Analisis Sentimen Ulasan Aplikasi TIX ID Menggunakan Metode Klasifikasi Algoritma SVM

Impor paket yang diperlukan

```
import pandas as pd

import numpy as np
```

```
# Mount Google Drive
from google.colab import drive
drive.mount('/content/drive')

# Set path untuk data
BASE_PATH = '/content/drive/MyDrive/Kuliah/Semester 4/PENDAT /Ipyb/SVM Sentimen Ulasan TIX ID/'
BASE_PATH_TOOLS = '/content/drive/MyDrive/Kuliah/Semester 4/PENDAT /Ipyb/SVM Sentimen Ulasan TIX ID/tools/'
df_busu = pd.read_csv(BASE_PATH + 'scrapped_TIX ID_EN.csv')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

```
len(df_busu.index) #menghitung berapa jumlah data yg didapatkan
```

```
28247
```

```
df_busu= df_busu.sample(n=10000, random_state=42).reset_index(drop=True) # saya mengambil 10000 data karena akan lama kalo ngeload 28.247 ba
```

```
len(df_busu.index) #menghitung berapa jumlah data yg sudah diambil
```

```
10000
```

```
df_busu[['userName', 'score','at', 'content']].head()  #dari dataset tsb didapatkan banyak sekali kolom, kemudian kolom" tsb saya filter
                                                       #sehingga didapatkan kolom username, score, at dan content
```

	userName	score	at	content
0	A Google user	5	2019-02-17 08:40:31	so far so good
1	A Google user	5	2018-09-30 09:56:55	Good!
2	A Google user	5	2019-07-27 01:55:24	convenient!
3	A Google user	5	2019-03-10 08:13:39	no antri-antri
4	A Google user	5	2018-12-21 02:53:57	good apps

```
new_df = df_busu[['userName', 'score','at', 'content']]
sorted_df = new_df.sort_values(by='at', ascending=False) #Sort by Newst, change to True if you want to sort by Oldest.
sorted_df.head()
```

	userName	score	at	content
4865	A Google user	1	2024-12-07 00:38:14	Gak bsa byar pke shopeepay Pas klik gk bsa red...
460	A Google user	5	2024-11-25 14:53:52	Mantapp!
6860	A Google user	5	2024-11-18 03:03:34	Simple and quick!
3591	A Google user	5	2024-10-25 07:34:47	very good
5810	gilang chandra maulana	1	2024-10-15 08:23:02	loading terus, bete jir

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```
my_df = sorted_df[['userName', 'score','at', 'content']] #kemudian saya simpan ke variabel my_df
```

```
my_df=my_df[['content', 'score']]#karena saya hanya membutuhkan kolom content dan score maka saya lakukan filter kolom lgi hingga menyisakar
```

```
my_df.head()
```

	content	score
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1
460	Mantapp!	5
6860	Simple and quick!	5
3591	very good	5
5810	loading terus, bete jir	1

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Hapus duplicate

```
my_df.drop_duplicates(subset="content", keep='first', inplace=True)
```

```
my_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 6790 entries, 4865 to 5855
Data columns (total 2 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   content  6790 non-null   object
 1   score    6790 non-null   int64
dtypes: int64(1), object(1)
memory usage: 159.1+ KB
```

```
my_df.head(5)
```

	content	score
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1
460	Mantapp!	5
6860	Simple and quick!	5
3591	very good	5
5810	loading terus, bete jir	1

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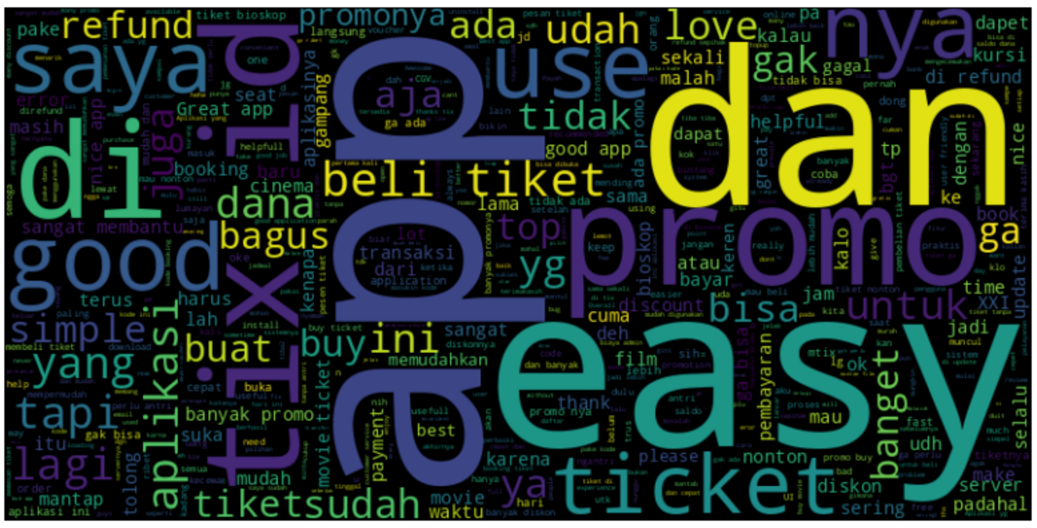
Wordcloud

```
import pandas as pd
import numpy as np
from PIL import Image
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
import matplotlib.pyplot as plt


# Mengisi nilai NaN dengan string kosong ('')
my_df['content'] = my_df['content'].fillna('')

# Menggabungkan teks dari kolom 'content'
text = ' '.join(my_df['content'].astype(str).tolist())

stopwords = set(STOPWORDS)
stopwords.update(['https', 'co', 'RT', '...', 'amp'])

wc = WordCloud(stopwords=stopwords, background_color="black", max_words=500, width=800, height=400)

wc.generate(text)

plt.figure(figsize=(10, 5))
plt.imshow(wc, interpolation='bilinear')
plt.axis("off")
plt.show()
```



