Project Core Module 5

Submitted By:

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Aim: Data Analytics using Jupyter NB

Hardware Software Requirements:

- Laptop/PC with OS installed
- CSV File to be manipulated
- Python & Jupyter NB

Procedure:

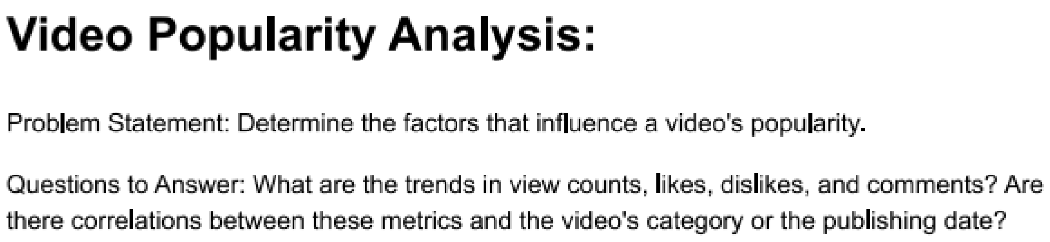
Step 1: Collecting dataset

Collect the dataset on which all the analytics algorithms to be performed for the future decision making For example here we have collected the Dataset by the use of Kaggle website.

Download the Dataset from Kaggle in the format of CSV.

Here we have downloaded the data of Trending videos of youtube for India

Step 2: Preparing problem Statements & answer to it



Video Popularity Analysis:

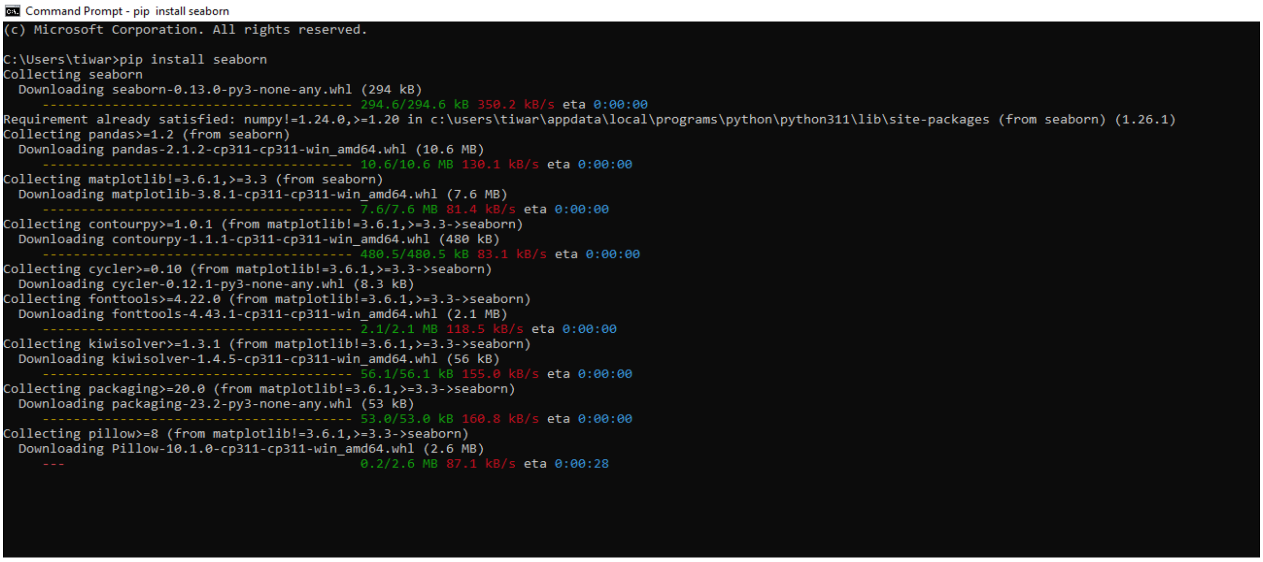
Problem Statement: Determine the factors that influence a video's popularity.

Questions to Answer: What are the trends in view counts, likes, dislikes, and comments? Are there correlations between these metrics and the video's category or the publishing date?

Step 3: Do the Analysis

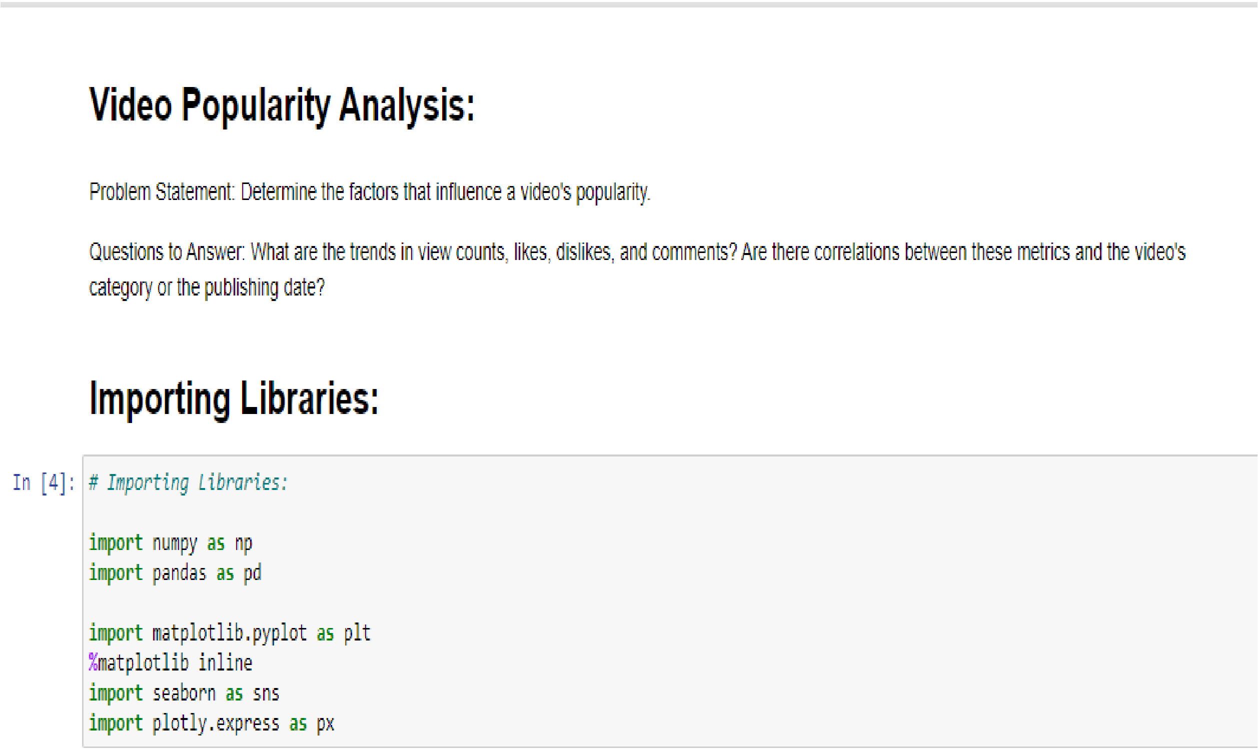
Go to the jupyter NB to perform the analysis on the dataset

(i) Installing & Importing libraries



Command Prompt - pip install seaborn

```
(c) Microsoft Corporation. All rights reserved.

C:\Users\tiwar>pip install seaborn
Collecting seaborn
  Downloading seaborn-0.13.0-py3-none-any.whl (294 kB)
     ---------------------------------------- 294.6/294.6 kB 350.2 kB/s eta 0:00:00
Requirement already satisfied: numpy!=1.24.0,>=1.20 in c:\users\tiwar\appdata\local\programs\python\python311\lib\site-packages (from seaborn) (1.26.1)
Collecting pandas>=1.2 (from seaborn)
  Downloading pandas-2.1.2-cp311-cp311-win_amd64.whl (10.6 MB)
     ---------------------------------------- 10.6/10.6 MB 130.1 kB/s eta 0:00:00
Collecting matplotlib!=3.6.1,>=3.3 (from seaborn)
  Downloading matplotlib-3.8.1-cp311-cp311-win_amd64.whl (7.6 MB)
     ---------------------------------------- 7.6/7.6 MB 81.4 kB/s eta 0:00:00
Collecting contourpy>=1.0.1 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading contourpy-1.1.1-cp311-cp311-win_amd64.whl (480 kB)
     ---------------------------------------- 480.5/480.5 kB 83.1 kB/s eta 0:00:00
Collecting cycler>=0.10 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading cycler-0.12.1-py3-none-any.whl (8.3 kB)
Collecting fonttools>=4.22.0 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading fonttools-4.43.1-cp311-cp311-win_amd64.whl (2.1 MB)
     ---------------------------------------- 2.1/2.1 MB 118.5 kB/s eta 0:00:00
Collecting kiwisolver>=1.3.1 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading kiwisolver-1.4.5-cp311-cp311-win_amd64.whl (56 kB)
     ---------------------------------------- 56.1/56.1 kB 155.0 kB/s eta 0:00:00
Collecting packaging>=20.0 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading packaging-23.2-py3-none-any.whl (53 kB)
     ---------------------------------------- 53.0/53.0 kB 160.8 kB/s eta 0:00:00
Collecting pillow>=8 (from matplotlib!=3.6.1,>=3.3->seaborn)
  Downloading Pillow-10.1.0-cp311-cp311-win_amd64.whl (2.6 MB)
     ---                                      0.2/2.6 MB 87.1 kB/s eta 0:00:28
```



Video Popularity Analysis:

Problem Statement: Determine the factors that influence a video's popularity.

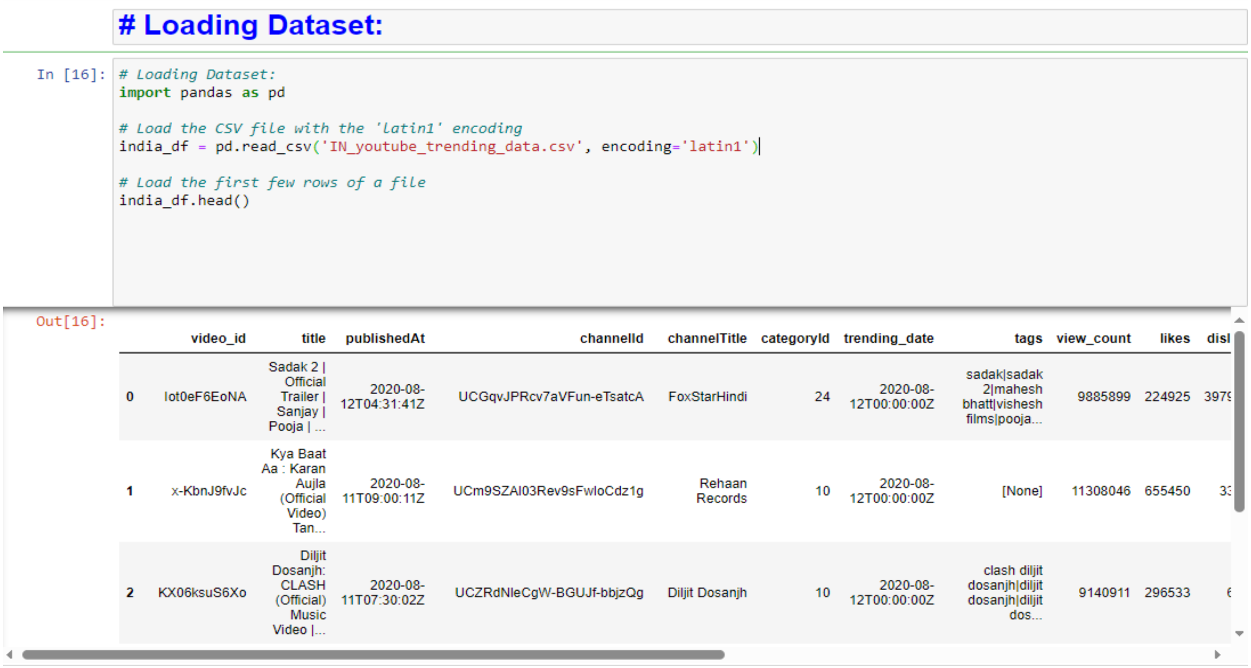
Questions to Answer: What are the trends in view counts, likes, dislikes, and comments? Are there correlations between these metrics and the video's category or the publishing date?

