Filter Bullying in Instagram Comment

Import Library

```
# Import Library

import pandas as pd # mengatur tata letak data
import numpy as np # untuk melakukan operasi vektor dan matriks
import matplotlib.pyplot as plt # visualisasi data
import seaborn as sns # untuk visualisasi data
import re # untuk mencari sebuah string untuk match (match)
import string # untuk menyimpan barisan karakter
import nltk # untuk memproses data text
import warnings # menonaktifkan peringatan
import random # untuk menghasilkan angka acak
import tensorflow as tf # melatih dan menjalankan neural network

from numpy import array # untuk melalukan operasi matriks
from sklearn.model_selection import train_test_split

from tensorflow.keras import regularizers
from tensorflow.keras.utils import to_categorical
from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
%matplotlib inline

warnings.filterwarnings('ignore')
```

Memuat Dataset

```
# Membaca dataset yang telah diupload, dan hanya menampilkan kolom komentar & kategori pada d
df = pd.read_csv('Dataset Cyberbullying Instagram.csv')
df = df[['Komentar', 'Kategori']]
df.size
```

```
     1300
```

```
# Menginisialisasikan kolom kategori dengan angka 1 dan 0
y = [ 0 if i=='Non-bullying' else 1 for i in df['Kategori'] ]

x = df['Komentar']
print(x[:5], y[:5])
```

```
     0          "Kaka tidur yaa, udah pagi, gaboleh capek2"
     1              "makan nasi padang aja begini badannya"
     2    "yang aku suka dari dia adalah selalu cukur je...
     3    "Hai kak Isyana aku ngefans banget sama kak Is...
     4    "Manusia apa bidadari sih herann deh cantik te...
     Name: Komentar, dtype: object [0, 0, 1, 0, 0]
```

```
# datatype info
df.info()
```

```
     <class 'pandas.core.frame.DataFrame'>
     RangeIndex: 650 entries, 0 to 649
     Data columns (total 2 columns):
      #   Column    Non-Null Count  Dtype 
     ---  ------    --------------  ----- 
      0   Komentar  650 non-null    object
      1   Kategori  650 non-null    object
     dtypes: object(2)
     memory usage: 10.3+ KB
```

Preprocessing dataset

```
# menghapus pola dalam teks input
def remove_pattern(input_txt, pattern):
  r = re.findall(pattern, input_txt)
  for word in r:
    input_txt = re.sub(word, "", input_txt)
  return input_txt

df.head()
```

	Komentar	Kategori
0	"Kaka tidur yaa, udah pagi, gaboleh capek2"	Non-bullying
1	"makan nasi padang aja begini badannya"	Non-bullying
2	"yang aku suka dari dia adalah selalu cukur je...	Bullying
3	"Hai kak Isyana aku ngefans banget sama kak Is...	Non-bullying
4	"Manusia apa bidadari sih herann deh cantik te...	Non-bullying

```
# menghapus nama pengguna instagram(@user)
df['clean_Komentar'] = np.vectorize(remove_pattern)(df['Komentar'], "@[\w]*")

df.head()
```

	Komentar	Kategori	clean_Komentar
0	"Kaka tidur yaa, udah pagi, gaboleh capek2"	Non-bullying	"Kaka tidur yaa, udah pagi, gaboleh capek2"
1	"makan nasi padang aja begini badannya"	Non-bullying	"makan nasi padang aja begini badannya"
2	"yang aku suka dari dia adalah selalu cukur	Bullying	"yang aku suka dari dia adalah selalu cukur

```
# menghapus karakter khusus, angka dan tanda baca
df['clean_Komentar'] = df['clean_Komentar'].str.replace("[^a-zA-Z#]", " ")
df.head()
```

	Komentar	Kategori	clean_Komentar
0	"Kaka tidur yaa, udah pagi, gaboleh capek2"	Non-bullying	Kaka tidur yaa udah pagi gaboleh capek
1	"makan nasi padang aja begini badannya"	Non-bullying	makan nasi padang aja begini badannya
2	"yang aku suka dari dia adalah selalu cukur je...	Bullying	yang aku suka dari dia adalah selalu cukur je...
	"Hai kak Isyana aku ngefans banget sama	Non-	Hai kak Isyana aku ngefans banget sama

```
# menghapus kata - kata pendek
df['clean_Komentar'] = df['clean_Komentar'].apply(lambda x: " ".join([w for w in x.split() if
df.head()
```