PEMBERSIHAN DATA

data cleaning

```
import re
import string
import nltk

# Fungsi untuk menghapus URL
def remove_URL(tweet):
    if tweet is not None and isinstance(tweet, str):
        url= re.compile(r'https?://\S+/www\.\S+')
        return url.sub(r'', tweet)
    else:
      return tweet

#Fungsi untuk menghapus HTML
def remove_html(tweet):
    if tweet is not None and isinstance(tweet, str):
        html = re.compile(r'<.*?>')
        return html.sub(r'', tweet)
    else:
        return tweet

# Fungsi untuk menghapus emoji
def remove_emoji(tweet):
    if tweet is not None and isinstance(tweet, str):
        emoji_pattern = re.compile("["
            u"\U0001F600-\U0001F64F" # emoticons
            u"\U0001F300-\U0001F5FF" # symbols & pictographs
            u"\U0001F680-\U0001F6FF" # transport & map symbols
            u"\U0001F700-\U0001F77F" # alchemical symbols
            u"\U0001F780-\U0001F7FF" # Geometric Shapes Extended
            u"\U0001F800-\U0001F8FF" # Supplemental Arrows-C
            u"\U0001F900-\U0001F9FF" # Supplemental Symbols and Pictographs
            u"\U0001FA00-\U0001FA6F" # Chess Symbols
            u"\U0001FA70-\U0001FAFF" # Symbols and Pictographs Extended-A
            u"\U0001F004-\U0001F0CF" # Additional emoticons
            u"\U0001F1E0-\U0001F1FF" # flags
                                "]+", flags=re.UNICODE)
        return emoji_pattern.sub(r'', tweet)
    else:
        return tweet

#Fungsi untuk menghapus simbol
def remove_symbols(tweet):
    if tweet is not None and isinstance(tweet, str):
        tweet = re.sub(r' [^a-zA-Z0-9\s]', '', tweet)
    return tweet

# Fungsi untuk menghapus angka
def remove_numbers (tweet):
    if tweet is not None and isinstance(tweet, str):
        tweet = re.sub(r'\d', '', tweet)
    return tweet

my_df['cleaning'] = my_df['content'].apply(lambda x: remove_URL(x))
my_df['cleaning'] = my_df['cleaning'].apply(lambda x: remove_html(x))
my_df['cleaning'] = my_df['cleaning'].apply(lambda x: remove_emoji(x))
my_df['cleaning'] = my_df['cleaning'].apply(lambda x: remove_symbols(x))
my_df['cleaning'] = my_df['cleaning'].apply(lambda x: remove_numbers(x))

my_df.head(10)
```

	content	score	cleaning
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...
460	Mantapp!	5	Mantapp!
6860	Simple and quick!	5	Simple and quick!
3591	very good	5	very good
5810	loading terus, bete jir	1	loading terus, bete jir
4494	It's useless if you want to book tickets long ...	2	It's useless if you want to book tickets long ...
5130	Good	5	Good
8326	Nice and helpfull application	5	Nice and helpfull application
1325	Awesome	5	Awesome
2181	senengg bangettt	5	senengg bangettt

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Text PreProcessing

Case Folding

Proses case folding adalah proses mengubah seluruh huruf menjadi huruf kecil. Pada proses ini karakter-karakter 'A'-'Z' yang terdapat pada data diubah kedalam karakter 'a'-'z'.

```
def case_folding(text):
    if isinstance(text, str):
        return text.lower()
    else:
        return text

my_df['case_folding'] = my_df['cleaning'].apply(case_folding)
my_df.head(5)
```

	content	score	cleaning	case_folding
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...
460	Mantapp!	5	Mantapp!	mantapp!
6860	Simple and quick!	5	Simple and quick!	simple and quick!
3591	very good	5	very good	very good

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Normalisasi Kata

```
import pandas as pd

#Fungsi penggantian kata tidak baku
def replace_taboo_words (text, kamus_tidak_baku):
    if isinstance(text, str):
        words = text.split()
        replaced_words = []
        kalimat_baku = []
        kata_diganti = []
        kata_tidak_baku_hash = []

        for word in words:
            if word in kamus_tidak_baku:
                baku_word = kamus_tidak_baku [word]
                if isinstance(baku_word, str) and all(char.isalpha() for char in baku_word):
                    replaced_words.append(baku_word)
                    kalimat_baku.append(baku_word)
                    kata_diganti.append(word)
                    kata_tidak_baku_hash.append(hash (word))
            else:
                replaced_words.append(word)
        replaced_text = ' '.join(replaced_words)
    else:
        replaced_text = text
        kalimat_baku = []
        kata_diganti = []
        kata_tidak_baku_hash = []

    return replaced_text, kalimat_baku, kata_diganti, kata_tidak_baku_hash
```

```
# Baca Dataset
data = pd.DataFrame(my_df[['content', 'score', 'cleaning', 'case_folding']])
data.head(5)
```

	content	score	cleaning	case_folding
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...
460	Mantapp!	5	Mantapp!	mantapp!
6860	Simple and quick!	5	Simple and quick!	simple and quick!
3591	very good	5	very good	very good

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```
# Baca kamus kata tidak baku
kamus_data = pd.read_excel(BASE_PATH_TOOLS + "kamuskatabaku.xlsx")
kamus_tidak_baku = dict(zip(kamus_data['tidak_baku'], kamus_data['kata_baku']))
```

```
# Terapkan fungsi pengganti kata tidak baku
data['normalisasi'], data['Kata_Baku'], data['Kata_Tidak_Baku'], data['Kata_Tidak_Baku_Hash'] = zip(*data['case_folding'].apply(lambda x: rep

my_df = pd.DataFrame(data[['content', 'score', 'cleaning', 'case_folding', 'normalisasi']])
my_df.head(10)
```

	content	score	cleaning	case_folding	normalisasi
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...
460	Mantapp!	5	Mantapp!	mantapp!	mantapp!
6860	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!
3591	very good	5	very good	very good	very good
5810	loading terus, bete jir	1	loading terus, bete jir	loading terus, bete jir	loading terus, bete jir
4494	It's useless if you want to book tickets long ...	2	It's useless if you want to book tickets long ...	it's useless if you want to book tickets long ...	it's useless if you want tapi book tickets lon...
5130	Good	5	Good	good	good
8326	Nice and helpfull application	5	Nice and helpfull application	nice and helpfull application	nice and helpfull application
1325	Awesome	5	Awesome	awesome	awesome

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Tokenizing

Tokenizing adalah proses pemisahan teks menjadi potongan-potongan yang disebut sebagai token untuk kemudian di analisa. Kata, angka, simbol, tanda baca dan entitas penting lainnya dapat dianggap sebagai token. Didalam NLP, token diartikan sebagai "kata" meskipun tokenize juga dapat dilakukan pada paragraf maupun kalimat

```
def tokenize(text):
    tokens = text.split()
    return tokens

my_df['tokenize'] = my_df['normalisasi'].apply(tokenize)
my_df.head(5)
```

	content	score	cleaning	case_folding	normalisasi	tokenize
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	[tidak, bisa, byar, pakai, shopeepay, pas, kli...
460	Mantapp!	5	Mantapp!	mantapp!	mantapp!	[mantapp!]
6860	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	[simple, and, quick!]
3591	very good	5	very good	very good	very good	[very, good]

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Stopword Removal

Stopword adalah kata umum yang biasanya muncul dalam jumlah besar dan dianggap tidak memiliki makna. Contoh stopword dalam bahasa Indonesia adalah "yang", "dan", "di", "dari", dll. Makna di balik penggunaan stopword yaitu dengan menghapus kata-kata yang memiliki informasi rendah dari sebuah teks, saya dapat fokus pada kata-kata penting sebagai gantinya.