Importing Libraries:

In [4]:

```
# Importing Libraries:

import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import plotly.express as px
```

(ii) Loading Data Set



Loading Dataset:

In [16]:
```
# Loading Dataset:
import pandas as pd

# Load the CSV file with the 'latin1' encoding
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

# Load the first few rows of a file
india_df.head()
```

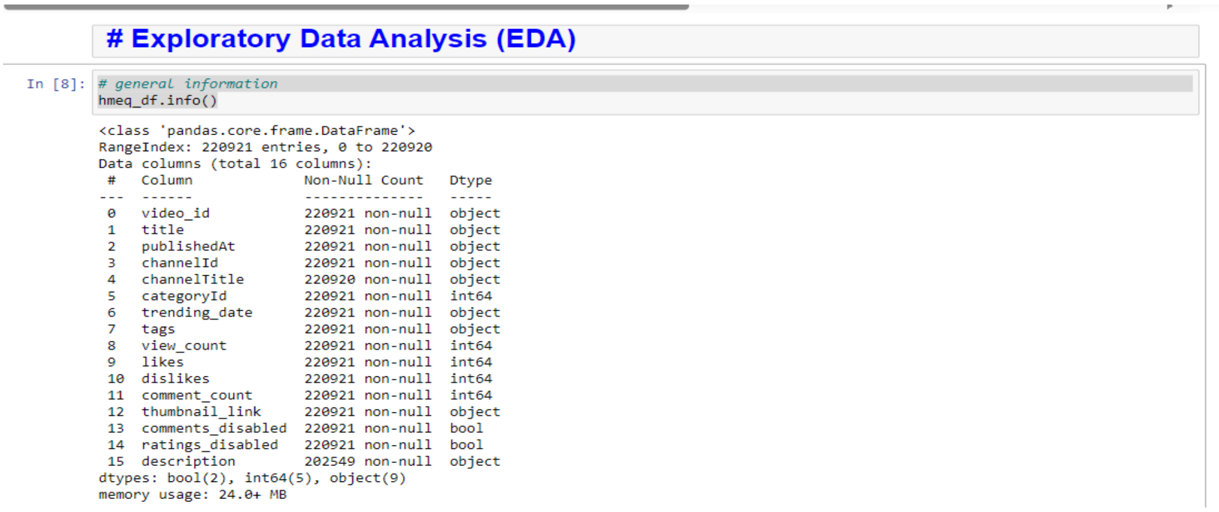
Out[16]:

	video_id	title	publishedAt	channelId	channelTitle	categoryId	trending_date	tags	view_count	likes	disl
0	lot0eF6EoNA	Sadak 2 | Official Trailer | Sanjay | Pooja | ...	2020-08-12T04:31:41Z	UCGqvJPRcv7aVFun-eTsatcA	FoxStarHindi	24	2020-08-12T00:00:00Z	sadak|sadak 2|mahesh bhatt|vishesh films|pooja...	9885899	224925	397
1	x-KbnJ9fvJc	Kya Baat Aa : Karan Aujla (Official Video) Tan...	2020-08-11T09:00:11Z	UCm9SZAI03Rev9sFwloCdz1g	Rehaan Records	10	2020-08-12T00:00:00Z	[None]	11308046	655450	33
2	KX06ksuS6Xo	Diljit Dosanjh: CLASH (Official) Music Video |...	2020-08-11T07:30:02Z	UCZRdNleCgW-BGUJf-bbjzQg	Diljit Dosanjh	10	2020-08-12T00:00:00Z	clash diljit dosanjh|diljit dosanjh|diljit dos...	9140911	296533	6

(iii) EDA:

Exploratory Data Analysis (EDA) is an essential process in data analysis, especially in the field of data science and statistics. EDA is the initial step to understand, summarize, and visualize the main characteristics of a dataset. Here are the key steps involved in EDA

a. Check information



Exploratory Data Analysis (EDA)

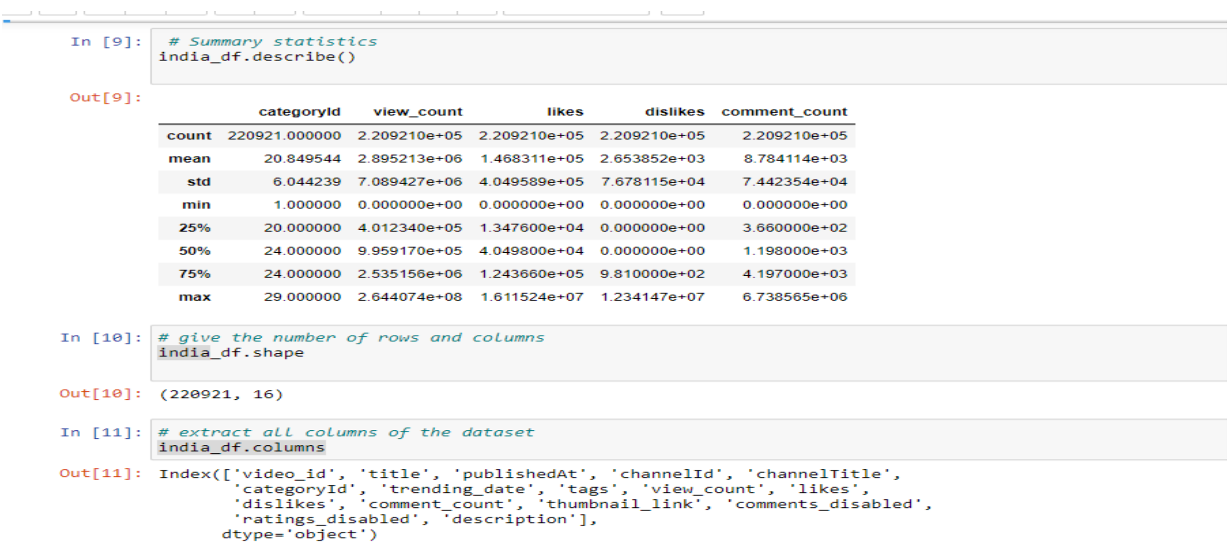
In [8]:
```
# general information
hmeq_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 220921 entries, 0 to 220920
Data columns (total 16 columns):
 #   Column             Non-Null Count   Dtype
---  ------             --------------   -----
 0   video_id           220921 non-null  object
 1   title              220921 non-null  object
 2   publishedAt        220921 non-null  object
 3   channelId          220921 non-null  object
 4   channelTitle       220920 non-null  object
 5   categoryId         220921 non-null  int64
 6   trending_date      220921 non-null  object
 7   tags               220921 non-null  object
 8   view_count         220921 non-null  int64
 9   likes              220921 non-null  int64
 10  dislikes           220921 non-null  int64
 11  comment_count      220921 non-null  int64
 12  thumbnail_link     220921 non-null  object
 13  comments_disabled  220921 non-null  bool
 14  ratings_disabled   220921 non-null  bool
 15  description        202549 non-null  object
dtypes: bool(2), int64(5), object(9)
memory usage: 24.0+ MB
```

b. Check statistics summary:

c. Find number of rows & columns:

d. Extract all the columns Name:



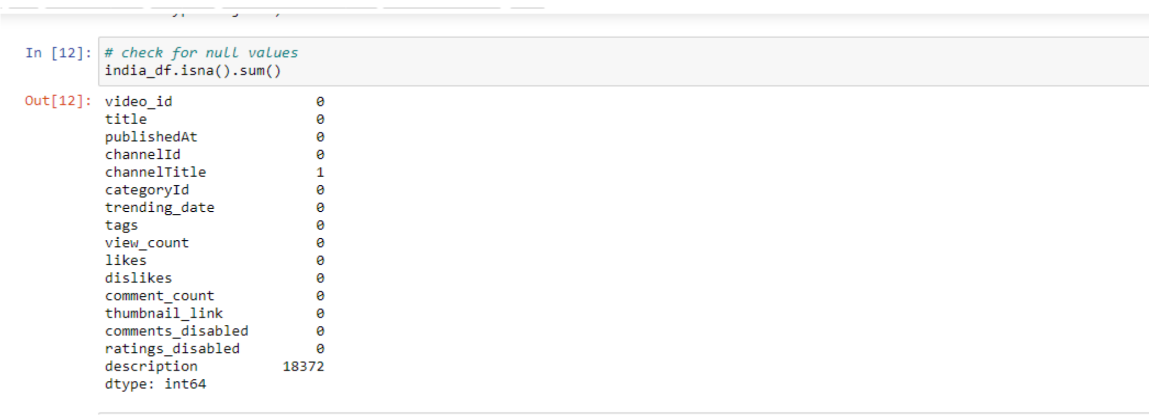
```
In [9]:  # Summary statistics
         india_df.describe()
```

Out[9]:

	categoryId	view_count	likes	dislikes	comment_count
count	220921.000000	2.209210e+05	2.209210e+05	2.209210e+05	2.209210e+05
mean	20.849544	2.895213e+06	1.468311e+05	2.653852e+03	8.784114e+03
std	6.044239	7.089427e+06	4.049589e+05	7.678115e+04	7.442354e+04
min	1.000000	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
25%	20.000000	4.012340e+05	1.347600e+04	0.000000e+00	3.660000e+02
50%	24.000000	9.959170e+05	4.049800e+04	0.000000e+00	1.198000e+03
75%	24.000000	2.535156e+06	1.243660e+05	9.810000e+02	4.197000e+03
max	29.000000	2.644074e+08	1.611524e+07	1.234147e+07	6.738565e+06

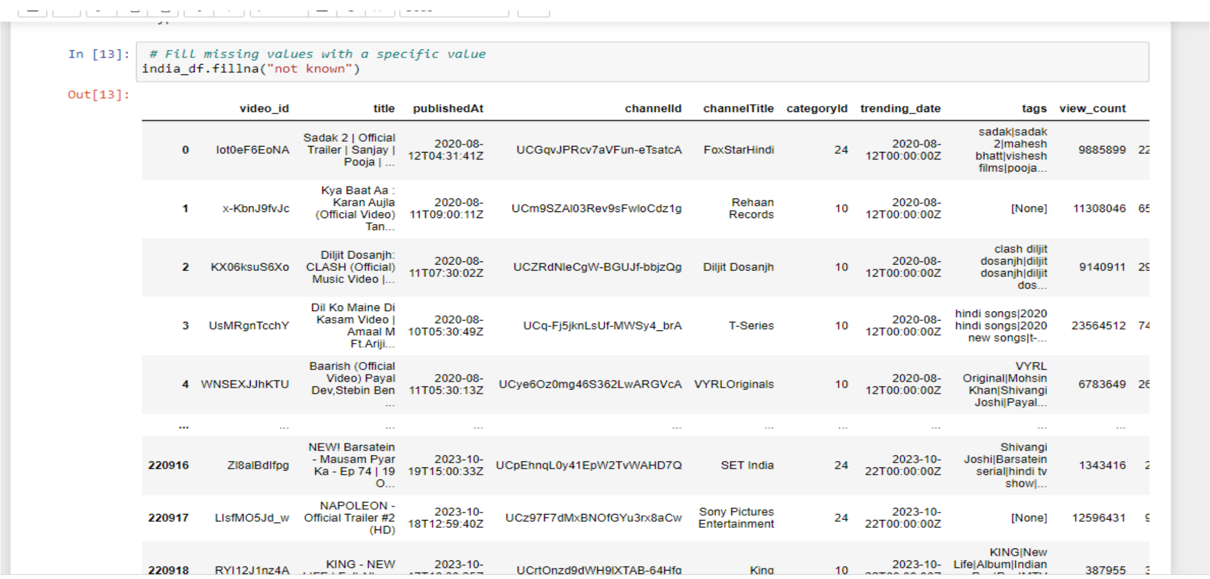
```
In [10]: # give the number of rows and columns
         india_df.shape

Out[10]: (220921, 16)

In [11]: # extract all columns of the dataset
         india_df.columns

Out[11]: Index(['video_id', 'title', 'publishedAt', 'channelId', 'channelTitle',
                'categoryId', 'trending_date', 'tags', 'view_count', 'likes',
                'dislikes', 'comment_count', 'thumbnail_link', 'comments_disabled',
                'ratings_disabled', 'description'],
               dtype='object')
```

e. Check null values:



```
In [12]: # check for null values
         india_df.isna().sum()

Out[12]: video_id                 0
         title                    0
         publishedAt              0
         channelId                0
         channelTitle             1
         categoryId               0
         trending_date            0
         tags                     0
         view_count               0
         likes                    0
         dislikes                 0
         comment_count            0
         thumbnail_link           0
         comments_disabled        0
         ratings_disabled         0
         description          18372
         dtype: int64
```

f. Fill the null values:



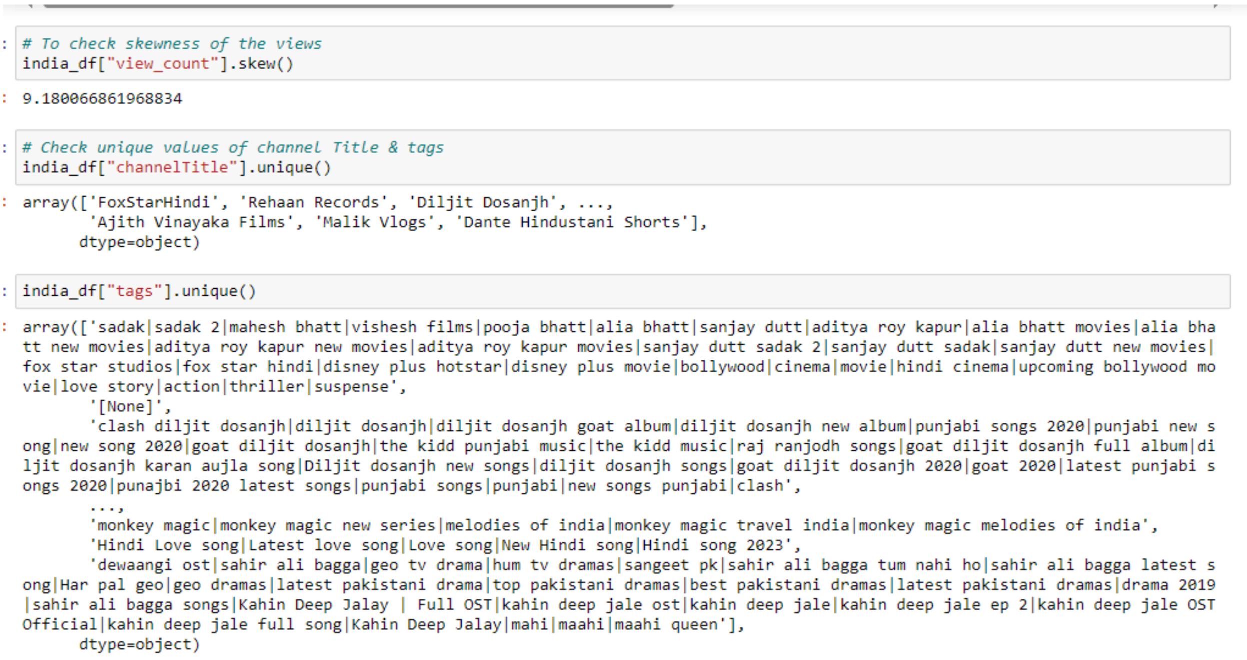
```
In [13]: # Fill missing values with a specific value
         india_df.fillna("not known")
```

Out[13]:

	video_id	title	publishedAt	channelId	channelTitle	categoryId	trending_date	tags	view_count	
0	lot0eF6EoNA	Sadak 2 | Official Trailer | Sanjay | Pooja | ...	2020-08-12T04:31:41Z	UCGqvJPRcv7aVFun-eTsatcA	FoxStarHindi	24	2020-08-12T00:00:00Z	sadak|sadak 2|mahesh bhatt|vishesh films|pooja...	9885899	22
1	x-KbnJ9fvJc	Kya Baat Aa : Karan Aujla (Official Video) Tan...	2020-08-11T09:00:11Z	UCm9SZAl03Rev9sFwloCdz1g	Rehaan Records	10	2020-08-12T00:00:00Z	[None]	11308046	65
2	KX06ksuS6Xo	Diljit Dosanjh: CLASH (Official) Music Video |...	2020-08-11T07:30:02Z	UCZRdNleCgW-BGUJf-bbjzQg	Diljit Dosanjh	10	2020-08-12T00:00:00Z	clash diljit dosanjh|diljit dosanjh|diljit dos...	9140911	29
3	UsMRgnTcchY	Dil Ko Maine Di Kasam Video | Amaal M Ft.Ariji...	2020-08-10T05:30:49Z	UCq-Fj5jknLsUf-MWSy4_brA	T-Series	10	2020-08-12T00:00:00Z	hindi songs|2020 hindi songs|2020 new songs|t-...	23564512	74
4	WNSEXJJhKTU	Baarish (Official Video) Payal Dev,Stebin Ben ...	2020-08-11T05:30:13Z	UCye6Oz0mg46S362LwARGVcA	VYRLOriginals	10	2020-08-12T00:00:00Z	VYRL Original|Mohsin Khan|Shivangi Joshi|Payal...	6783649	26
...	...	...	...	...	...	...	...	...	...	
220916	Zl8alBdlfpg	NEW! Barsatein - Mausam Pyar Ka - Ep 74 | 19 O...	2023-10-19T15:00:33Z	UCpEhnqL0y41EpW2TvWAHD7Q	SET India	24	2023-10-22T00:00:00Z	Shivangi Joshi|Barsatein serial|hindi tv show|...	1343416	2
220917	LlsfMO5Jd_w	NAPOLEON - Official Trailer #2 (HD)	2023-10-18T12:59:40Z	UCz97F7dMxBNOfGYu3rx8aCw	Sony Pictures Entertainment	24	2023-10-22T00:00:00Z	[None]	12596431	9
220918	RYI12J1nz4A	KING - NEW	2023-10-	UCrtOnzd9dWH9IXTAB-64Hfq	King	10	2023-10-	KING|New Life|Album|Indian	387955	3

g. To Check Skewness:

h. Check unique values for channel Title & Tags



```
# To check skewness of the views
india_df["view_count"].skew()
```

```
9.180066861968834
```

```
# Check unique values of channel Title & tags
india_df["channelTitle"].unique()
```

```
array(['FoxStarHindi', 'Rehaan Records', 'Diljit Dosanjh', ...,
       'Ajith Vinayaka Films', 'Malik Vlogs', 'Dante Hindustani Shorts'],
      dtype=object)
```

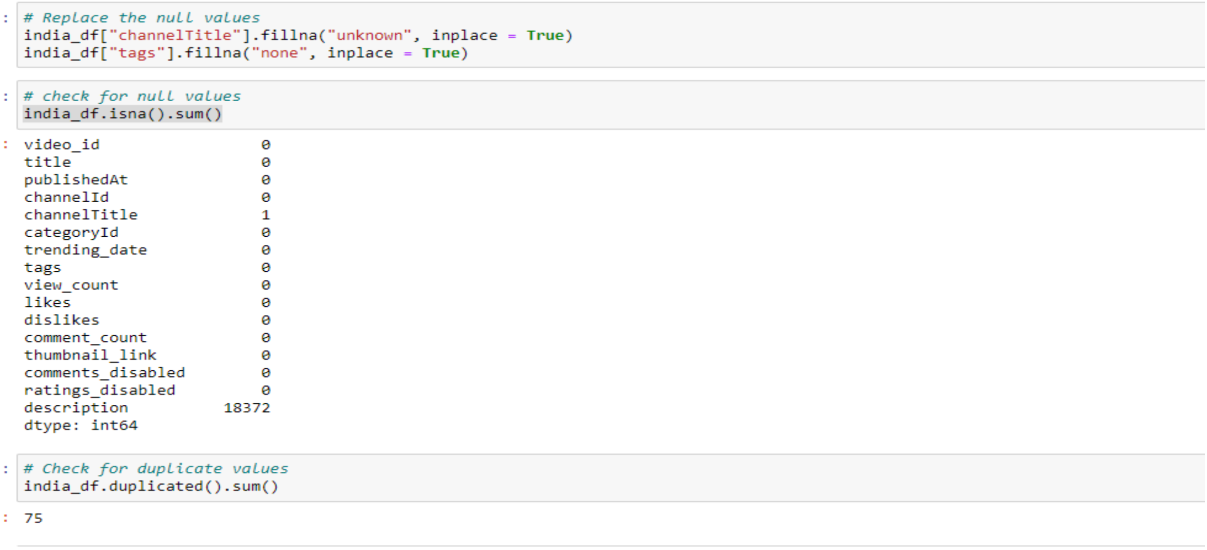
```
india_df["tags"].unique()
```

```
array(['sadak|sadak 2|mahesh bhatt|vishesh films|pooja bhatt|alia bhatt|sanjay dutt|aditya roy kapur|alia bhatt movies|alia bha
tt new movies|aditya roy kapur new movies|aditya roy kapur movies|sanjay dutt sadak 2|sanjay dutt sadak|sanjay dutt new movies|
fox star studios|fox star hindi|disney plus hotstar|disney plus movie|bollywood|cinema|movie|hindi cinema|upcoming bollywood mo
vie|love story|action|thriller|suspense',
       '[None]',
       'clash diljit dosanjh|diljit dosanjh|diljit dosanjh goat album|diljit dosanjh new album|punjabi songs 2020|punjabi new s
ong|new song 2020|goat diljit dosanjh|the kidd punjabi music|the kidd music|raj ranjodh songs|goat diljit dosanjh full album|di
ljit dosanjh karan aujla song|Diljit dosanjh new songs|diljit dosanjh songs|goat diljit dosanjh 2020|goat 2020|latest punjabi s
ongs 2020|punajbi 2020 latest songs|punjabi songs|punjabi|new songs punjabi|clash',
       ...,
       'monkey magic|monkey magic new series|melodies of india|monkey magic travel india|monkey magic melodies of india',
       'Hindi Love song|Latest love song|Love song|New Hindi song|Hindi song 2023',
       'dewaangi ost|sahir ali bagga|geo tv drama|hum tv dramas|sangeet pk|sahir ali bagga tum nahi ho|sahir ali bagga latest s
ong|Har pal geo|geo dramas|latest pakistani drama|top pakistani dramas|best pakistani dramas|latest pakistani dramas|drama 2019
|sahir ali bagga songs|Kahin Deep Jalay | Full OST|kahin deep jale ost|kahin deep jale|kahin deep jale ep 2|kahin deep jale OST
Official|kahin deep jale full song|Kahin Deep Jalay|mahi|maahi|maahi queen'],
      dtype=object)
```

i. Replace null values

j. Check null values

k. Check duplicate values



```
# Replace the null values
india_df["channelTitle"].fillna("unknown", inplace = True)
india_df["tags"].fillna("none", inplace = True)
```

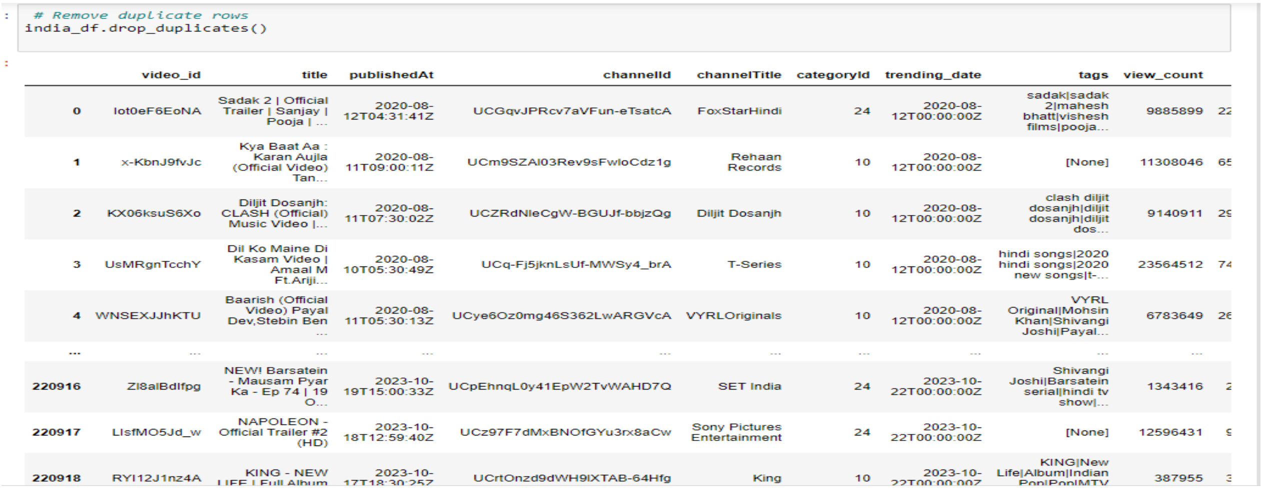
```
# check for null values
india_df.isna().sum()
```

```
video_id                0
title                   0
publishedAt             0
channelId               0
channelTitle            1
categoryId              0
trending_date           0
tags                    0
view_count              0
likes                   0
dislikes                0
comment_count           0
thumbnail_link          0
comments_disabled       0
ratings_disabled        0
description         18372
dtype: int64
```

```
# Check for duplicate values
india_df.duplicated().sum()
```

```
75
```

