IS733 – DATA MINING

HOMEWORK – 1

Submitted By

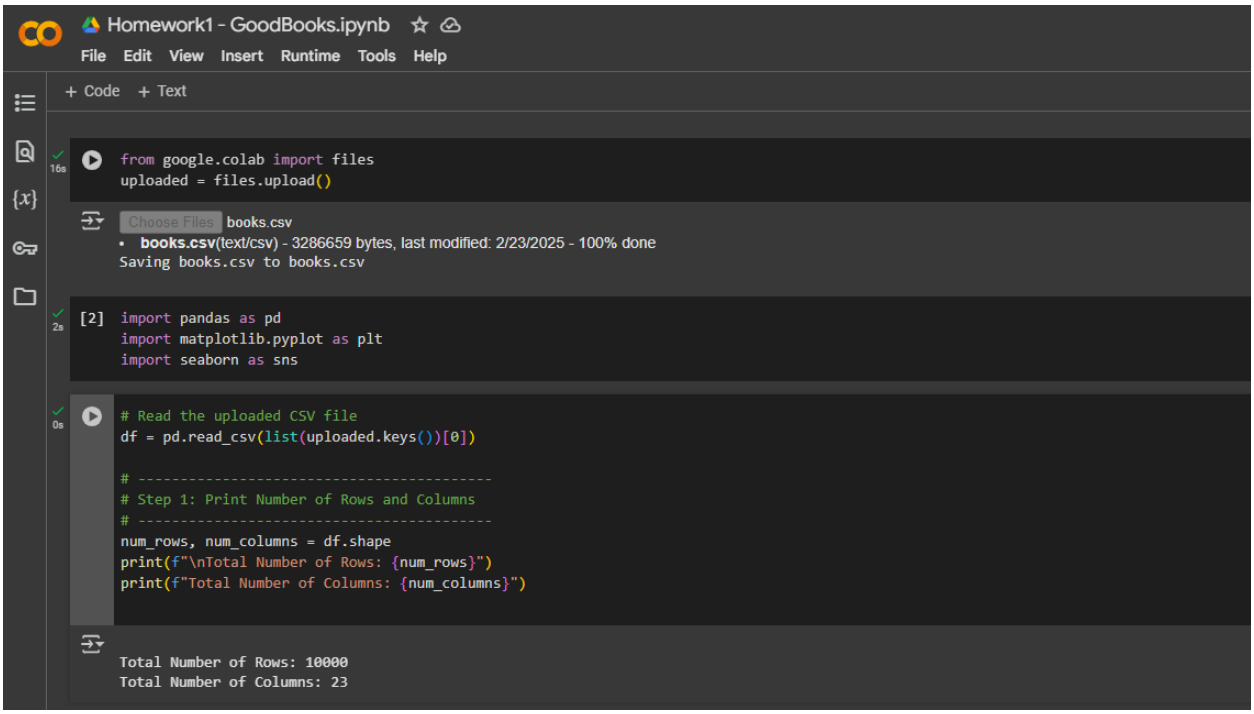
Prathyusha Harish Kumar

Campus ID: JB24771

Dataset: ***https://github.com/zygmuntz/goodbooks-10k/blob/master/books.csv***

CODE SNIPPETS FROM GOOGLE COLLAB

```
# Upload CSV file
from google.colab import files
uploaded = files.upload()
```



```
# Import Libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

---

1. DATA EXPLORATION

```
# Read the uploaded CSV file
df = pd.read_csv(list(uploaded.keys())[0])

# Number of Rows and Columns
num_rows, num_columns = df.shape
print(f"\nTotal Number of Rows: {num_rows}")
print(f"Total Number of Columns: {num_columns}\n")

# Total number of books
total_books = df.shape[0]
print(f" Total Books: {total_books}")

# Summary statistics for numeric attributes
numeric_stats = df.describe().T

# Display Dataset Information
print("\nDataset Information:")
print(df.info())  # Summary of dataset including column types and missing values

# Display First 5 Rows of Dataset
print("\nFirst 5 Rows of the Dataset:")
print(df.head())

# To give Summary Statistics for Numeric Columns
print("\nSummary Statistics for Numeric Columns:")
print(df.describe())
```

```
# Count of Missing Values per Column
print("\nMissing Values in Each Column:")
print(df.isnull().sum())

# Missing data percentage
missing_data = df.isnull().sum() / num_rows * 100

print("\n### Missing Data Percentage ###")
print(missing_data[missing_data > 0])