	Komentar	Kategori	cl
0	"Kaka tidur yaa, udah pagi, gaboleh capek2"	Non-bullying	Kaka tidur udah pagi
1	"makan nasi padang aja begini badannya"	Non-bullying	makan nasi padang be
2	"yang aku suka dari dia adalah selalu cukur je...	Bullying	yang suka dari adalah selalu cukur
3	"Hai kak Isyana aku ngefans banget sama kak Is...	Non-bullying	Isyana ngefans banget sama Isyana
4	"Manusia apa bidadari sih herann deh cantik te...	Non-bullying	Manusia bidadari hera

```
# Kata - kata individu yang dianggap sebagai token
tokenized_Komentar = df['clean_Komentar'].apply(lambda x : x.split())
tokenized_Komentar.head()
```

```
0             [Kaka, tidur, udah, pagi, gaboleh, capek]
1               [makan, nasi, padang, begini, badannya]
2    [yang, suka, dari, adalah, selalu, cukur, jemb...
3    [Isyana, ngefans, banget, sama, Isyana, paling...
4            [Manusia, bidadari, herann, cantik, terus]
Name: clean_Komentar, dtype: object
```

```
# kontrol Kata - kata
# Kontrol Kata - kata
from nltk.stem.porter import PorterStemmer
stemmer = PorterStemmer()

tokenized_Komentar= tokenized_Komentar.apply(lambda sentence: [stemmer.stem(word) for word in
tokenized_Komentar.head()
```

```
0             [kaka, tidur, udah, pagi, gaboleh, capek]
1               [makan, nasi, padang, begini, badannya]
2     [yang, suka, dari, adalah, selalu, cukur, jemb...
3     [isyana, ngefan, banget, sama, isyana, pale, s...
4             [manusia, bidadari, herann, cantik, teru]
Name: clean_Komentar, dtype: object
```

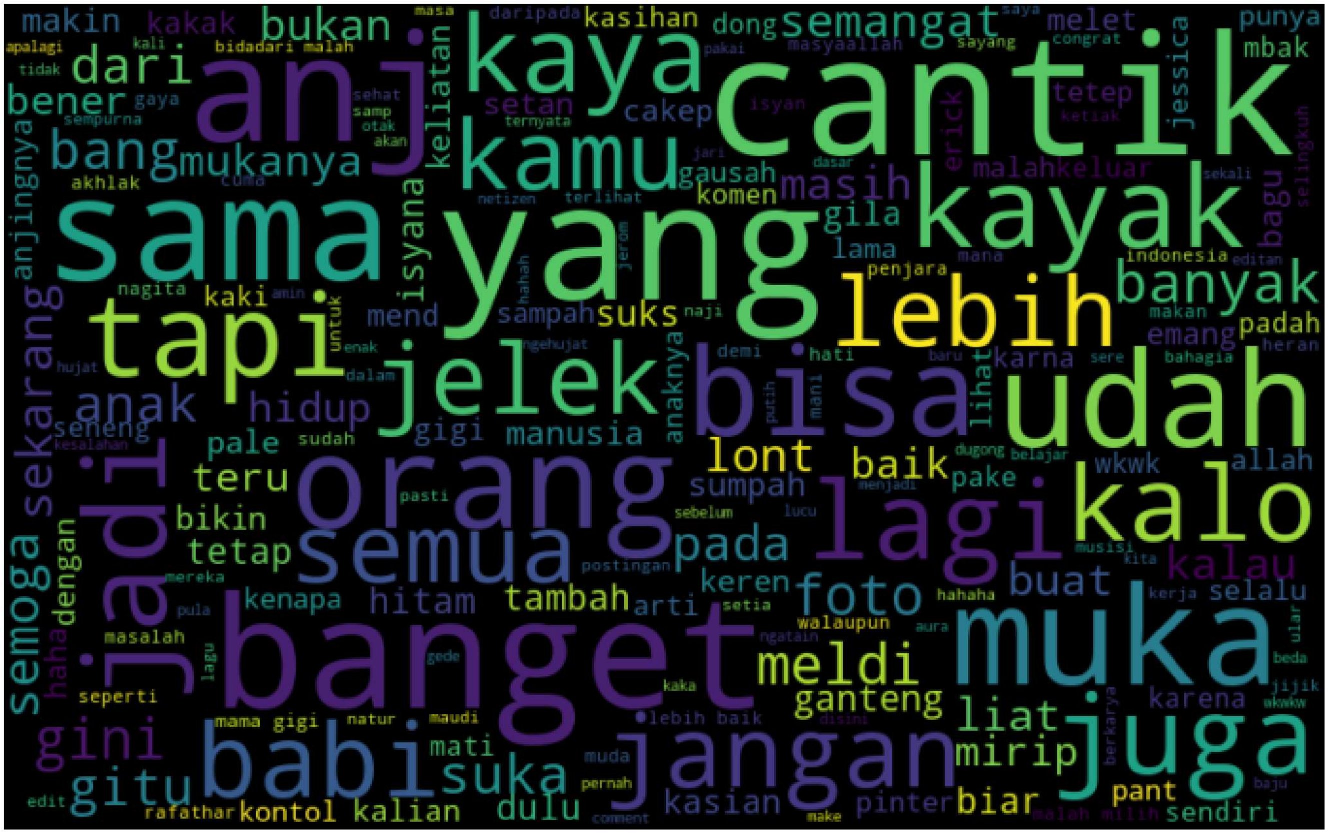
```
# Menggabungkan kata menjadi satu kalimat
for i in range(len(tokenized_Komentar)):
  tokenized_Komentar[i] = " ".join(tokenized_Komentar[i])

df["clean_Komentar"] = tokenized_Komentar
df.head()
```