l. Remove Duplicate Rows

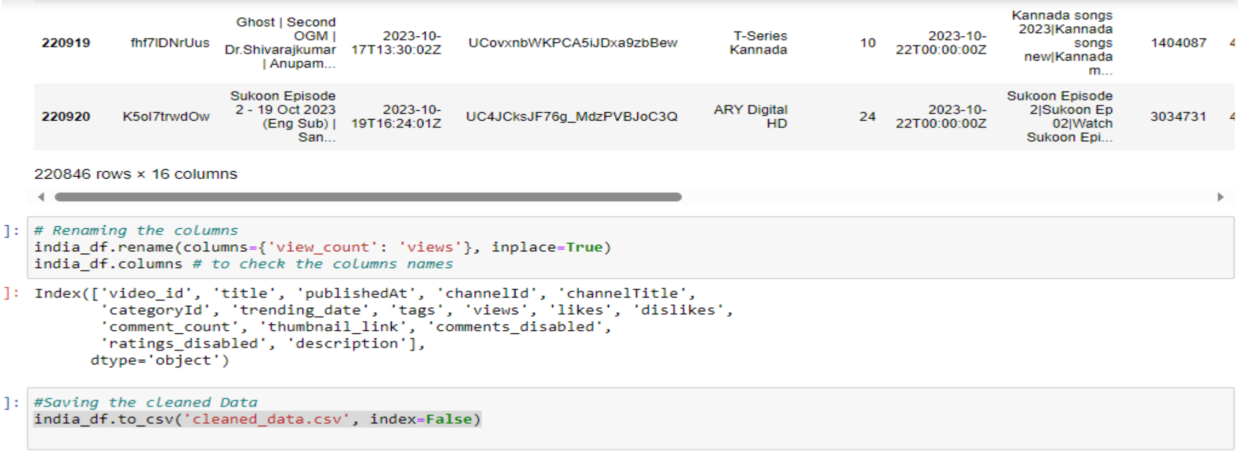


```
# Remove duplicate rows
india_df.drop_duplicates()
```

	video_id	title	publishedAt	channelId	channelTitle	categoryId	trending_date	tags	view_count	
0	lot0eF6EoNA	Sadak 2 | Official Trailer | Sanjay | Pooja | ...	2020-08-12T04:31:41Z	UCGqvJPRcv7aVFun-eTsatcA	FoxStarHindi	24	2020-08-12T00:00:00Z	sadak|sadak 2|mahesh bhatt|vishesh films|pooja...	9885899	22
1	x-KbnJ9fvJc	Kya Baat Aa : Karan Aujla (Official Video) Tan...	2020-08-11T09:00:11Z	UCm9SZAl03Rev9sFwloCdz1g	Rehaan Records	10	2020-08-12T00:00:00Z	[None]	11308046	65
2	KX06ksuS6Xo	Diljit Dosanjh: CLASH (Official) Music Video |...	2020-08-11T07:30:02Z	UCZRdNleCgW-BGUJf-bbjzQg	Diljit Dosanjh	10	2020-08-12T00:00:00Z	clash diljit dosanjh|diljit dosanjh|diljit dos...	9140911	29
3	UsMRgnTcchY	Dil Ko Maine Di Kasam Video | Amaal M Ft.Ariji...	2020-08-10T05:30:49Z	UCq-Fj5jknLsUf-MWSy4_brA	T-Series	10	2020-08-12T00:00:00Z	hindi songs|2020 hindi songs|2020 new songs|t-...	23564512	74
4	WNSEXJJhKTU	Baarish (Official Video) Payal Dev,Stebin Ben ...	2020-08-11T05:30:13Z	UCye6Oz0mg46S362LwARGVcA	VYRLOriginals	10	2020-08-12T00:00:00Z	VYRL Original|Mohsin Khan|Shivangi Joshi|Payal...	6783649	26
...	...	...	...	...	...	...	...	...	...	
220916	Zl8alBdlfpg	NEW! Barsatein - Mausam Pyar Ka - Ep 74 | 19 O...	2023-10-19T15:00:33Z	UCpEhnqL0y41EpW2TvWAHD7Q	SET India	24	2023-10-22T00:00:00Z	Shivangi Joshi|Barsatein serial|hindi tv show|...	1343416	2
220917	LlsfMO5Jd_w	NAPOLEON - Official Trailer #2 (HD)	2023-10-18T12:59:40Z	UCz97F7dMxBNOfGYu3rx8aCw	Sony Pictures Entertainment	24	2023-10-22T00:00:00Z	[None]	12596431	9
220918	RYI12J1nz4A	KING - NEW LIFE | Full Album	2023-10-17T18:30:25Z	UCrtOnzd9dWH9IXTAB-64Hfg	King	10	2023-10-22T00:00:00Z	KING|New Life|Album|Indian Pop|Pop|MTV	387955	3
220919	fhf7IDNrUus	Ghost | Second OGM | Dr.Shivarajkumar | Anupam...	2023-10-17T13:30:02Z	UCovxnbWKPCA5iJDxa9zbBew	T-Series Kannada	10	2023-10-22T00:00:00Z	Kannada songs 2023|Kannada songs new|Kannada m...	1404087	4
220920	K5ol7trwdOw	Sukoon Episode 2 - 19 Oct 2023 (Eng Sub) | San...	2023-10-19T16:24:01Z	UC4JCksJF76g_MdzPVBJoC3Q	ARY Digital HD	24	2023-10-22T00:00:00Z	Sukoon Episode 2|Sukoon Ep 02|Watch Sukoon Epi...	3034731	4

m. Renaming the columns:

n. Save the cleaned Data:



220846 rows × 16 columns

```
# Renaming the columns
india_df.rename(columns={'view_count': 'views'}, inplace=True)
india_df.columns # to check the columns names
```

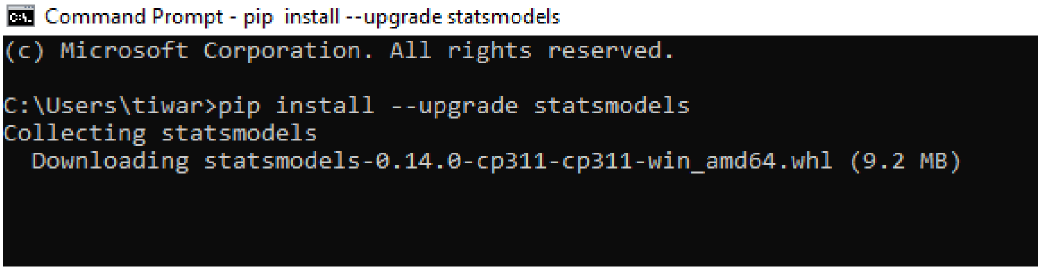
```
Index(['video_id', 'title', 'publishedAt', 'channelId', 'channelTitle',
       'categoryId', 'trending_date', 'tags', 'views', 'likes', 'dislikes',
       'comment_count', 'thumbnail_link', 'comments_disabled',
       'ratings_disabled', 'description'],
      dtype='object')
```

```
#Saving the cleaned Data
india_df.to_csv('cleaned_data.csv', index=False)
```

(iv) Time-Series Analysis:

a. Import Necessary libraries:

- **Install statsmodel**

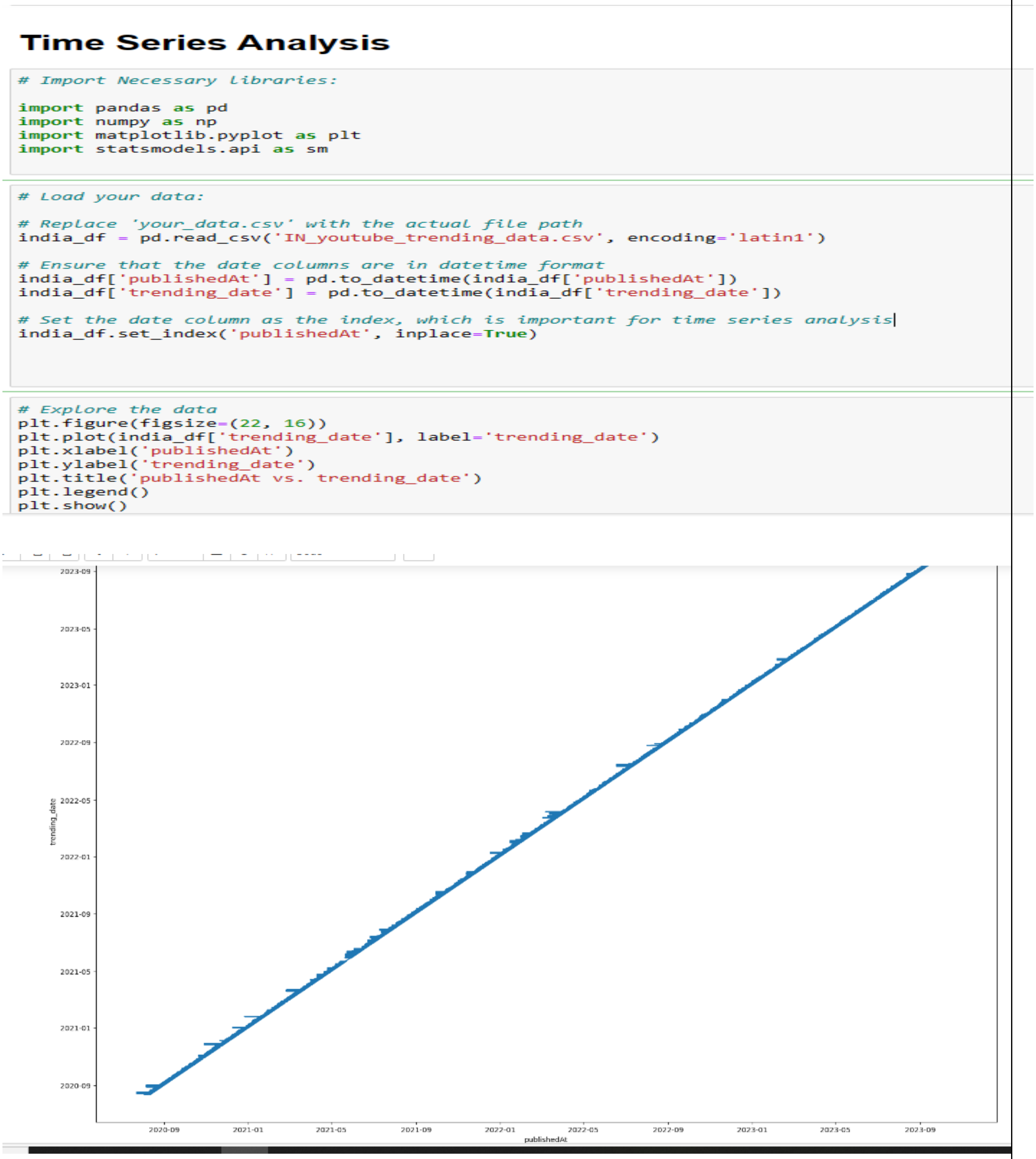


Command Prompt - pip install --upgrade statsmodels

```
(c) Microsoft Corporation. All rights reserved.

C:\Users\tiwar>pip install --upgrade statsmodels
Collecting statsmodels
  Downloading statsmodels-0.14.0-cp311-cp311-win_amd64.whl (9.2 MB)
```

b. Load data

c. Explore Data



Time Series Analysis

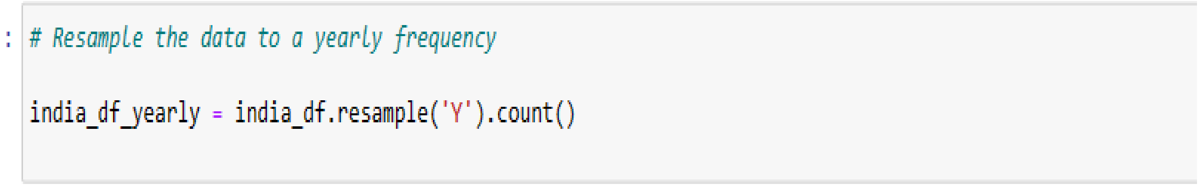
```
# Import Necessary Libraries:

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import statsmodels.api as sm
```

```
# Load your data:

# Replace 'your_data.csv' with the actual file path
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

# Ensure that the date columns are in datetime format
india_df['publishedAt'] = pd.to_datetime(india_df['publishedAt'])
india_df['trending_date'] = pd.to_datetime(india_df['trending_date'])

# Set the date column as the index, which is important for time series analysis
india_df.set_index('publishedAt', inplace=True)
```