```
nltk.download('stopwords')
from nltk.corpus import stopwords
stop_words = stopwords.words('indonesian')
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
```

```
def remove_stopwords(text):
    return [word for word in text if word not in stop_words]

my_df['stopword removal'] = my_df['tokenize'].apply(remove_stopwords)

my_df.head()
```

	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	[tidak, bisa, byar, pakai, shopeepay, pas, kli...	[byar, pakai, shopeepay, pas, klik, redirect.....
460	Mantapp!	5	Mantapp!	mantapp!	mantapp!	[mantapp!]	[mantapp!]
6860	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	[simple, and, quick!]	[simple, and, quick!]
3591	very good	5	very good	very good	very good	[very, good]	[very, good]

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Stemming

Stemming adalah proses pemetaan dan penguraian bentuk dari suatu kata menjadi bentuk kata dasarnya. Untuk melakukan stemming bahasa Indonesia saya dapat menggunakan library Python Sastrawi yang sudah saya siapkan di awal. Library Sastrawi menerapkan Algoritma Nazief dan Adriani dalam melakukan stemming bahasa Indonesia.

```
!pip install Sastrawi

from Sastrawi.Stemmer.StemmerFactory import StemmerFactory
from nltk.stem import PorterStemmer
from nltk.stem.snowball import SnowballStemmer
```

```
Collecting Sastrawi
  Downloading Sastrawi-1.0.1-py2.py3-none-any.whl.metadata (909 bytes)
Downloading Sastrawi-1.0.1-py2.py3-none-any.whl (209 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 209.7/209.7 kB 2.8 MB/s eta 0:00:00
Installing collected packages: Sastrawi
Successfully installed Sastrawi-1.0.1
```

```
factory = StemmerFactory()
stemmer = factory.create_stemmer()

def stem_text(text):
    return [stemmer.stem(word) for word in text]

my_df['steming_data'] = my_df['stopword removal'].apply(lambda x: ' '.join(stem_text(x)))
my_df.head(5)
```

	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal	steming_data
4865	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	[tidak, bisa, byar, pakai, shopeepay, pas, kli...	[byar, pakai, shopeepay, pas, klik, redirect.....	byar pakai shopeepay pas klik redirect gk canc...
460	Mantapp!	5	Mantapp!	mantapp!	mantapp!	[mantapp!]	[mantapp!]	mantapp
6860	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	[simple, and, quick!]	[simple, and, quick!]	simple and quick

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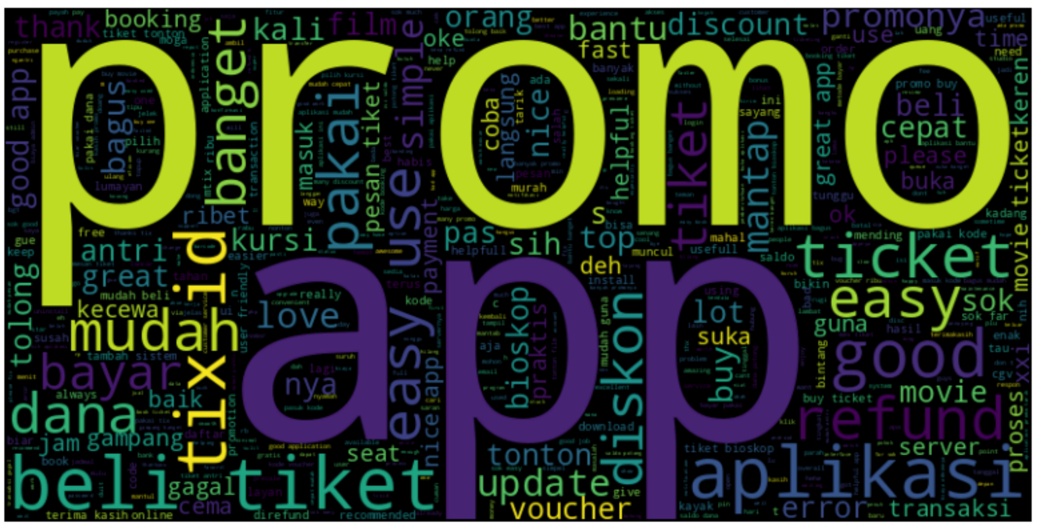
```
my_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 6790 entries, 4865 to 5855
Data columns (total 8 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   content          6790 non-null   object
 1   score            6790 non-null   int64 
 2   cleaning         6790 non-null   object
 3   case_folding     6790 non-null   object
 4   normalisasi      6790 non-null   object
 5   tokenize         6790 non-null   object
 6   stopword removal 6790 non-null   object
 7   steming_data     6790 non-null   object
dtypes: int64(1), object(7)
memory usage: 477.4+ KB
```