	Komentar	Kategori	clean_Komentar
0	"Kaka tidur yaa, udah pagi, gaboleh capek2"	Non-bullying	kaka tidur udah pagi gaboleh capek
1	"makan nasi padang aja begini badannya"	Non-bullying	makan nasi padang begini badannya
2	"yang aku suka dari dia adalah selalu cukur je...	Bullying	yang suka dari adalah selalu cukur jembut sebe...
3	"Hai kak Isyana aku ngefans banget sama	Non-	isyana ngefan banget sama isyana pale

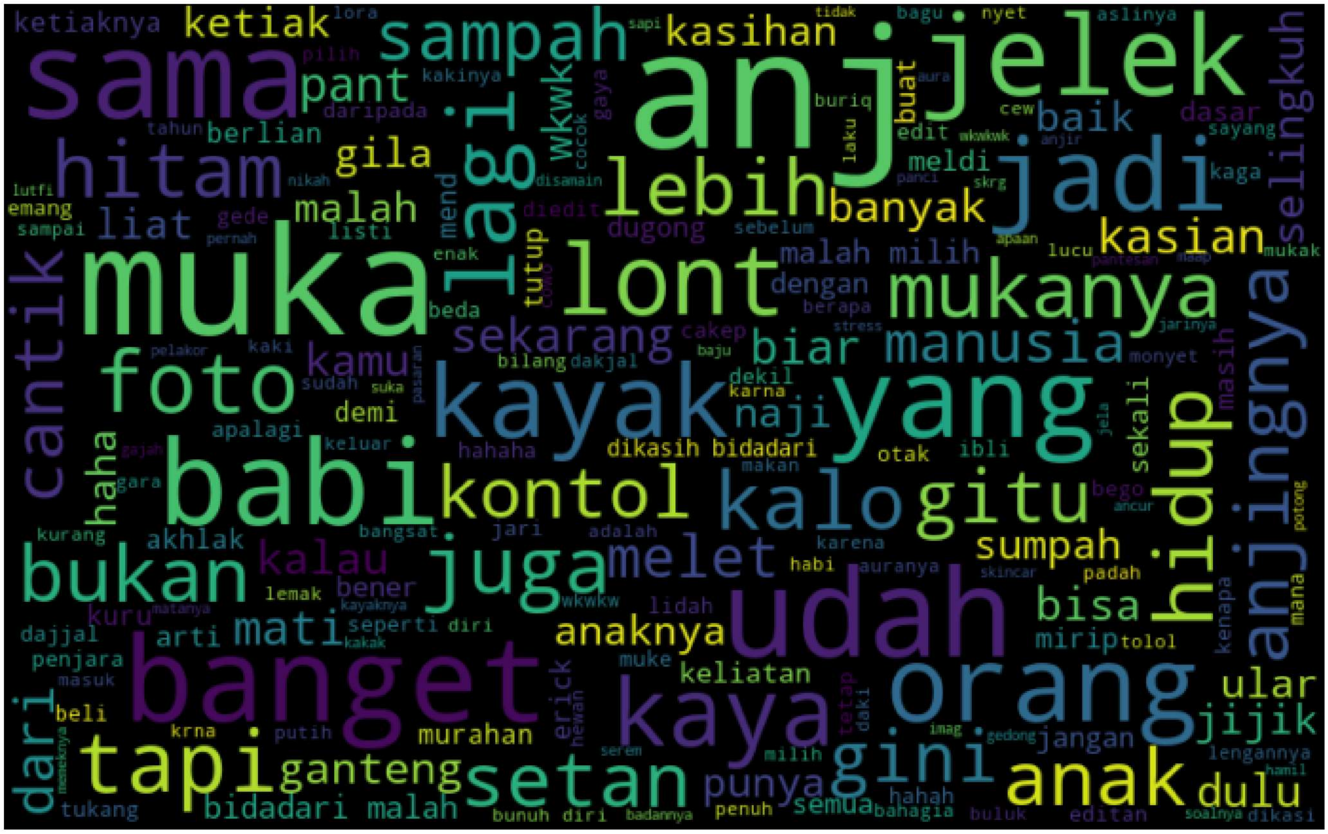
Explorasi Data Analisis

```
!pip install wordcloud
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/publ
Requirement already satisfied: wordcloud in /usr/local/lib/python3.7/dist-packages (1.8
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: matplotlib in /usr/local/lib/python3.7/dist-packages (fro
Requirement already satisfied: pillow in /usr/local/lib/python3.7/dist-packages (from wo
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.7/dist-packag
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/li
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.7/dist-pac
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.7/dist-packag
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from
# memvisualisasikan kata-kata yang sering muncul
all_words = " ".join([sentence for sentence in df['clean_Komentar']])

from wordcloud import WordCloud
wordcloud = WordCloud(width=800, height=500, random_state=42, max_font_size=100).generate(all_

# Menggambar grafik
plt.figure(figsize=(15,8))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.show()
```



```
# visualisasi kata yang sering untuk +ve
all_words = " ".join([sentence for sentence in df['clean_Komentar'][df['Kategori']=='Bullying

wordcloud = WordCloud(width=800, height=500, random_state=42, max_font_size=100).generate(all_

# Menggambar grafik
plt.figure(figsize=(15,8))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.show()
```



