropout=0.2))
    model.add(Dense(3,activation='softmax'))
    model.compile(loss = 'categorical_crossentropy', optimizer='adam',metrics = ['accuracy'])
    return model
# print(model.summary())

labelencoder = LabelEncoder()
integer_encoded = labelencoder.fit_transform(data['sentiment'])
y = to_categorical(integer_encoded)
X_train, X_test, Y_train, Y_test = train_test_split(X,y, test_size = 0.33, random_state = 42)

batch_size = 32
model = createmodel()
model.fit(X_train, Y_train, epochs = 1, batch_size=batch_size, verbose = 2)
score,acc = model.evaluate(X_test,Y_test,verbose=2,batch_size=batch_size)
print(score)
print(acc)
print(model.metrics_names)
```

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Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-packages (2.15.0)
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Requirement already satisfied: wrapt<1.15,>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.14.1)
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[ ]
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WARNING:tensorflow:Layer lstm will not use cuDNN kernels since it doesn't meet the criteria. It will use a generic GPU kernel as fallback when running on GPU.
291/291 - 38s - loss: 0.8301 - accuracy: 0.6441 - 38s/epoch - 131ms/step
144/144 - 2s - loss: 0.7573 - accuracy: 0.6686 - 2s/epoch - 11ms/step
0.7572979927062988
0.6686325669288635
['loss', 'accuracy']
```

Apply GridSearchCV on the source code provided in the class

```
# Apply GridSearchCV on the source code provided in the class

import numpy as np
from sklearn.model_selection import train_test_split, GridSearchCV
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.pipeline import Pipeline
from sklearn.datasets import fetch_20newsgroups
import joblib
import pandas as pd
from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Embedding, LSTM, SpatialDropout1D
from matplotlib import pyplot
from tensorflow.keras.utils import to_categorical
import re
from sklearn.preprocessing import LabelEncoder

# Load dataset
categories = ['talk.politics.misc', 'sci.space']
newsgroups_train = fetch_20newsgroups(subset='train', categories=categories)
newsgroups_test = fetch_20newsgroups(subset='test', categories=categories)

# Split the data
X_train, X_test, y_train, y_test = train_test_split(newsgroups_train.data, newsgroups_train.target, test_size=0.3, random_state=42)

# Create a pipeline that combines TfidfVectorizer and LogisticRegression
pipeline = Pipeline([
    ('tfidf', TfidfVectorizer(stop_words='english')),
    ('clf', LogisticRegression(max_iter=1000))
])

# Define the parameter grid for GridSearchCV
param_grid = {
    'tfidf__max_df': (0.5, 0.75, 1.0),
    'clf__C': (0.1, 1, 10),
}

# Create a GridSearchCV object
grid_search = GridSearchCV(pipeline, param_grid, cv=5)

# Fit the GridSearchCV object to the training data
grid_search.fit(X_train, y_train)

# Print the best parameters found by GridSearchCV
print("Best parameters:", grid_search.best_params_)

# Get the best model from GridSearchCV
best_model = grid_search.best_estimator_

# Save the best model to a file
model_filename = 'text_classification_model.pkl'
joblib.dump(best_model, model_filename)

# Load the model from the file
loaded_model = joblib.load(model_filename)

# New text data for prediction
new_text = ["A lot of good things are happening. We are respected again throughout the world, and that's a great thing.@realDonaldTrump"]

# Make predictions
predictions = loaded_model.predict(new_text)
print(predictions)

!pip install tensorflow


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data['text'] = data['text'].apply((lambda x: re.sub('[^a-zA-z0-9\s]', '', x)))

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    model.add(LSTM(lstm_out, dropout=0.2, recurrent_dropout=0.2))
    model.add(Dense(3,activation='softmax'))
    model.compile(loss = 'categorical_crossentropy', optimizer='adam',metrics = ['accuracy'])
    return model
# print(model.summary())

labelencoder = LabelEncoder()
integer_encoded = labelencoder.fit_transform(data['sentiment'])
y = to_categorical(integer_encoded)
X_train, X_test, Y_train, Y_test = train_test_split(X,y, test_size = 0.33, random_state = 42)

batch_size = 32
model = createmodel()
model.fit(X_train, Y_train, epochs = 1, batch_size=batch_size, verbose = 2)
score,acc = model.evaluate(X_test,Y_test,verbose=2,batch_size=batch_size)
print(score)
print(acc)
print(model.metrics_names)
```

```
Best parameters: {'clf__C': 10, 'tfidf__max_df': 0.5}
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291/291 - 38s - loss: 0.8241 - accuracy: 0.6444 - 38s/epoch - 130ms/step
144/144 - 2s - loss: 0.7604 - accuracy: 0.6723 - 2s/epoch - 16ms/step
0.7604281306266785
0.6723459959030151
['loss', 'accuracy']
```