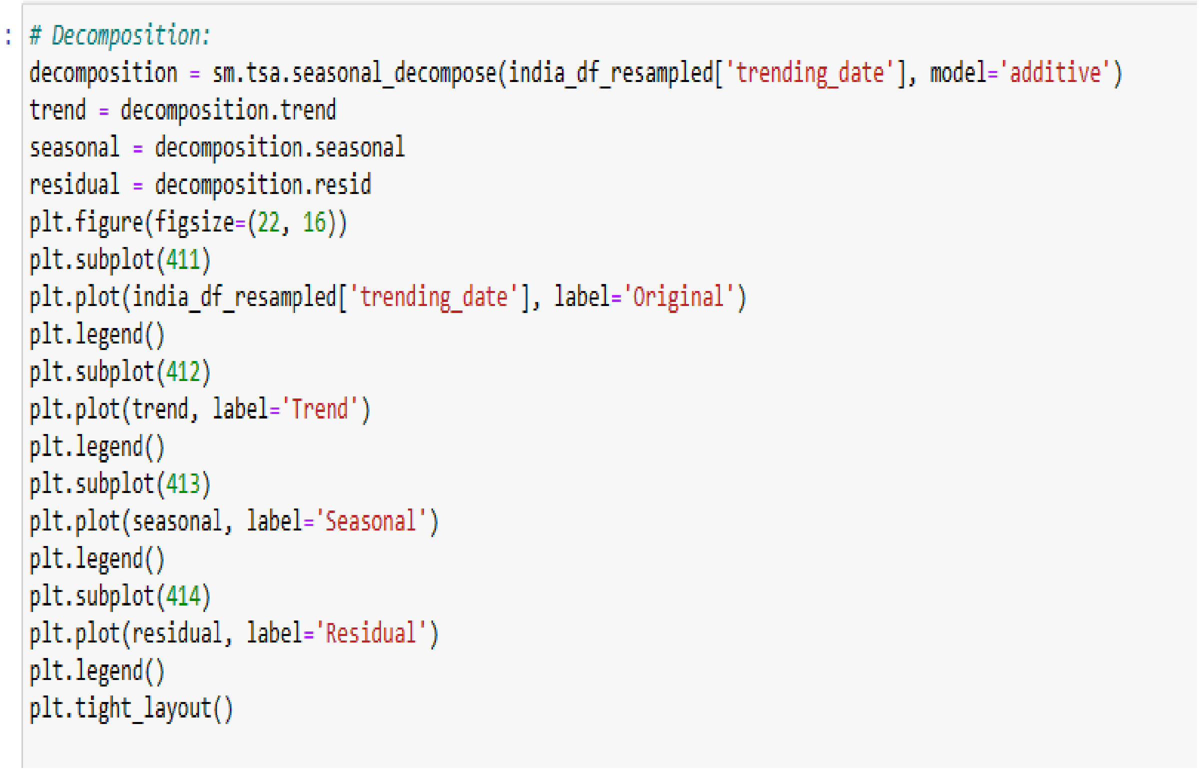
```
# Explore the data
plt.figure(figsize=(22, 16))
plt.plot(india_df['trending_date'], label='trending_date')
plt.xlabel('publishedAt')
plt.ylabel('trending_date')
plt.title('publishedAt vs. trending_date')
plt.legend()
plt.show()
```

d. Resampling

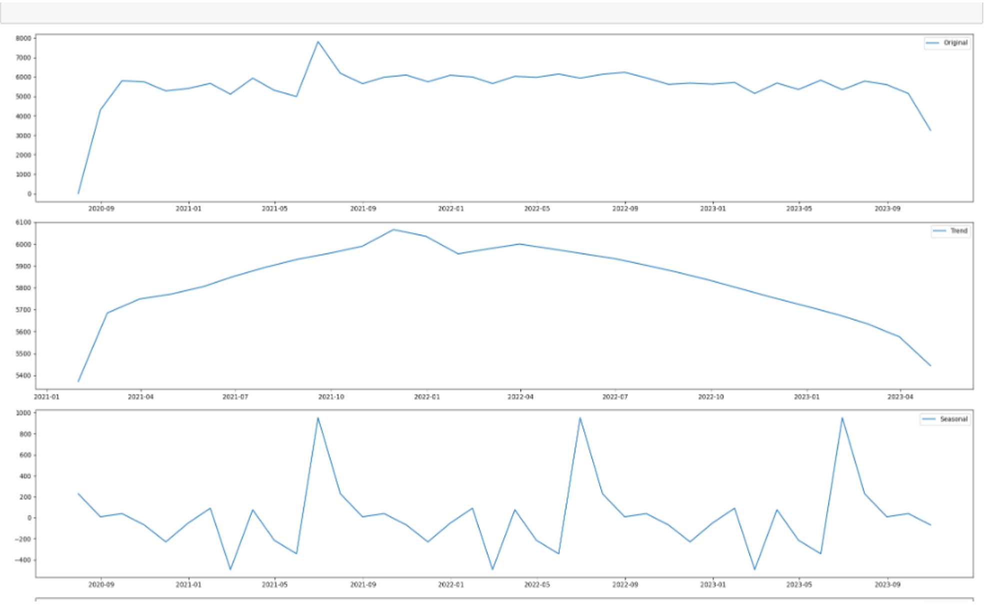
e. Decomposition

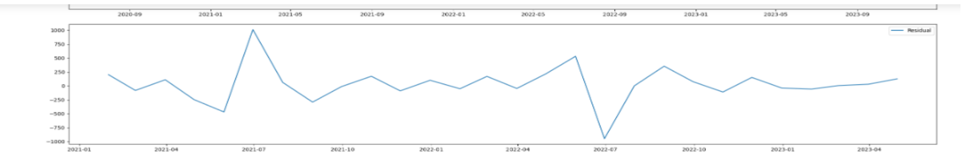


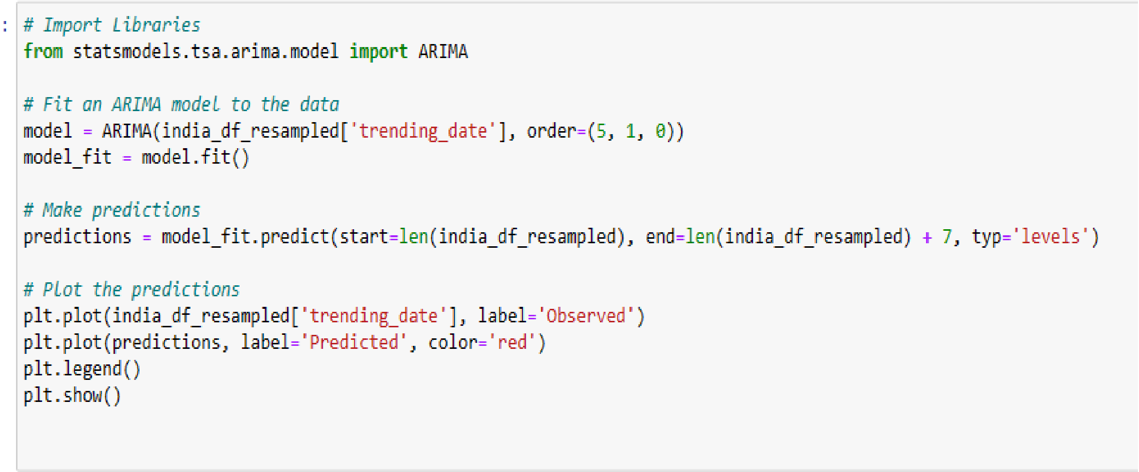
```
# Resample the data to a yearly frequency

india_df_yearly = india_df.resample('Y').count()
```



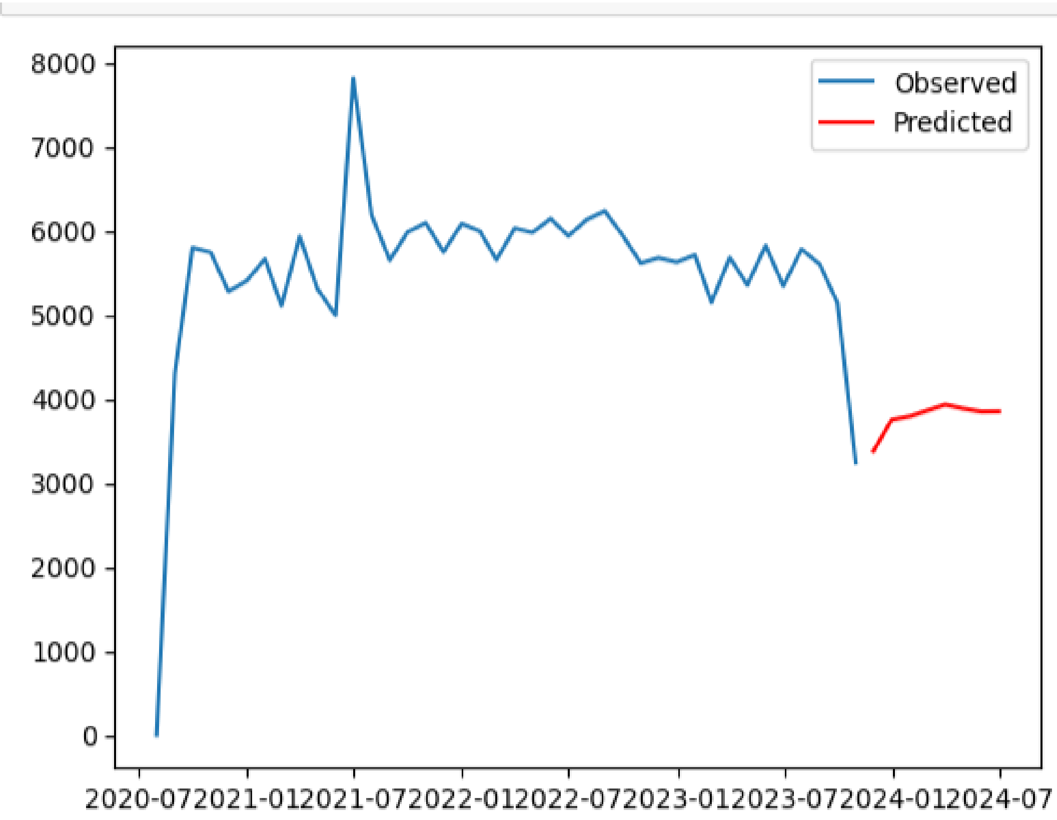
```
# Decomposition:
decomposition = sm.tsa.seasonal_decompose(india_df_resampled['trending_date'], model='additive')
trend = decomposition.trend
seasonal = decomposition.seasonal
residual = decomposition.resid
plt.figure(figsize=(22, 16))
plt.subplot(411)
plt.plot(india_df_resampled['trending_date'], label='Original')
plt.legend()
plt.subplot(412)
plt.plot(trend, label='Trend')
plt.legend()
plt.subplot(413)
plt.plot(seasonal, label='Seasonal')
plt.legend()
plt.subplot(414)
plt.plot(residual, label='Residual')
plt.legend()
plt.tight_layout()
```



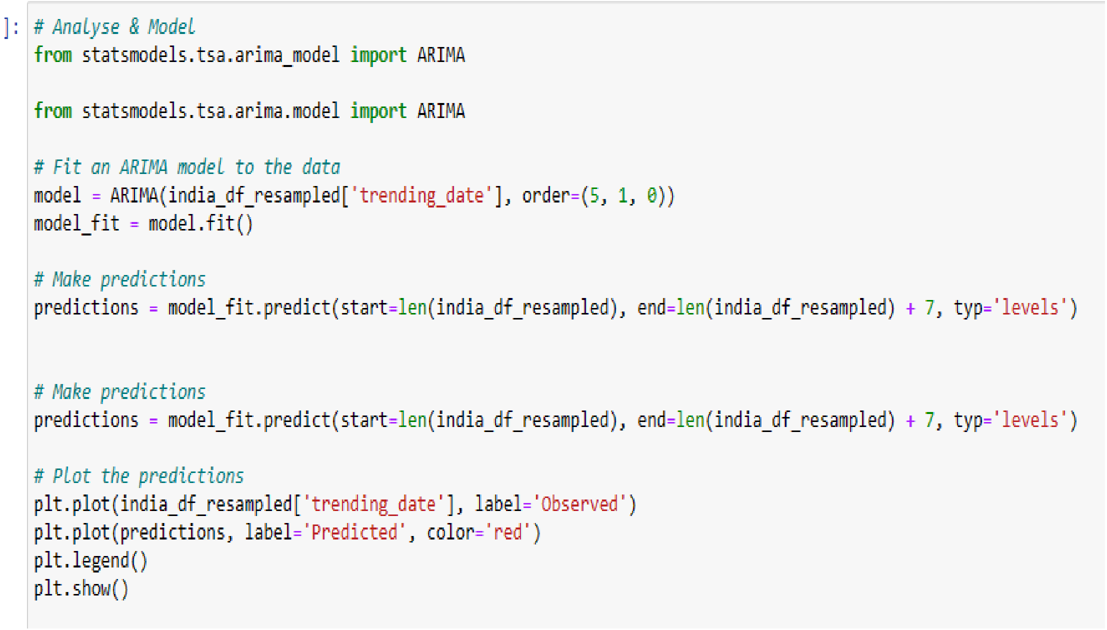




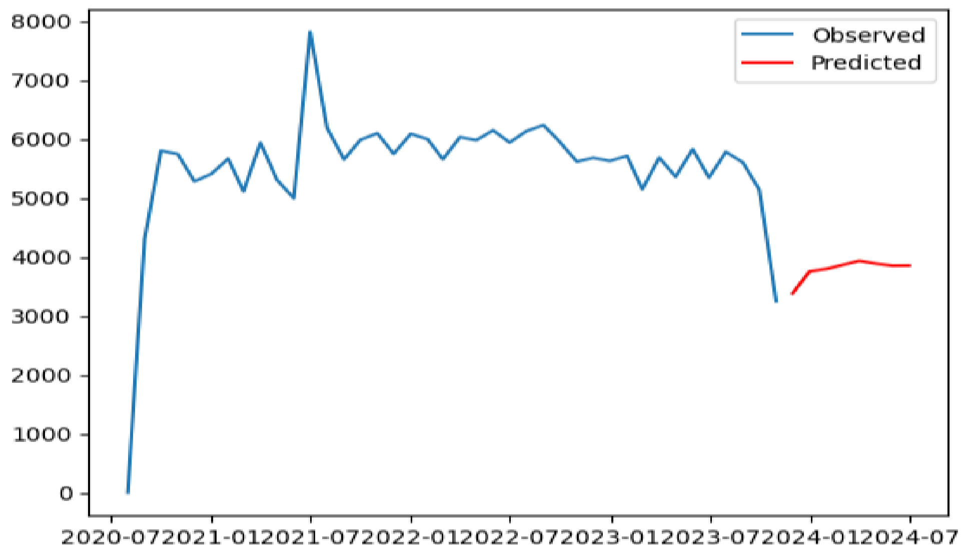
```
: # Import Libraries
from statsmodels.tsa.arima.model import ARIMA

# Fit an ARIMA model to the data
model = ARIMA(india_df_resampled['trending_date'], order=(5, 1, 0))
model_fit = model.fit()

# Make predictions
predictions = model_fit.predict(start=len(india_df_resampled), end=len(india_df_resampled) + 7, typ='levels')

# Plot the predictions
plt.plot(india_df_resampled['trending_date'], label='Observed')
plt.plot(predictions, label='Predicted', color='red')
plt.legend()
plt.show()
```