Input Split

```
# split data
X_train, X_test, y_train, y_test = train_test_split(x, y, test_size=0.30)
```

```
# Melihat frequensi pada dataset
(unique, counts) = np.unique(y_test, return_counts=True)
frequencies = np.asarray((unique, counts)).T
print(frequencies)
```

```
[[  0 103]
 [  1  92]]
```

Modelling

```
# konfigurasi model
vocab_size = 10000
embedding_dim = 16
max_length = 100
trunc_type='post'
padding_type='post'
oov_tok = "<OOV>"
```

```
# preprocess: tokenization

tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(x)

word_index = tokenizer.word_index

training_sequences = tokenizer.texts_to_sequences(X_train)
testing_sequences = tokenizer.texts_to_sequences(X_test)

#padding
training_padded = pad_sequences(training_sequences, maxlen=max_length, padding=padding_type,
testing_padded = pad_sequences(testing_sequences, maxlen=max_length, padding=padding_type, tr

#convert to numpy array
training_padded = np.array(training_padded)
training_labels = np.array(y_train)

testing_padded = np.array(testing_padded)
testing_labels = np.array(y_test)



# model
model = tf.keras.Sequential([
    tf.keras.layers.Embedding(vocab_size, embedding_dim, input_length=max_length),
    tf.keras.layers.GlobalAveragePooling1D(),
    tf.keras.layers.Dense(24, activation='sigmoid'),
    tf.keras.layers.Dropout(0.5),
    tf.keras.layers.Dense(1, activation='sigmoid')
])
model.compile(loss='binary_crossentropy',optimizer='nadam',metrics=['accuracy'])
```