```
my_df.to_csv(BASE_PATH + "hasil_TextPreProcessing_shopee.csv", index= False) #kemudian simpan hasil text preprocessing ke file csv
```

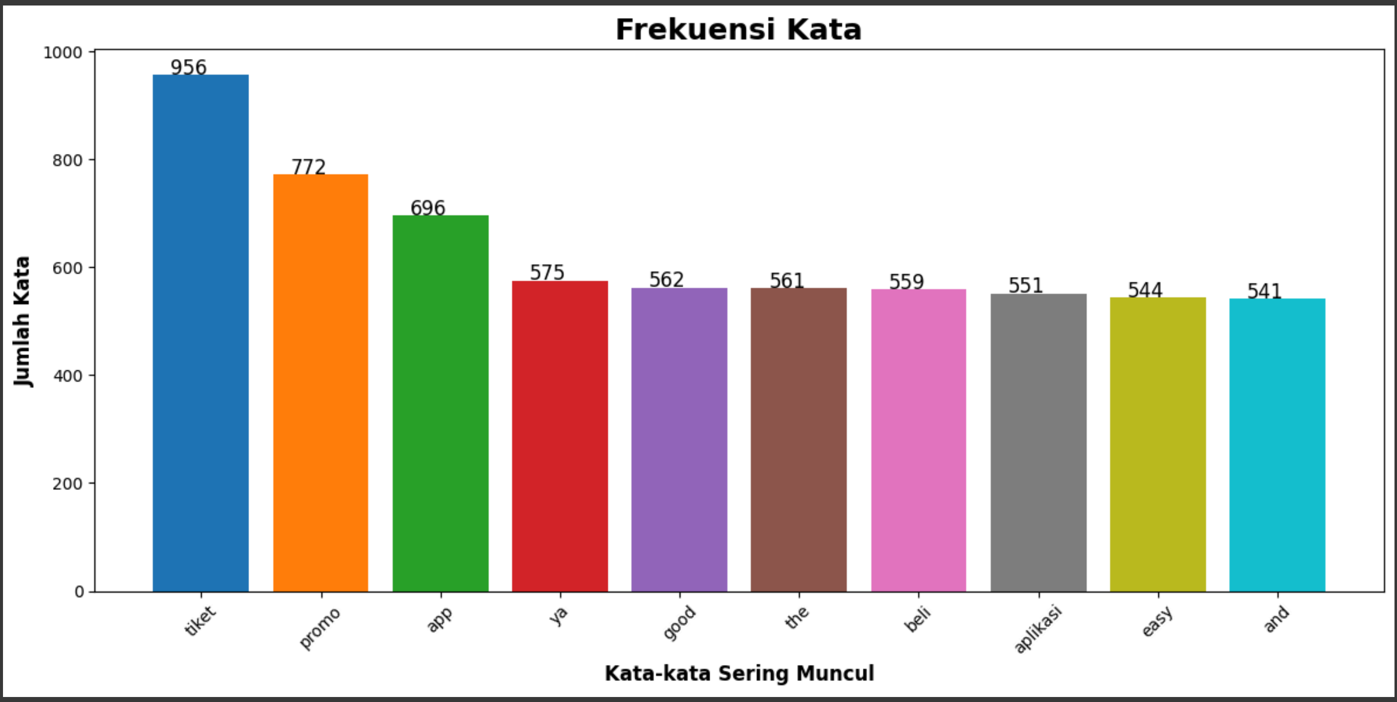
WORDCLOUD SETELAH PREPROCESSING

```
import pandas as pd
import numpy as np
from PIL import Image
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
import matplotlib.pyplot as plt

# Menggabungkan teks dari kolom 'content'
text = ' '.join(my_df['steming_data'].astype(str).tolist())

stopwords=set (STOPWORDS)
stopwords.update(['https', 'co', 'RT', '...', 'amp', 'ya'])

wc=WordCloud(stopwords=stopwords, background_color="black", max_words=500, width=800, height=400)
wc.generate(text)

plt.figure(figsize=(10, 5))
plt.imshow(wc, interpolation='bilinear')
plt.axis("off")
plt.show()
```



```
import matplotlib.pyplot as plt
from collections import Counter

# Gabungkan semua teks
text = " ".join(my_df['steming_data'])

tokens = text.split()
# Hitung frekuensi kata
word_count = Counter(tokens)

# Ambil 10 kata paling sering muncul
top_word = word_count.most_common(10)

# Pisahkan menjadi dua list: kata dan jumlahnya
word, count = zip(*top_word)

# Definisikan palet warna
colors = plt.cm.tab10(range(len(word)))
```

```
# Plot bar chart
plt.figure(figsize=(12, 6))
bars = plt.bar(word, count, color=colors)
plt.xlabel('Kata-kata Sering Muncul', fontsize=12, fontweight='bold')
plt.ylabel('Jumlah Kata', fontsize=12, fontweight='bold')
plt.title('Frekuensi Kata', fontsize=18, fontweight='bold')
plt.xticks(rotation=45)

# Tambahkan label angka di atas setiap bar
for bar, num in zip(bars, count):
    plt.text(bar.get_x() + bar.get_width() / 2 - 0.1, num + 1, str(num), ha='center', color='black', fontsize=12)

plt.tight_layout()
plt.show()
```



Labelling Data Lexicon Based

Link github label positif & Negatif : https://github.com/fajri91/InSet

```
import pandas as pd

data = pd.read_csv(BASE_PATH + 'hasil_TextPreProcessing_shopee.csv')
data.head(5)
```

	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal	steming_data
0	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	['tidak', 'bisa', 'byar', 'pakai', 'shopeepay'...	['byar', 'pakai', 'shopeepay', 'pas', 'klik', ...	byar pakai shopeepay pas klik redirect gk canc...
1	Mantapp!	5	Mantapp!	mantapp!	mantapp!	['mantapp!']	['mantapp!']	mantapp
2	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	['simple', 'and', 'quick!']	['simple', 'and', 'quick!']	simple and quick

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```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6790 entries, 0 to 6789
Data columns (total 8 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   content           6790 non-null   object
 1   score             6790 non-null   int64 
 2   cleaning          6741 non-null   object
 3   case_folding      6741 non-null   object
 4   normalisasi       6740 non-null   object
 5   tokenize          6790 non-null   object
 6   stopword removal  6790 non-null   object
 7   steming_data      6714 non-null   object
dtypes: int64(1), object(7)
memory usage: 424.5+ KB
```

```
# Jika ada data kosong maka di drop
my_df = data.dropna()
```

```
my_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 6714 entries, 0 to 6789
Data columns (total 8 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   content           6714 non-null   object
 1   score             6714 non-null   int64
 2   cleaning          6714 non-null   object
 3   case_folding      6714 non-null   object
 4   normalisasi       6714 non-null   object
 5   tokenize          6714 non-null   object
 6   stopword removal  6714 non-null   object
 7   steming_data      6714 non-null   object
dtypes: int64(1), object(7)
memory usage: 472.1+ KB
```

```python
import pandas as pd

# Fungsi untuk menentukan sentimen
def determine_sentiment(text):
    positive_count = sum(1 for word in text.split() if word in positive_lexicon)
    negative_count = sum(1 for word in text.split() if word in negative_lexicon)
    if positive_count > negative_count:
        return 'Positif'
    elif positive_count < negative_count:
        return 'Negatif'

# Baca kamus leksikon positif dan negatif
positive_lexicon = set(pd.read_csv(BASE_PATH_TOOLS + 'positive.tsv', sep='\t', header=None)[0])
negative_lexicon = set(pd.read_csv(BASE_PATH_TOOLS + 'negative.tsv', sep='\t', header=None)[0])

def replace_none_sentiment(sentiments):
    replace_flag = "Positif"
    for i in range(len(sentiments)):
        if sentiments[i] is None:
            sentiments[i] = replace_flag
            replace_flag = "Negatif" if replace_flag == "Positif" else "Positif"
    return sentiments

my_df['Sentiment'] = my_df['steming_data'].apply(determine_sentiment)
my_df['Sentiment'] = replace_none_sentiment(my_df['Sentiment'].tolist())

my_df.head(10)
```

```
<ipython-input-40-341034993>:24: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-cc
  my_df['Sentiment'] = my_df['steming_data'].apply(determine_sentiment)
<ipython-input-40-341034993>:25: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-cc
  my_df['Sentiment'] = replace_none_sentiment(my_df['Sentiment'].tolist())
```