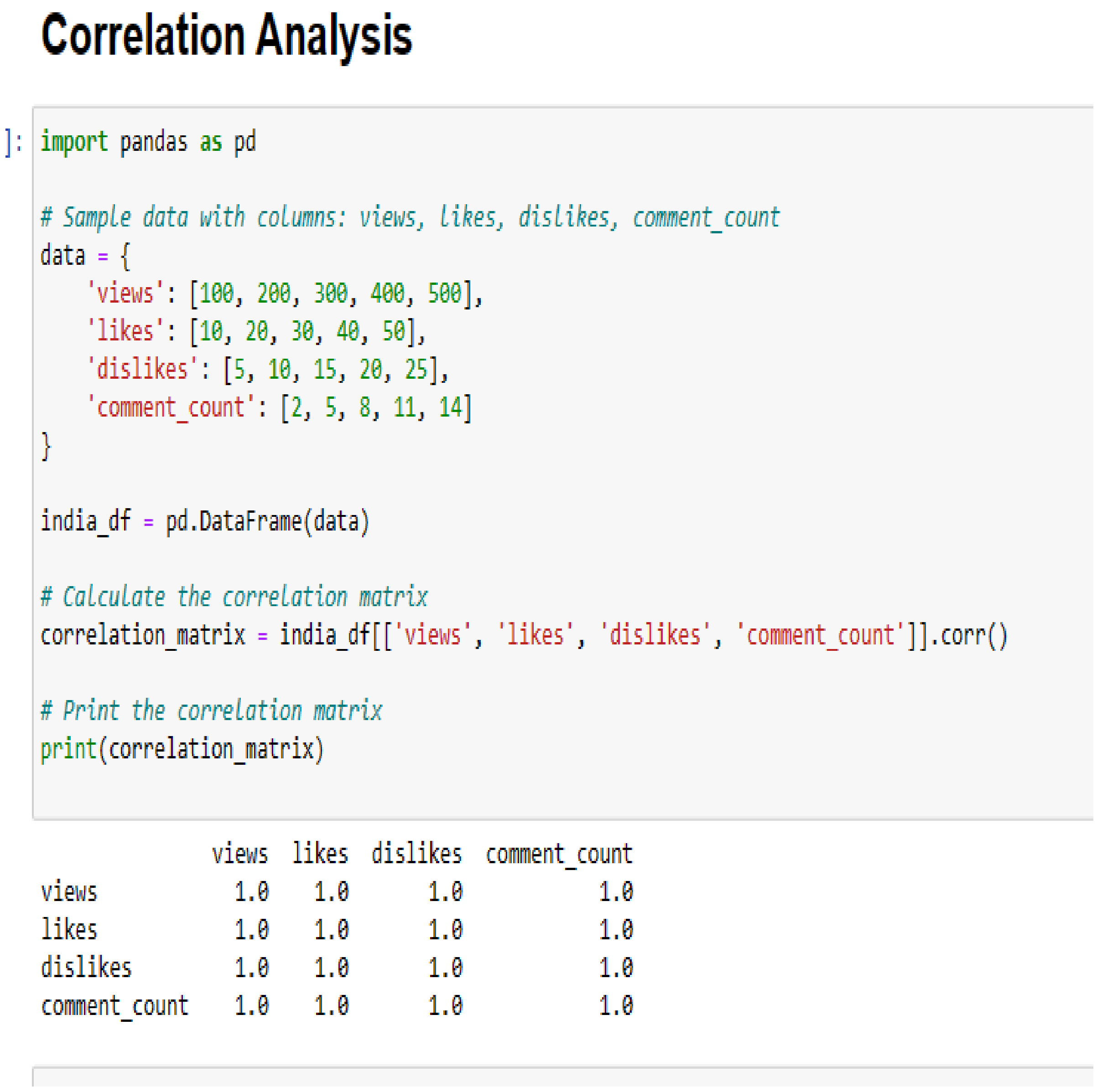


f. Analyse & Model



```
]: # Analyse & Model
from statsmodels.tsa.arima_model import ARIMA

from statsmodels.tsa.arima.model import ARIMA

# Fit an ARIMA model to the data
model = ARIMA(india_df_resampled['trending_date'], order=(5, 1, 0))
model_fit = model.fit()

# Make predictions
predictions = model_fit.predict(start=len(india_df_resampled), end=len(india_df_resampled) + 7, typ='levels')


# Make predictions
predictions = model_fit.predict(start=len(india_df_resampled), end=len(india_df_resampled) + 7, typ='levels')

# Plot the predictions
plt.plot(india_df_resampled['trending_date'], label='Observed')
plt.plot(predictions, label='Predicted', color='red')
plt.legend()
plt.show()
```

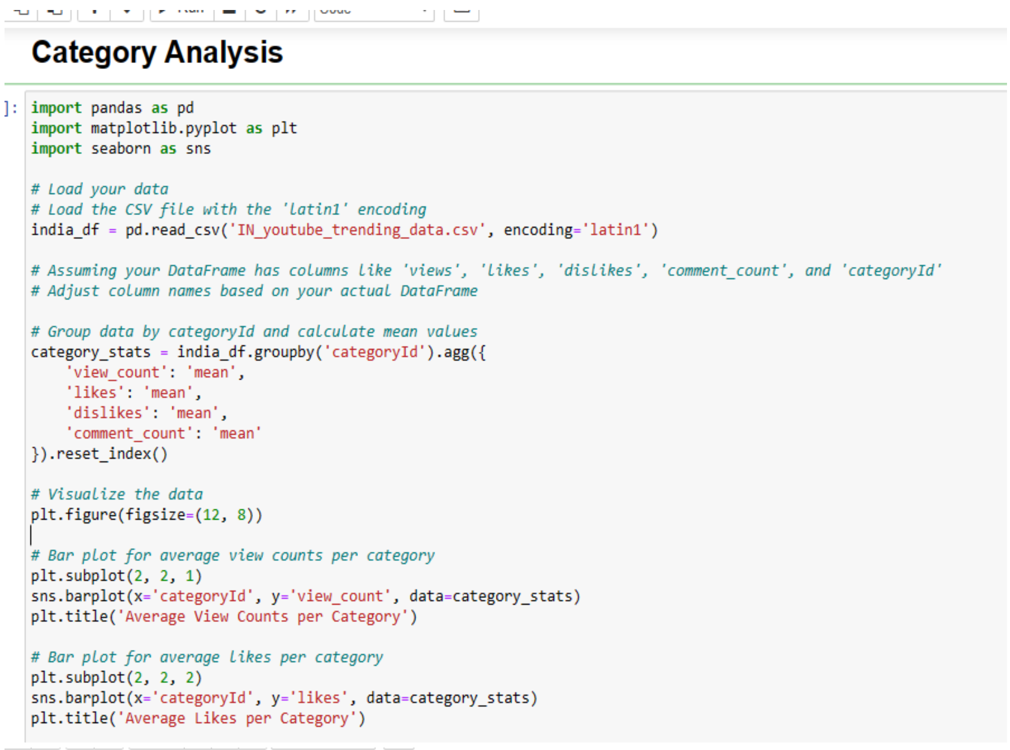




Correlation Analysis

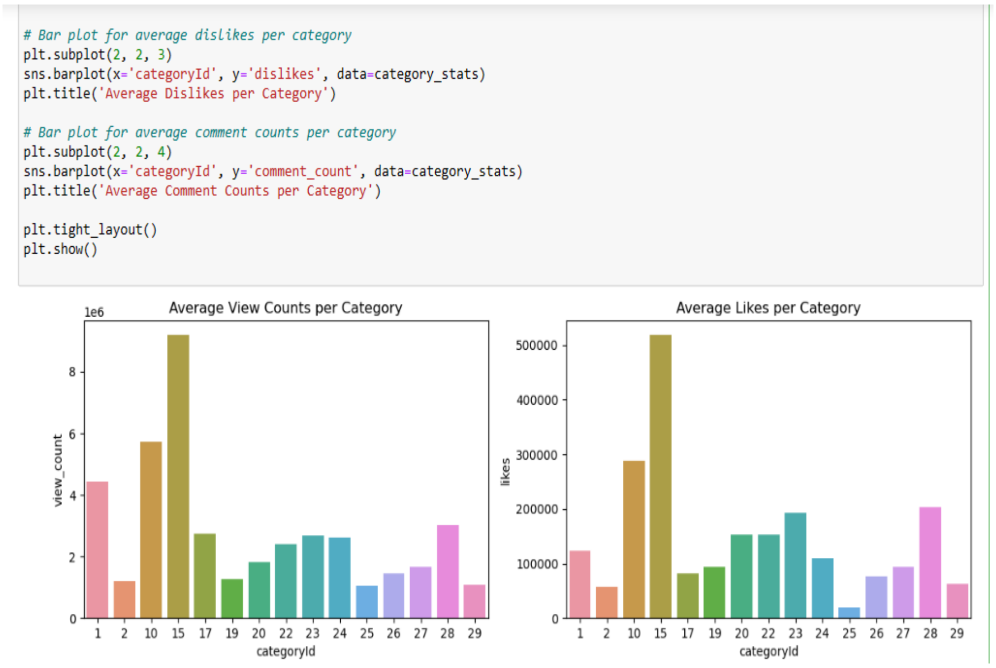
```python
import pandas as pd

# Sample data with columns: views, likes, dislikes, comment_count
data = {
    'views': [100, 200, 300, 400, 500],
    'likes': [10, 20, 30, 40, 50],
    'dislikes': [5, 10, 15, 20, 25],
    'comment_count': [2, 5, 8, 11, 14]
}

india_df = pd.DataFrame(data)

# Calculate the correlation matrix
correlation_matrix = india_df[['views', 'likes', 'dislikes', 'comment_count']].corr()

# Print the correlation matrix
print(correlation_matrix)
```

```
               views  likes  dislikes  comment_count
views            1.0    1.0       1.0            1.0
likes            1.0    1.0       1.0            1.0
dislikes         1.0    1.0       1.0            1.0
comment_count    1.0    1.0       1.0            1.0
```