Training Model

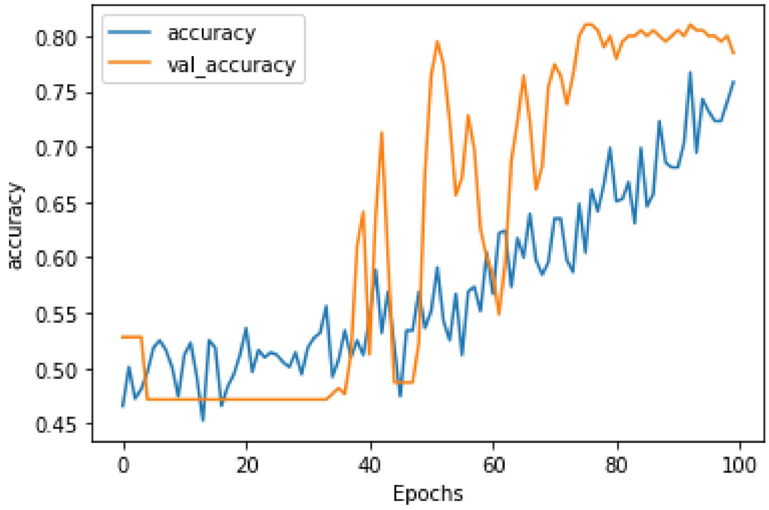
```
# training model
num_epochs = 100
history = model.fit(training_padded, training_labels, batch_size = 32, epochs=num_epochs, val
```