# Finding Unique Values Count for Categorical Columns
categorical_columns = df.select_dtypes(include=['object']).columns
print("\nUnique Values Count for Categorical Columns:")
for col in categorical_columns:
    print(f"{col}: {df[col].nunique()} unique values")
```

```
Total Number of Rows: 10000
Total Number of Columns: 23

📚 Total Books: 10000
👤 Unique Authors: 4664


Dataset Information:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 23 columns):
 #   Column                     Non-Null Count  Dtype  
---  ------                     --------------  -----  
 0   book_id                    10000 non-null  int64  
 1   goodreads_book_id          10000 non-null  int64  
 2   best_book_id               10000 non-null  int64  
 3   work_id                    10000 non-null  int64  
 4   books_count                10000 non-null  int64  
 5   isbn                       9300 non-null   object 
 6   isbn13                     9415 non-null   float64
 7   authors                    10000 non-null  object 
 8   original_publication_year  9979 non-null   float64
 9   original_title             9415 non-null   object 
 10  title                      10000 non-null  object 
 11  language_code              8916 non-null   object 
 12  average_rating             10000 non-null  float64
 13  ratings_count              10000 non-null  int64  
 14  work_ratings_count         10000 non-null  int64  
 15  work_text_reviews_count    10000 non-null  int64  
 16  ratings_1                  10000 non-null  int64  
 17  ratings_2                  10000 non-null  int64  
 18  ratings_3                  10000 non-null  int64  
 19  ratings_4                  10000 non-null  int64  
 20  ratings_5                  10000 non-null  int64  
 21  image_url                  10000 non-null  object 
 22  small_image_url            10000 non-null  object 
dtypes: float64(3), int64(13), object(7)
```

```
# Identify column types
column_types = {}
for col in df.columns:
    if df[col].dtype in ['int64', 'float64']:  # Numeric columns
        column_types[col] = "Numeric"
    elif df[col].dtype == 'object':  # Categorical/discrete columns
        column_types[col] = "Discrete" if df[col].nunique() < df.shape[0] * 0.5 else "Possibly Unique"

column_types
```

```
{'book_id': 'Numeric',
 'goodreads_book_id': 'Numeric',
 'best_book_id': 'Numeric',
 'work_id': 'Numeric',
 'books_count': 'Numeric',
 'isbn': 'Possibly Unique',
 'isbn13': 'Numeric',
 'authors': 'Discrete',
 'original_publication_year': 'Numeric',
 'original_title': 'Possibly Unique',
 'title': 'Possibly Unique',
 'language_code': 'Discrete',
 'average_rating': 'Numeric',
 'ratings_count': 'Numeric',
 'work_ratings_count': 'Numeric',
 'work_text_reviews_count': 'Numeric',
 'ratings_1': 'Numeric',
 'ratings_2': 'Numeric',
 'ratings_3': 'Numeric',
 'ratings_4': 'Numeric',
 'ratings_5': 'Numeric',
 'image_url': 'Possibly Unique',
 'small_image_url': 'Possibly Unique'}
```

Calculate missing data percentage

missingness = (df.isnull().mean() * 100).round(2)

missingness[missingness > 0] # Show only columns with missing values

```
Missing Values in Each Column:
book_id                         0
goodreads_book_id               0
best_book_id                    0
work_id                         0
books_count                     0
isbn                          700
isbn13                        585
authors                         0
original_publication_year      21
original_title                585
title                           0
language_code                1084
average_rating                  0
ratings_count                   0
work_ratings_count              0
work_text_reviews_count         0
ratings_1                       0
ratings_2                       0
ratings_3                       0
ratings_4                       0
ratings_5                       0
image_url                       0
small_image_url                 0
dtype: int64

### Missing Data Percentage ###
isbn                          7.00
isbn13                        5.85
original_publication_year     0.21
original_title                5.85
language_code                10.84
dtype: float64