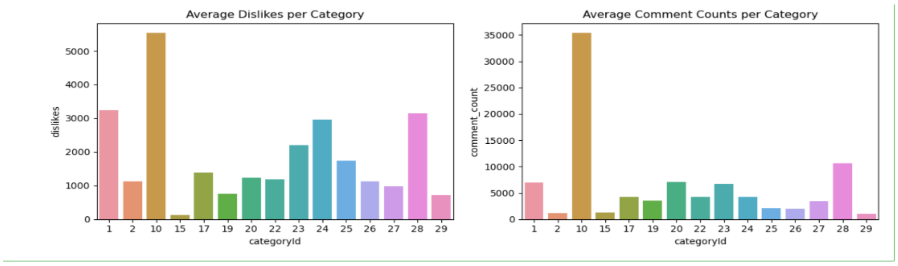


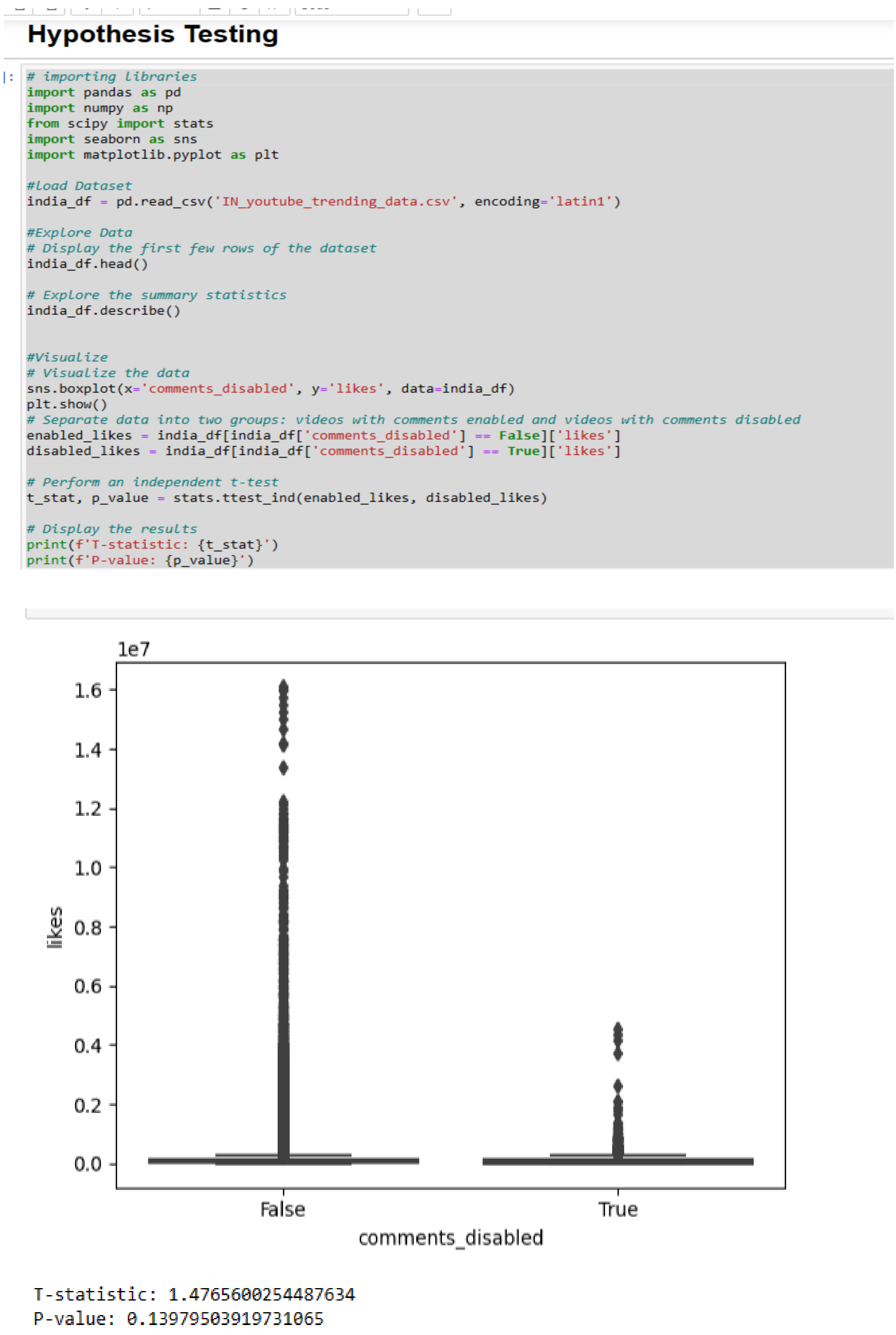
Category Analysis

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

# Load your data
# Load the CSV file with the 'latin1' encoding
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

# Assuming your DataFrame has columns like 'views', 'likes', 'dislikes', 'comment_count', and 'categoryId'
# Adjust column names based on your actual DataFrame

# Group data by categoryId and calculate mean values
category_stats = india_df.groupby('categoryId').agg({
    'view_count': 'mean',
    'likes': 'mean',
    'dislikes': 'mean',
    'comment_count': 'mean'
}).reset_index()

# Visualize the data
plt.figure(figsize=(12, 8))

# Bar plot for average view counts per category
plt.subplot(2, 2, 1)
sns.barplot(x='categoryId', y='view_count', data=category_stats)
plt.title('Average View Counts per Category')

# Bar plot for average likes per category
plt.subplot(2, 2, 2)
sns.barplot(x='categoryId', y='likes', data=category_stats)
plt.title('Average Likes per Category')
```



```
# Bar plot for average dislikes per category
plt.subplot(2, 2, 3)
sns.barplot(x='categoryId', y='dislikes', data=category_stats)
plt.title('Average Dislikes per Category')

# Bar plot for average comment counts per category
plt.subplot(2, 2, 4)
sns.barplot(x='categoryId', y='comment_count', data=category_stats)
plt.title('Average Comment Counts per Category')

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

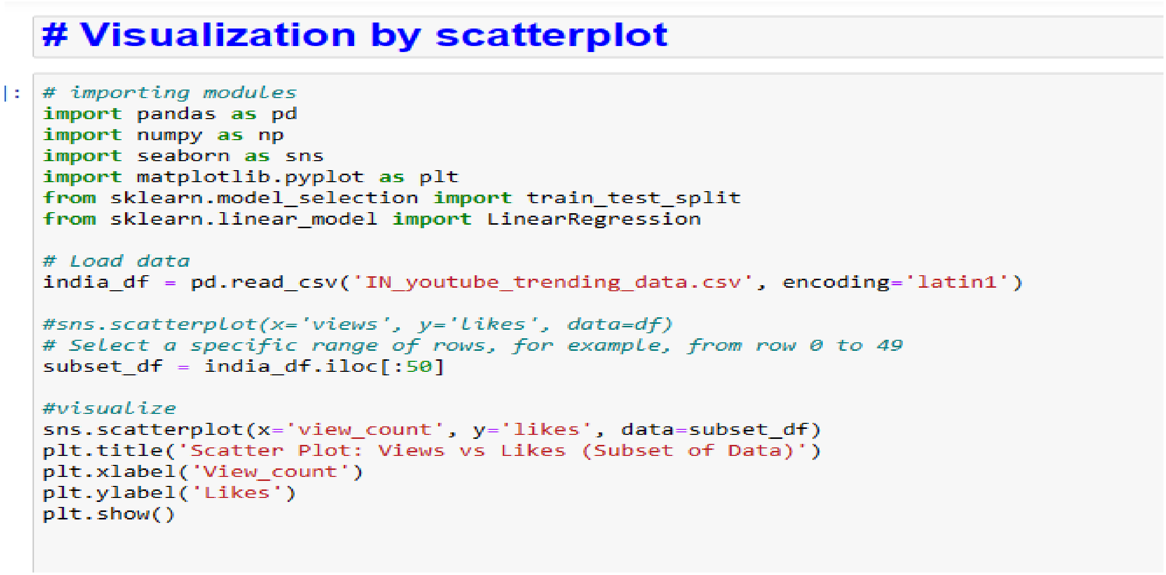




Hypothesis Testing

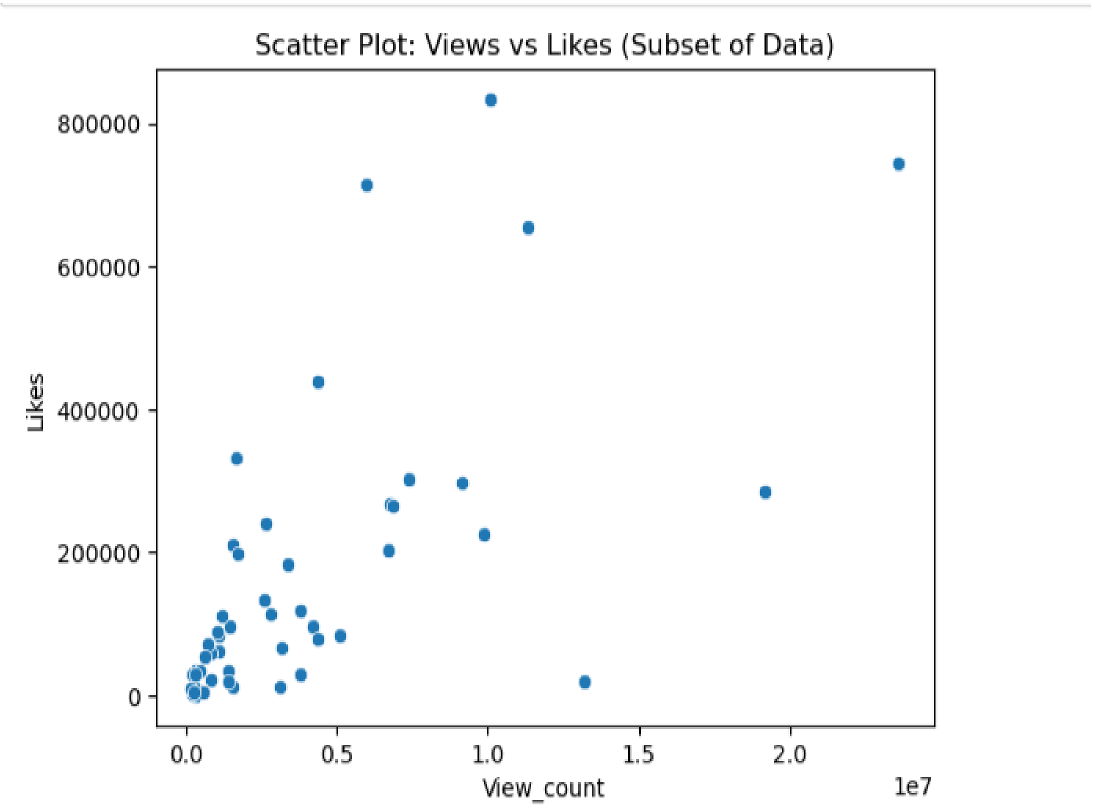
```
# importing libraries
import pandas as pd
import numpy as np
from scipy import stats
import seaborn as sns
import matplotlib.pyplot as plt

#Load Dataset
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

#Explore Data
# Display the first few rows of the dataset
india_df.head()

# Explore the summary statistics
india_df.describe()


#Visualize
# Visualize the data
sns.boxplot(x='comments_disabled', y='likes', data=india_df)
plt.show()
# Separate data into two groups: videos with comments enabled and videos with comments disabled
enabled_likes = india_df[india_df['comments_disabled'] == False]['likes']
disabled_likes = india_df[india_df['comments_disabled'] == True]['likes']

# Perform an independent t-test
t_stat, p_value = stats.ttest_ind(enabled_likes, disabled_likes)

# Display the results
print(f'T-statistic: {t_stat}')
print(f'P-value: {p_value}')
```

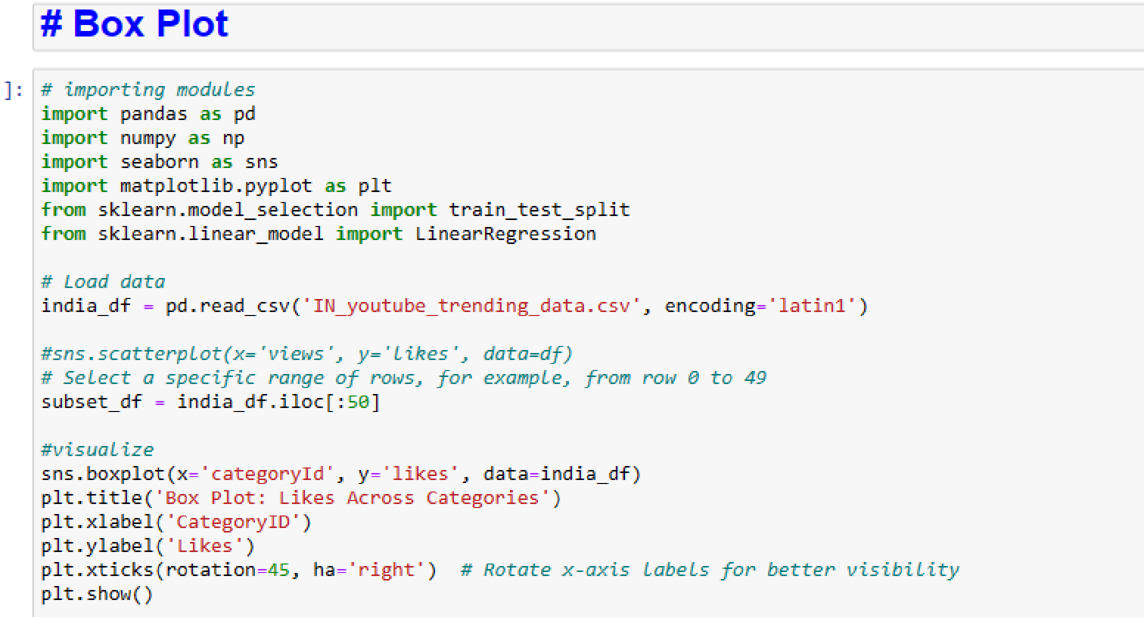
```
T-statistic: 1.4765600254487634
P-value: 0.13979503919731065
```