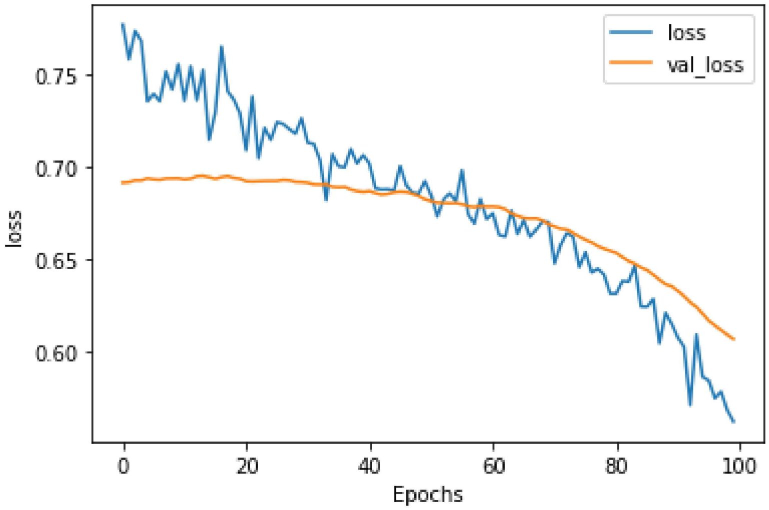
```
Epoch 1/100
15/15 - 1s - loss: 0.7772 - accuracy: 0.4659 - val_loss: 0.6915 - val_accuracy: 0.52
Epoch 2/100
15/15 - 0s - loss: 0.7585 - accuracy: 0.5011 - val_loss: 0.6917 - val_accuracy: 0.52
Epoch 3/100
15/15 - 0s - loss: 0.7739 - accuracy: 0.4725 - val_loss: 0.6927 - val_accuracy: 0.52
Epoch 4/100
15/15 - 0s - loss: 0.7682 - accuracy: 0.4813 - val_loss: 0.6927 - val_accuracy: 0.52
Epoch 5/100
15/15 - 0s - loss: 0.7356 - accuracy: 0.4967 - val_loss: 0.6938 - val_accuracy: 0.47
```

```
Epoch 6/100
15/15 - 0s - loss: 0.7396 - accuracy: 0.5187 - val_loss: 0.6933 - val_accuracy: 0.47
Epoch 7/100
15/15 - 0s - loss: 0.7356 - accuracy: 0.5253 - val_loss: 0.6930 - val_accuracy: 0.47
Epoch 8/100
15/15 - 0s - loss: 0.7519 - accuracy: 0.5165 - val_loss: 0.6937 - val_accuracy: 0.47
Epoch 9/100
15/15 - 0s - loss: 0.7421 - accuracy: 0.5011 - val_loss: 0.6938 - val_accuracy: 0.47
Epoch 10/100
15/15 - 0s - loss: 0.7557 - accuracy: 0.4747 - val_loss: 0.6938 - val_accuracy: 0.47
Epoch 11/100
15/15 - 0s - loss: 0.7359 - accuracy: 0.5121 - val_loss: 0.6933 - val_accuracy: 0.47
Epoch 12/100
15/15 - 0s - loss: 0.7546 - accuracy: 0.5231 - val_loss: 0.6936 - val_accuracy: 0.47
Epoch 13/100
15/15 - 0s - loss: 0.7361 - accuracy: 0.4923 - val_loss: 0.6949 - val_accuracy: 0.47
Epoch 14/100
15/15 - 0s - loss: 0.7527 - accuracy: 0.4527 - val_loss: 0.6951 - val_accuracy: 0.47
Epoch 15/100
15/15 - 0s - loss: 0.7148 - accuracy: 0.5253 - val_loss: 0.6944 - val_accuracy: 0.47
Epoch 16/100
15/15 - 0s - loss: 0.7297 - accuracy: 0.5187 - val_loss: 0.6935 - val_accuracy: 0.47
Epoch 17/100
15/15 - 0s - loss: 0.7654 - accuracy: 0.4659 - val_loss: 0.6945 - val_accuracy: 0.47
Epoch 18/100
15/15 - 0s - loss: 0.7410 - accuracy: 0.4835 - val_loss: 0.6950 - val_accuracy: 0.47
Epoch 19/100
15/15 - 0s - loss: 0.7366 - accuracy: 0.4945 - val_loss: 0.6941 - val_accuracy: 0.47
Epoch 20/100
15/15 - 0s - loss: 0.7290 - accuracy: 0.5121 - val_loss: 0.6936 - val_accuracy: 0.47
Epoch 21/100
15/15 - 0s - loss: 0.7090 - accuracy: 0.5363 - val_loss: 0.6922 - val_accuracy: 0.47
Epoch 22/100
15/15 - 0s - loss: 0.7382 - accuracy: 0.4967 - val_loss: 0.6921 - val_accuracy: 0.47
Epoch 23/100
15/15 - 0s - loss: 0.7047 - accuracy: 0.5165 - val_loss: 0.6922 - val_accuracy: 0.47
Epoch 24/100
15/15 - 0s - loss: 0.7211 - accuracy: 0.5099 - val_loss: 0.6923 - val_accuracy: 0.47
Epoch 25/100
15/15 - 0s - loss: 0.7147 - accuracy: 0.5143 - val_loss: 0.6924 - val_accuracy: 0.47
Epoch 26/100
15/15 - 0s - loss: 0.7243 - accuracy: 0.5121 - val_loss: 0.6924 - val_accuracy: 0.47
Epoch 27/100
15/15 - 0s - loss: 0.7233 - accuracy: 0.5055 - val_loss: 0.6930 - val_accuracy: 0.47
Epoch 28/100
15/15 - 0s - loss: 0.7205 - accuracy: 0.5011 - val_loss: 0.6927 - val_accuracy: 0.47
```

```
# display history
def plot_graphs(history, string):
  plt.plot(history.history[string])
  plt.plot(history.history['val_'+string])
  plt.xlabel("Epochs")
  plt.ylabel(string)
  plt.legend([string, 'val_'+string])
```

```
      plt.show()

    plot_graphs(history, "accuracy")
    plot_graphs(history, "loss")
```





```
    # Menampilkan prediksi
    y_pred = np.rint(model.predict(testing_padded))
    y_pred

         array([[1.],
                [0.],
                [1.],
                [0.],
                [1.],
                [1.],
                [0.],
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            [0.],
            [0.],
            [0.],
```

```
#confision matrix
con_mat = tf.math.confusion_matrix(labels=testing_labels, predictions=y_pred).numpy()
con_mat
```