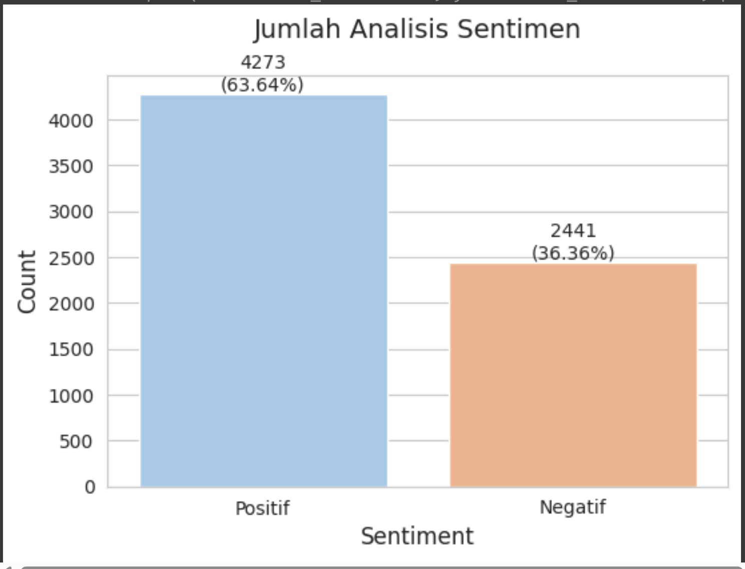
	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal	steming_data	Sentiment
0	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	['tidak', 'bisa', 'byar', 'pakai', 'shopeepay'...	['byar', 'pakai', 'shopeepay', 'pas', 'klik', ...	byar pakai shopeepay pas klik redirect gk canc...	Positif
1	Mantapp!	5	Mantapp!	mantapp!	mantapp!	['mantapp!']	['mantapp!']	mantapp	Negatif
2	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	['simple', 'and', 'quick!']	['simple', 'and', 'quick!']	simple and quick	Positif
3	very good	5	very good	very good	very good	['very', 'good']	['very', 'good']	very good	Positif
4	loading terus, bete jir	1	loading terus, bete jir	loading terus, bete jir	loading terus, bete jir	['loading', 'terus,', 'bete', 'jir']	['loading', 'terus,', 'bete', 'jir']	loading terus bete jir	Negatif
5	It's useless if you want to book tickets long ...	2	It's useless if you want to book tickets long ...	it's useless if you want to book tickets long ...	it's useless if you want tapi book tickets lon...	["it's", 'useless', 'if', 'you', 'want', 'tapi...	["it's", 'useless', 'if', 'you', 'want', 'book...	it s useless if you want book tickets long bef...	Positif

Next steps: Generate code with my_df   View recommended plots   New interactive sheet

```python
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

sentiment_count = my_df['Sentiment'].value_counts()
sns.set_style("whitegrid")

fig, ax = plt.subplots(figsize=(6, 4))
ax = sns.barplot(x=sentiment_count.index, y=sentiment_count.values, palette="pastel")
plt.title("Jumlah Analisis Sentimen", fontsize=14, pad=20)
plt.xlabel("Sentiment", fontsize=12)
plt.ylabel("Count", fontsize=12)

total = len(my_df['Sentiment'])

for i, count in enumerate(sentiment_count.values):
    percentage = f'{100 * count / total:.2f}%'
    ax.text(i, count + 0.10,f'{count}\n({percentage})', ha='center', va='bottom')
```

```
plt.show()
```

```
<ipython-input-41-2336621753>:9: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend

  ax = sns.barplot(x=sentiment_count.index, y=sentiment_count.values, palette="pastel")
```



```
my_df.to_csv(BASE_PATH + "hasil_Labelling_Data.csv",encoding='utf8', index= False) #kemudian simpan hasil text preprocessing ke file csv
```

ALGORITMA SUPPORT VECTOR MACHINE (SVM)

```
import pandas as pd

data = pd.read_csv(BASE_PATH + 'hasil_Labelling_Data.csv')
data.head(5)
```

	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal	steming_data	Sentiment
0	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	['tidak', 'bisa', 'byar', 'pakai', 'shopeepay'...	['byar', 'pakai', 'shopeepay', 'pas', 'klik', ...	byar pakai shopeepay pas klik redirect gk canc...	Positif
1	Mantapp!	5	Mantapp!	mantapp!	mantapp!	['mantapp!']	['mantapp!']	mantapp	Negatif
2	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	['simple', 'and', 'quick!']	['simple', 'and', 'quick!']	simple and quick	Positif

Next steps: Generate code with data View recommended plots New interactive sheet

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6714 entries, 0 to 6713
Data columns (total 9 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   content           6714 non-null   object
 1   score             6714 non-null   int64 
 2   cleaning          6714 non-null   object
 3   case_folding      6714 non-null   object
 4   normalisasi       6714 non-null   object
 5   tokenize          6714 non-null   object
 6   stopword removal  6714 non-null   object
 7   steming_data      6714 non-null   object
 8   Sentiment         6714 non-null   object
dtypes: int64(1), object(8)
memory usage: 472.2+ KB
```

```
my_df = data.dropna()
```

```
my_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6714 entries, 0 to 6713
Data columns (total 9 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   content           6714 non-null   object
 1   score             6714 non-null   int64 
 2   cleaning          6714 non-null   object
 3   case_folding      6714 non-null   object
 4   normalisasi       6714 non-null   object
 5   tokenize          6714 non-null   object
 6   stopword removal  6714 non-null   object
 7   steming_data      6714 non-null   object
 8   Sentiment         6714 non-null   object
dtypes: int64(1), object(8)
memory usage: 472.2+ KB
```

Spliting Data

memecah data test 20% dari keseluruhan data