Visualization by scatterplot

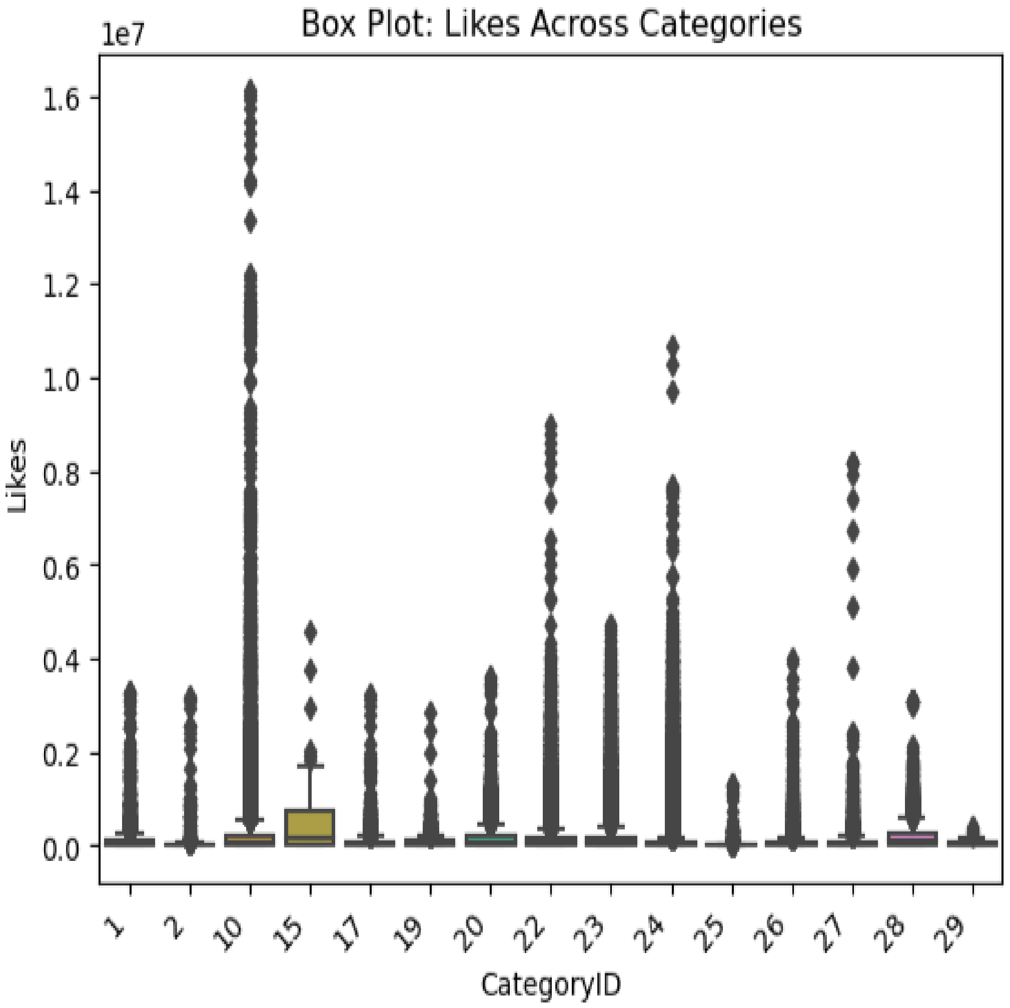
```
# importing modules
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

# Load data
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

#sns.scatterplot(x='views', y='likes', data=df)
# Select a specific range of rows, for example, from row 0 to 49
subset_df = india_df.iloc[:50]

#visualize
sns.scatterplot(x='view_count', y='likes', data=subset_df)
plt.title('Scatter Plot: Views vs Likes (Subset of Data)')
plt.xlabel('View_count')
plt.ylabel('Likes')
plt.show()
```





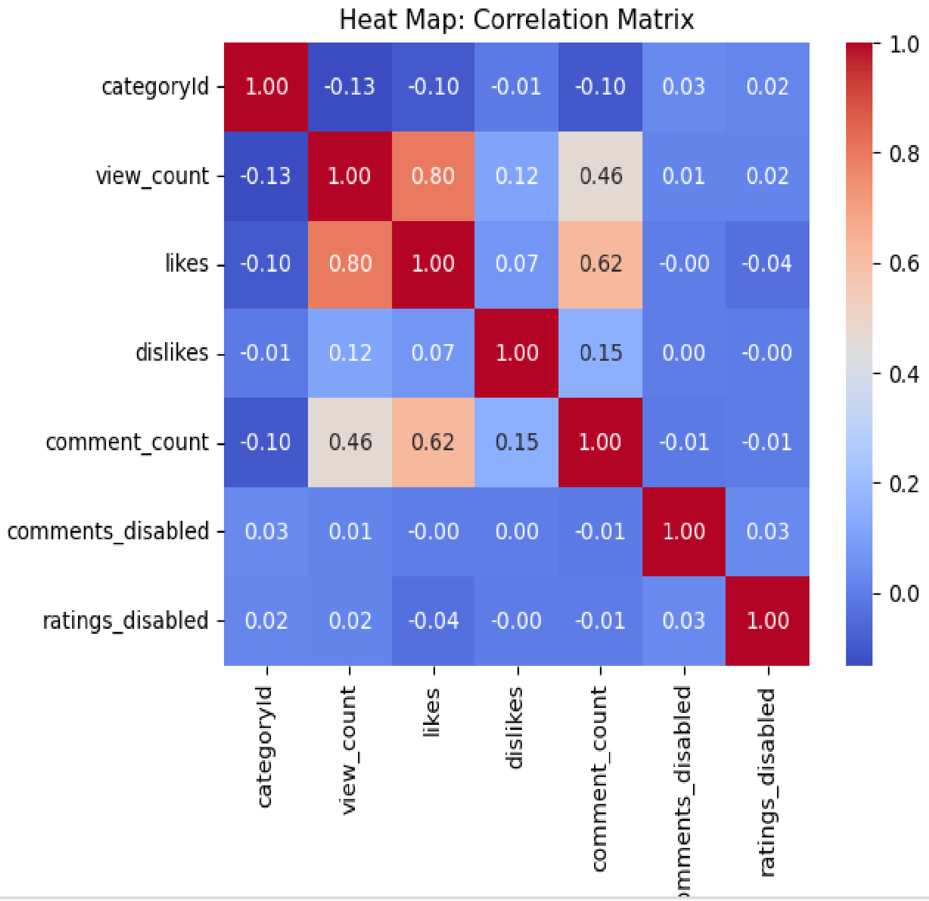
Box Plot

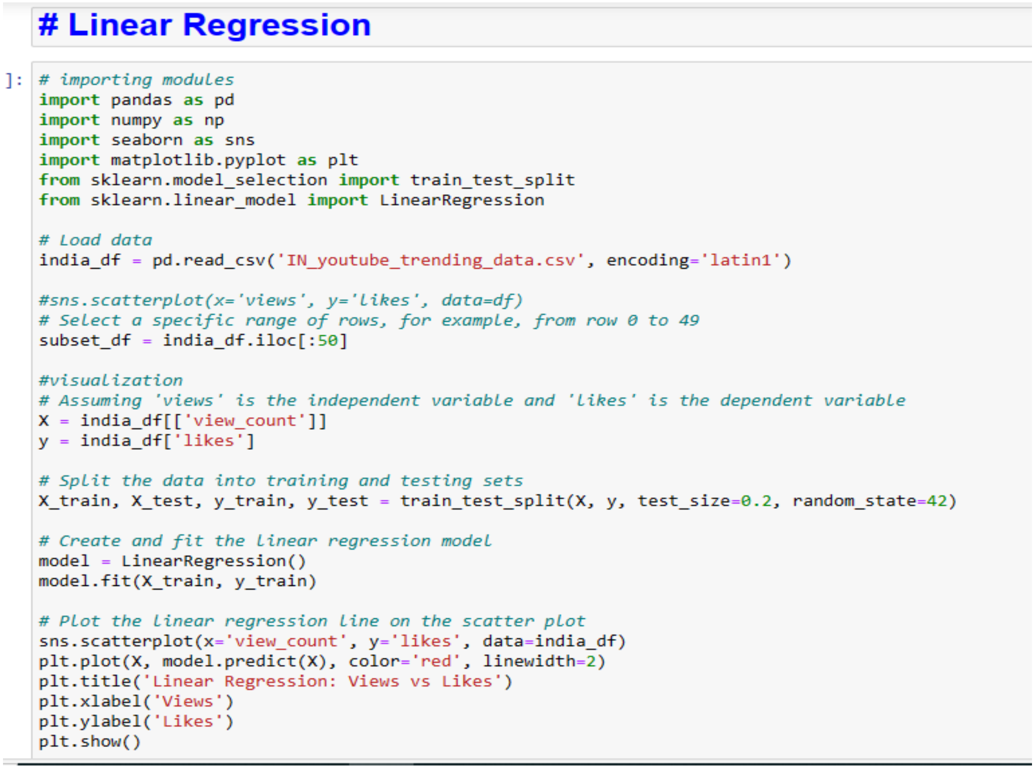
```
]: # importing modules
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

# Load data
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

#sns.scatterplot(x='views', y='likes', data=df)
# Select a specific range of rows, for example, from row 0 to 49
subset_df = india_df.iloc[:50]

#visualize
sns.boxplot(x='categoryId', y='likes', data=india_df)
plt.title('Box Plot: Likes Across Categories')
plt.xlabel('CategoryID')
plt.ylabel('Likes')
plt.xticks(rotation=45, ha='right')  # Rotate x-axis labels for better visibility
plt.show()
```



Heat Map

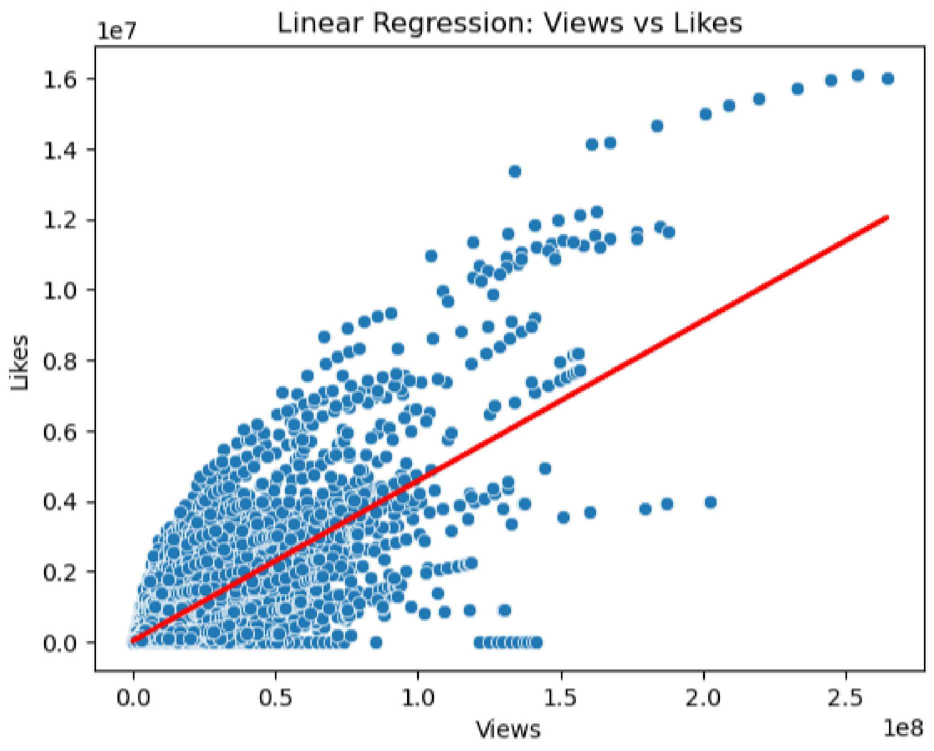
```
]: # importing modules
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

# Load data
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

#sns.scatterplot(x='views', y='likes', data=df)
# Select a specific range of rows, for example, from row 0 to 49
subset_df = india_df.iloc[:50]

correlation_matrix = df.corr()
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Heat Map: Correlation Matrix')
plt.show()
```





Linear Regression

```
# importing modules
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

# Load data
india_df = pd.read_csv('IN_youtube_trending_data.csv', encoding='latin1')

#sns.scatterplot(x='views', y='likes', data=df)
# Select a specific range of rows, for example, from row 0 to 49
subset_df = india_df.iloc[:50]

#visualization
# Assuming 'views' is the independent variable and 'likes' is the dependent variable
X = india_df[['view_count']]
y = india_df['likes']

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Create and fit the linear regression model
model = LinearRegression()
model.fit(X_train, y_train)

# Plot the linear regression line on the scatter plot
sns.scatterplot(x='view_count', y='likes', data=india_df)
plt.plot(X, model.predict(X), color='red', linewidth=2)
plt.title('Linear Regression: Views vs Likes')
plt.xlabel('Views')
plt.ylabel('Likes')
plt.show()
```


Linear Regression: Views vs Likes
1e7
Likes
Views
1e8