Unique Values Count for Categorical Columns:
isbn: 9300 unique values
authors: 4664 unique values
original_title: 9274 unique values
title: 9964 unique values
language_code: 25 unique values
image_url: 6669 unique values
small_image_url: 6669 unique values
```

Get statistics for numeric attributes

numeric_stats = df.describe().T[['min', 'max', 'mean', '50%', 'std']]

numeric_stats.rename(columns={'50%': 'median'}, inplace=True)

numeric_stats

	min	max	mean	median	std
book_id	1.000000e+00	1.000000e+04	5.000500e+03	5.000500e+03	2.886896e+03
goodreads_book_id	1.000000e+00	3.328864e+07	5.264697e+06	3.949655e+05	7.575462e+06
best_book_id	1.000000e+00	3.553423e+07	5.471214e+06	4.251235e+05	7.827330e+06
work_id	8.700000e+01	5.639960e+07	8.646183e+06	2.719524e+06	1.175106e+07
books_count	1.000000e+00	3.455000e+03	7.571270e+01	4.000000e+01	1.704707e+02
isbn13	1.951703e+08	9.790008e+12	9.755044e+12	9.780452e+12	4.428619e+11
original_publication_year	-1.750000e+03	2.017000e+03	1.981988e+03	2.004000e+03	1.525767e+02
average_rating	2.470000e+00	4.820000e+00	4.002191e+00	4.020000e+00	2.544275e-01
ratings_count	2.716000e+03	4.780653e+06	5.400124e+04	2.115550e+04	1.573700e+05
work_ratings_count	5.510000e+03	4.942365e+06	5.968732e+04	2.383250e+04	1.678038e+05
work_text_reviews_count	3.000000e+00	1.552540e+05	2.919955e+03	1.402000e+03	6.124378e+03
ratings_1	1.100000e+01	4.561910e+05	1.345041e+03	3.910000e+02	6.635626e+03
ratings_2	3.000000e+01	4.368020e+05	3.110885e+03	1.163000e+03	9.717124e+03
ratings_3	3.230000e+02	7.933190e+05	1.147589e+04	4.894000e+03	2.854645e+04
ratings_4	7.500000e+02	1.481305e+06	1.996570e+04	8.269500e+03	5.144736e+04
ratings_5	7.540000e+02	3.011543e+06	2.378981e+04	8.836000e+03	7.976889e+04

```
# Analyze discrete columns
discrete_stats = {}