```
from sklearn.model_selection import train_test_split
# Bagi data menjadi data pelatihan dan pengujian
X_train, X_test, y_train, y_test = train_test_split(my_df['steming_data'], my_df['Sentiment'], test_size=0.2, random_state=42)
```

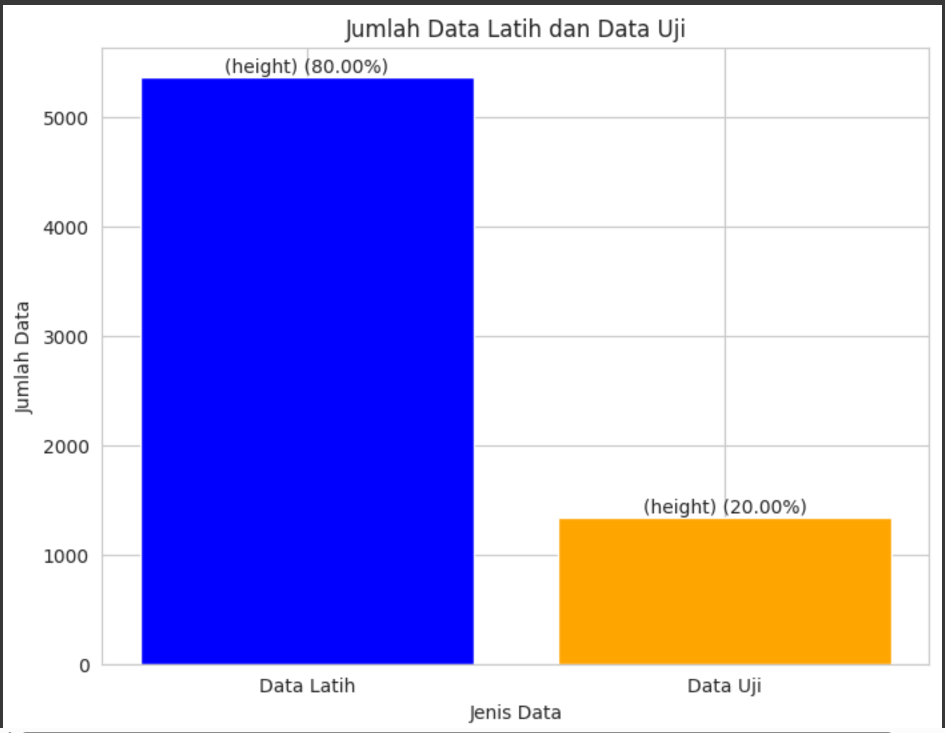
```
# Simpan data latih ke file
train_set = pd.DataFrame({'text': X_train, 'Sentiment': y_train})
train_set.to_csv(BASE_PATH + 'train_data.csv', index=False)
```

```
# Simpan data uji ke file
test_set = pd.DataFrame({'text': X_test, 'Sentiment': y_test})
test_set.to_csv(BASE_PATH + 'test_data.csv', index=False)
```

```
# Menampilkan informasi jumlah data
print("Jumlah data latih:", len(X_train))
print("Jumlah data uji:", len(X_test))
```

```
Jumlah data latih: 5371
Jumlah data uji: 1343
```

```
import matplotlib.pyplot as plt

#Jumlah data latih dan data uji
train_size = len(X_train)
test_size = len(X_test)

# Membuat plot
plt.figure(figsize=(8, 6))
bars= plt.bar(['Data Latih', 'Data Uji'], [train_size, test_size], color=['blue', 'orange'])

# Menambahkan label untuk setiap bar (dalam kurung persentase)
for bar in bars:
    height = bar.get_height()
    plt.text(bar.get_x() + bar.get_width()/2, height + 0.7, f'(height) ({height / (train_size + test_size) * 100:.2f}%)',
             ha='center', va='bottom')

plt.title('Jumlah Data Latih dan Data Uji')
plt.xlabel('Jenis Data')
plt.ylabel('Jumlah Data')
plt.show()
```



SUPPORT VECTOR MACHINE (SVM)

```
from sklearn.svm import SVC
from sklearn.metrics import classification_report, confusion_matrix, accuracy_score
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.feature_extraction.text import TfidfVectorizer
```

```
# Mendefinisikan vectorizer
vectorizer = TfidfVectorizer()
X_train_vectorized = vectorizer.fit_transform(X_train)
X_test_vectorized = vectorizer.transform(X_test)
```

```
# Menampilkan hasil vektorisasi
print("Matriks Vektorisasi untuk Data Latih:")
print(X_train_vectorized.toarray())

#menampilkan sebagian kecil matriks
print("\nSebagian kecil Matriks Vektorisasi untuk Data Latih:")
print(X_train_vectorized[:5, :].toarray())
```

```
Matriks Vektorisasi untuk Data Latih:
[[0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]

Sebagian kecil Matriks Vektorisasi untuk Data Latih:
[[0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]
```

```
# Membuat dan melatih model SVM (model jenis linear)
svm = SVC(kernel='linear')
svm.fit(X_train_vectorized, y_train)
```

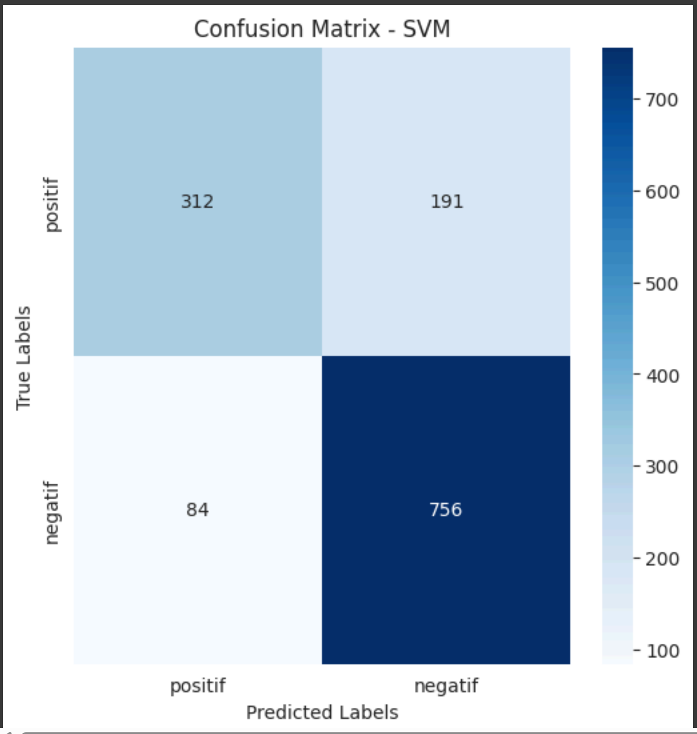
```
SVC
SVC(kernel='linear')
```