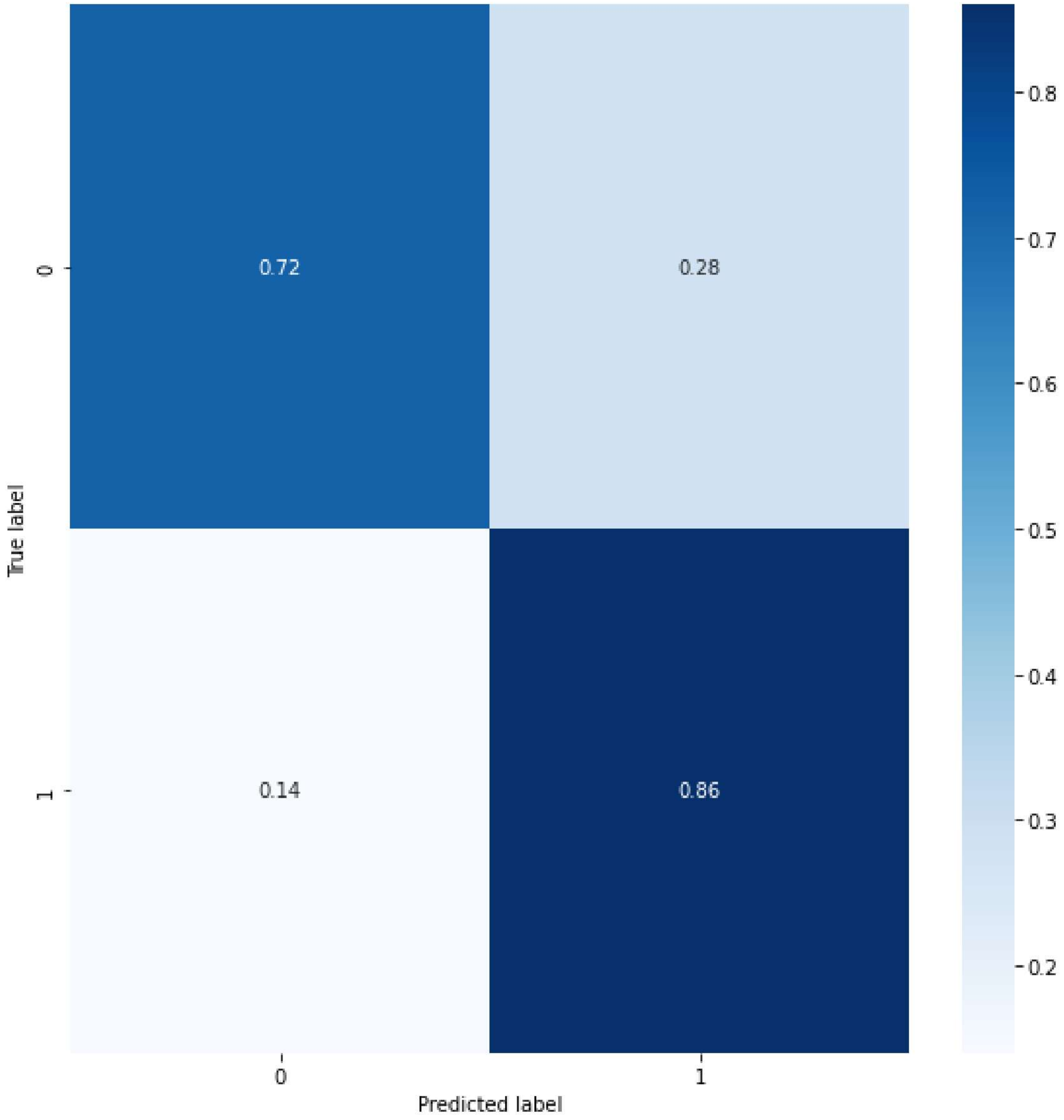
```
     array([[74, 29],
            [13, 79]], dtype=int32)
```

```
#Menormalisasi confision matrix
classes=[0,1]
```

```
con_mat_norm = np.around(con_mat.astype('float') / con_mat.sum(axis=1)[:, np.newaxis], decima
con_mat_df = pd.DataFrame(con_mat_norm, index = classes,columns = classes)
con_mat_df
```

```
      0     1
0  0.72  0.28
1  0.14  0.86
```

```
# display confision matrix
import seaborn as sns
figure = plt.figure(figsize=(8, 8))
sns.heatmap(con_mat_df, annot=True,cmap=plt.cm.Blues)
plt.tight_layout()
plt.ylabel('True label')
plt.xlabel('Predicted label')
plt.show()
```



Uji Coba Model

```
# test sentence
sentence = ["Kamu cantik sekali"]
sequences = tokenizer.texts_to_sequences(sentence)
padded = pad_sequences(sequences, maxlen=max_length, padding=padding_type, truncating=trunc_t
print(np.rint(model.predict(padded)))
```

```
     [[0.]]
```

Kesimpulan

Pada Program yang telah dibuat, memiliki akurasi yang cukup tinggi yaitu sebesar 0.7582. Tujuan dari program ini adalah agar mesin dapat mengidentifikasi antara kalimat negatif dan positif pada komentar di instagram. Program ini juga menggunakan NLP yang mana NLP adalah Natural language processing (NLP) adalah cabang dari kecerdasan buatan yang berhubungan dengan interaksi antara komputer dan manusia menggunakan bahasa alami.