for col in df.select_dtypes(include=['object']).columns:
    unique_values = df[col].value_counts()
    discrete_stats[col] = {
        "unique_count": df[col].nunique(),
        "top_3_values": unique_values.head(3).to_dict()
    }

discrete_stats
```

```
{'isbn': {'unique_count': 9300,
  'top_3_values': {'439023483': 1, '310228638': 1, '1442413336': 1}},
 'authors': {'unique_count': 4664,
  'top_3_values': {'Stephen King': 60, 'Nora Roberts': 59, 'Dean Koontz': 47}},
 'original_title': {'unique_count': 9274,
  'top_3_values': {' ': 5, 'The Gift': 5, 'Perfect': 4}},
 'title': {'unique_count': 9964,
  'top_3_values': {'Selected Poems': 4,
   'Stone Soup': 3,
   'The Beach House': 2}},
 'language_code': {'unique_count': 25,
  'top_3_values': {'eng': 6341, 'en-US': 2070, 'en-GB': 257}},
 'image_url': {'unique_count': 6669,
  'top_3_values': {'https://s.gr-assets.com/assets/nophoto/book/111x148-bcc042a9c91a29c1d680899eff700a03.png': 3332,
   'https://images.gr-assets.com/books/1447303603m/2767052.jpg': 1,
   'https://images.gr-assets.com/books/1328103463m/11981168.jpg': 1}},
 'small_image_url': {'unique_count': 6669,
  'top_3_values': {'https://s.gr-assets.com/assets/nophoto/book/50x75-a91bf249278a81aabab721ef782c4a74.png': 3332,
   'https://images.gr-assets.com/books/1447303603s/2767052.jpg': 1,
   'https://images.gr-assets.com/books/1328103463s/11981168.jpg': 1}}}
```

Check for strange values, e.g., original publication year anomalies

df[df['original_publication_year'] < 0]

Data Cleaning - Handle Negative Publication Years

Remove rows where the original publication year is negative or missing

df_clean = df[df["original_publication_year"] > 0]

Confirm changes

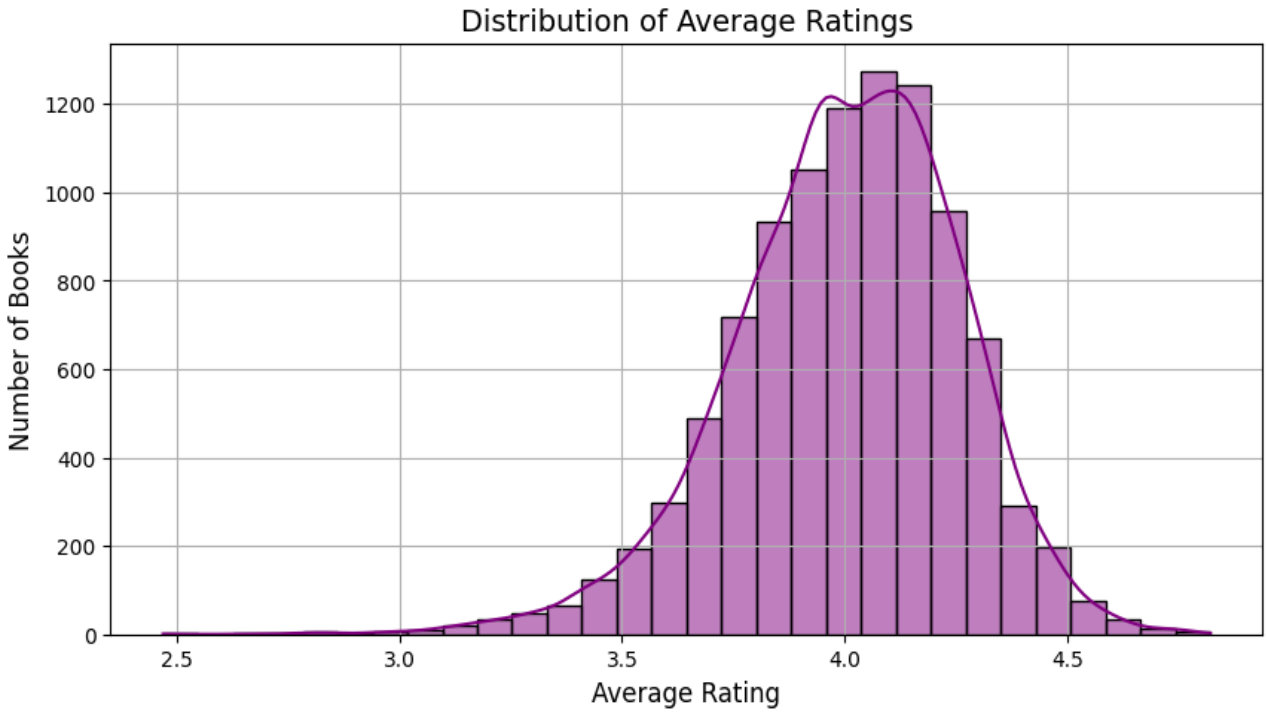
print("\nDataset after removing invalid publication years:")