```
# Evaluasi model
y_pred_svm = svm.predict(X_test_vectorized)
```

```
# Menampilkan confusion matrix dalam angka
cm_svm = confusion_matrix(y_test, y_pred_svm)
print("Confusion Matrix (SVM):")
print(cm_svm)
```

```
Confusion Matrix (SVM):
[[312 191]
 [ 84 756]]
```

```
# Fungsi untuk plot confusion matrix
def plot_confusion_matrix(model_name, y_true, y_pred):
    cm = confusion_matrix(y_true, y_pred)

    plt.figure(figsize=(6, 6))
    sns.heatmap(cm, annot=True, fmt="d", cmap="Blues",
                xticklabels=['positif', 'negatif'],
                yticklabels=['positif', 'negatif'])

    plt.title(f'Confusion Matrix - {model_name}')
    plt.xlabel('Predicted Labels')
    plt.ylabel('True Labels')
    plt.show()

plot_confusion_matrix('SVM', y_test, y_pred_svm)
```



```
# Menampilkan accuracy untuk SVM
accuracy_svm = accuracy_score(y_test, y_pred_svm)

#Menampilkan classification report untuk SVM
print("SVM Classification Report:")
print(classification_report(y_test, y_pred_svm))
```

```
SVM Classification Report:
              precision    recall  f1-score   support

     Negatif       0.79      0.62      0.69       503
     Positif       0.80      0.90      0.85       840

    accuracy                           0.80      1343
   macro avg       0.79      0.76      0.77      1343
weighted avg       0.79      0.80      0.79      1343
```

WORDCLOUD

```
import pandas as pd

data = pd.read_csv(BASE_PATH + 'hasil_Labelling_Data.csv')
data.head()
```

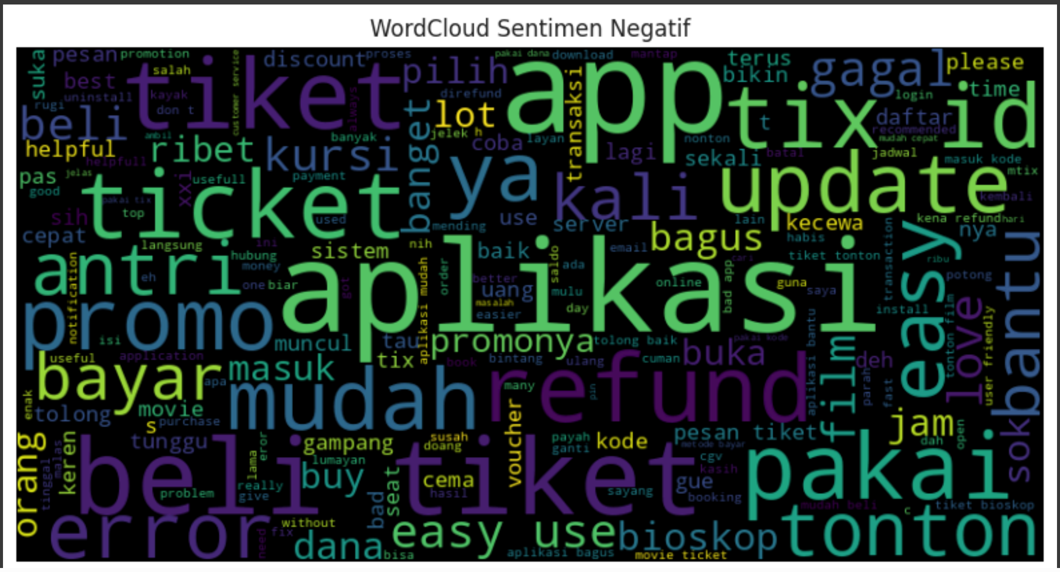
	content	score	cleaning	case_folding	normalisasi	tokenize	stopword removal	steming_data	Sentiment
0	Gak bsa byar pke shopeepay Pas klik gk bsa red...	1	Gak bsa byar pke shopeepay Pas klik gk bsa red...	gak bsa byar pke shopeepay pas klik gk bsa red...	tidak bisa byar pakai shopeepay pas klik tidak...	['tidak', 'bisa', 'byar', 'pakai', 'shopeepay'...	['byar', 'pakai', 'shopeepay', 'pas', 'klik', ...	byar pakai shopeepay pas klik redirect gk canc...	Positif
1	Mantapp!	5	Mantapp!	mantapp!	mantapp!	['mantapp!']	['mantapp!']	mantapp	Negatif
2	Simple and quick!	5	Simple and quick!	simple and quick!	simple and quick!	['simple', 'and', 'quick!']	['simple', 'and', 'quick!']	simple and quick	Positif

Next steps: Generate code with data View recommended plots New interactive sheet

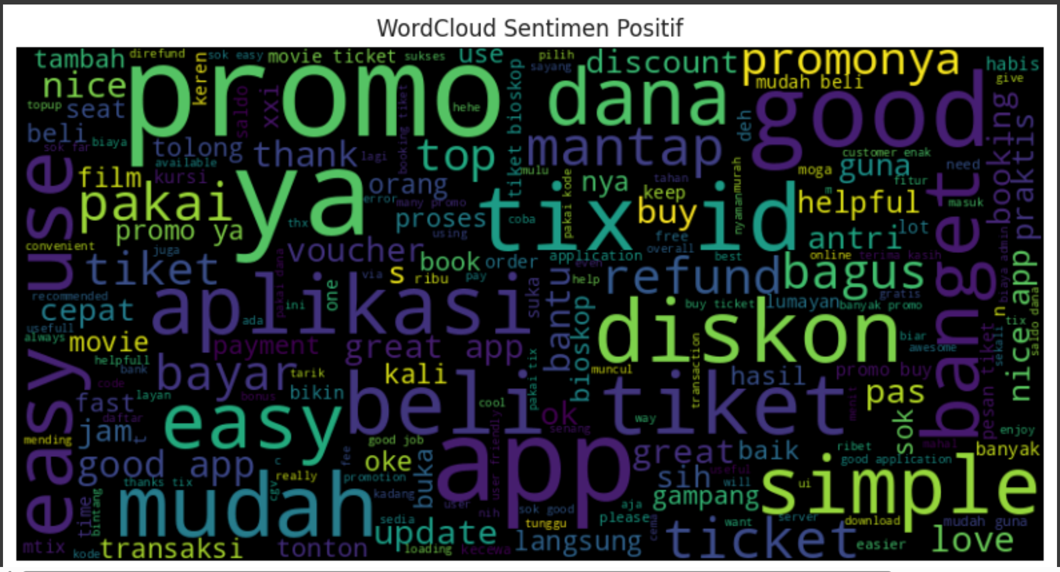
```
import pandas as pd
from wordcloud import WordCloud
import matplotlib.pyplot as plt