```
print(df_clean["original_publication_year"].describe())
```

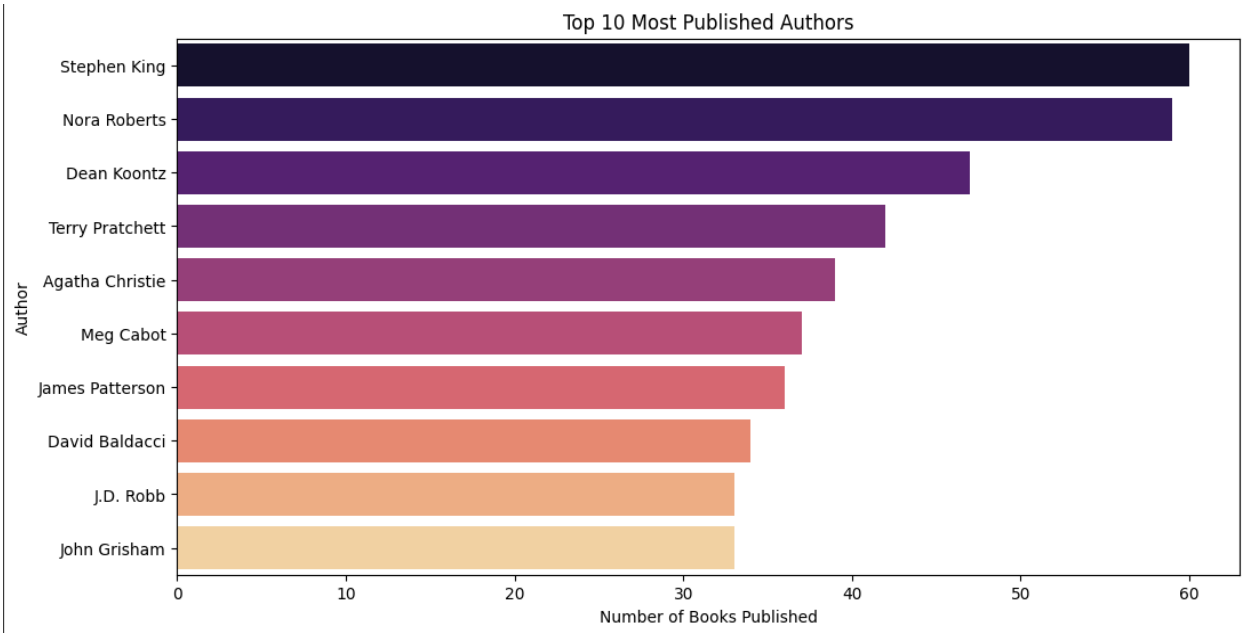
---

2. GENERATE A SERIES OF PLOTS TO DESCRIBE THE TEMPORAL PATTERN:

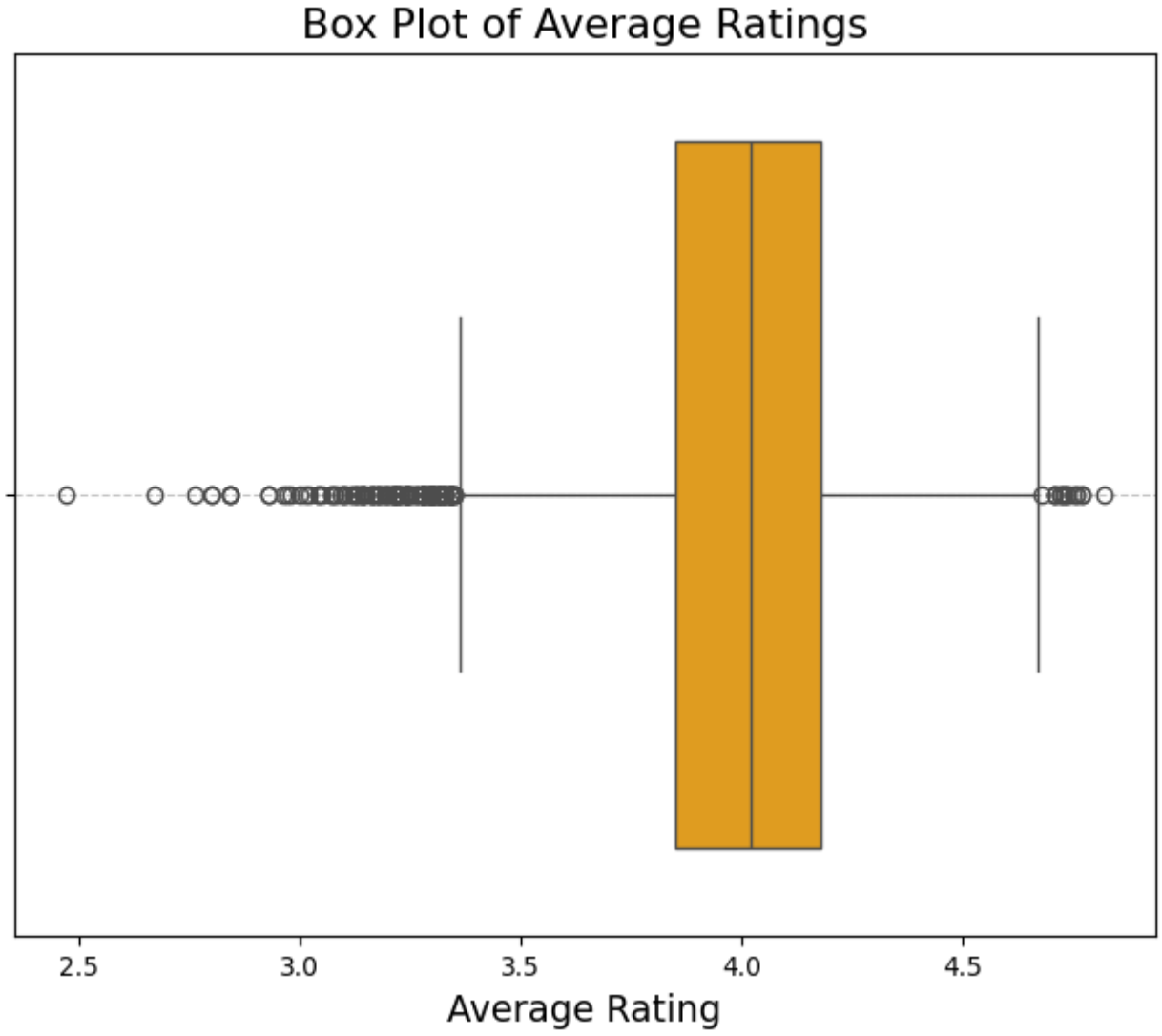
```
# Visualization - Distribution of Book Ratings
plt.figure(figsize=(10, 5))
sns.histplot(df_clean["average_rating"], bins=30, kde=True, color="purple")