# Pisahkan dataset berdasarkan sentimen
sentimen_negatif = data[data['Sentiment'] == 'Negatif'] ['steming_data'].str.cat(sep=' ')
sentimen_positif = data[data['Sentiment'] == 'Positif'] ['steming_data'].str.cat(sep=' ')
```

```
# Fungsi untuk membuat dan menampilkan WordCloud
def create_wordcloud(text, title):
    wordcloud = WordCloud(width=800, height=400, random_state=42, max_font_size=100, background_color='black').generate(text)

    plt.figure(figsize=(10, 5))
    plt.imshow(wordcloud, interpolation='bilinear')
    plt.axis('off')
    plt.title(title)
    plt.show()
```

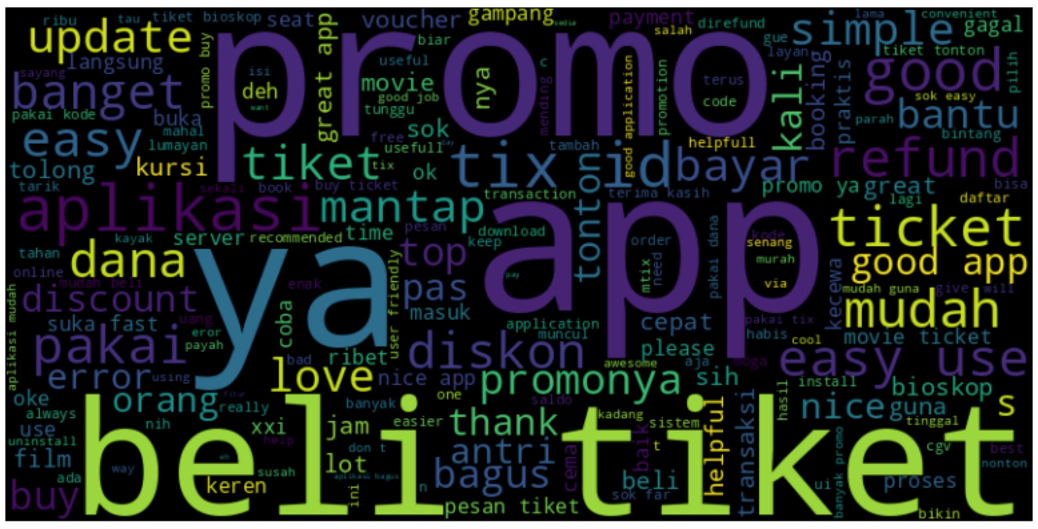
```
# Membuat WordCloud untuk sentimen negatif
create_wordcloud(sentimen_negatif, 'WordCloud Sentimen Negatif')
```



```
# Membuat WordCloud untuk sentimen positif
create_wordcloud(sentimen_positif, 'WordCloud Sentimen Positif')
```



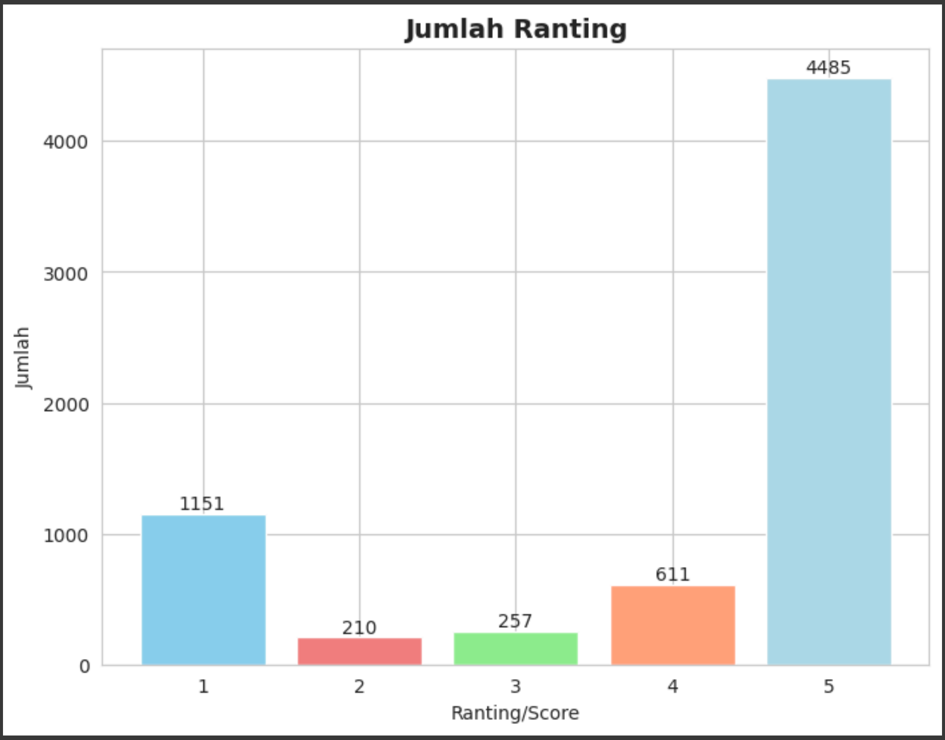
```
text = ' '.join(data['steming_data'].apply(lambda x: str(x) if isinstance(x, (str, int, float)) else ''))
wordcloud = WordCloud(width=800, height=400, background_color='black').generate(text)

plt.figure(figsize=(10, 5))
plt.imshow(wordcloud, interpolation='bilinear')

plt.axis("off")
plt.show()
```



RATING

```
import pandas as pd

data = pd.read_csv(BASE_PATH + "hasil_Labelling_Data.csv")
```

```
import matplotlib.pyplot as plt

rating_counts = data['score'].value_counts()
rating_counts = rating_counts.sort_index()

colors = ['skyblue', 'lightcoral', 'lightgreen', 'lightsalmon', 'lightblue']

plt.figure(figsize=(8, 6))
bars = plt.bar(rating_counts.index, rating_counts.values, color=colors)
plt.title('Jumlah Ranting', fontsize=14, fontweight='bold')
plt.xlabel('Ranting/Score')
plt.ylabel('Jumlah')
plt.xticks(rating_counts.index)

for bar in bars:
    height = bar.get_height()
    plt.text(bar.get_x() + bar.get_width() / 2, height, str(int(height)), ha='center', va='bottom')

plt.show()
```


Jumlah Ranting
Jumlah
Ranting/Score