plt.title("Distribution of Average Ratings", fontsize=14)
plt.xlabel("Average Rating", fontsize=12)
plt.ylabel("Number of Books", fontsize=12)
plt.grid(True)
plt.show()
```



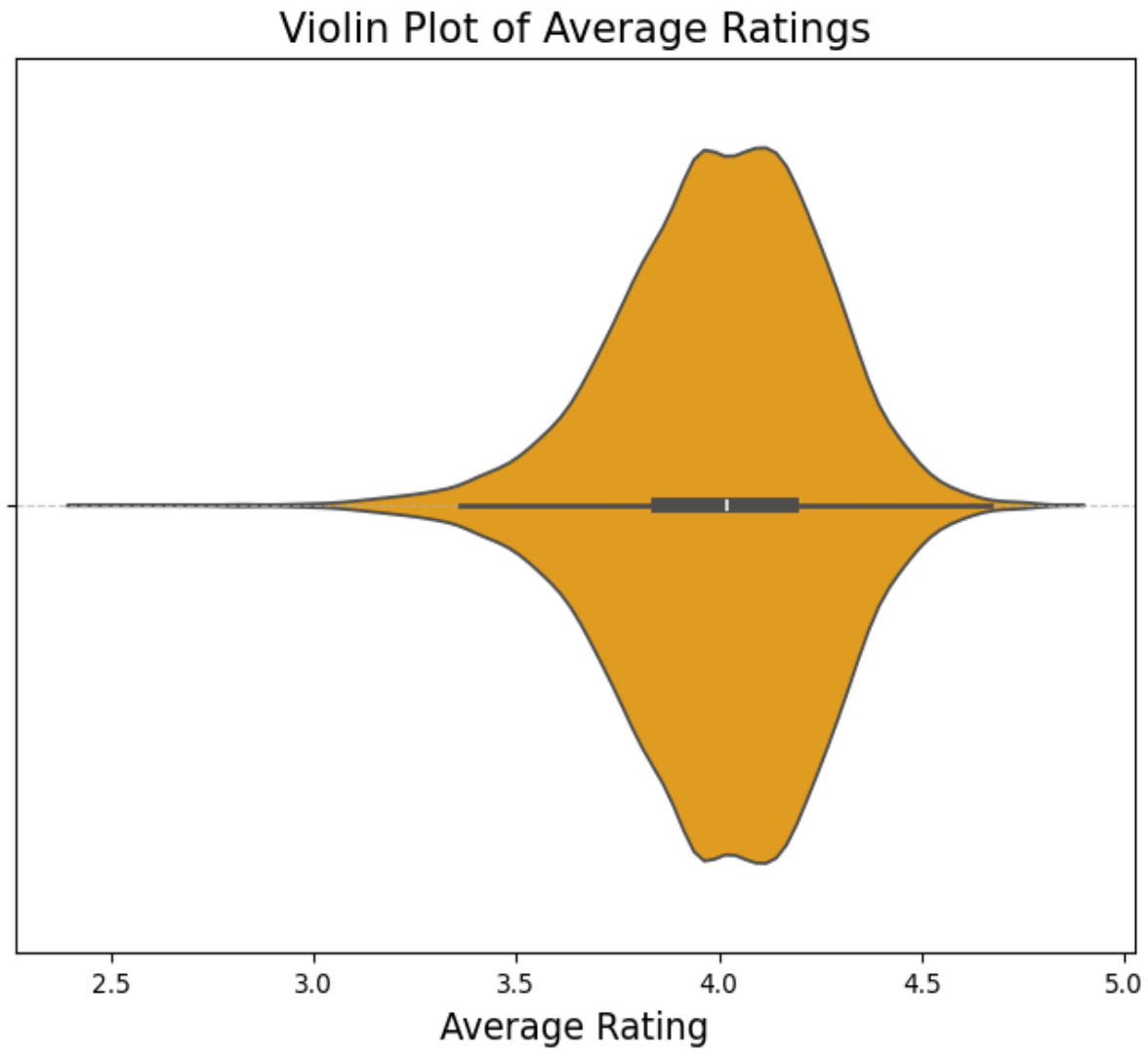
```
# Count number of books per author
author_counts = df['authors'].value_counts().head(10)

# Top 10 most published authors
plt.figure(figsize=(12,6))
sns.barplot(x=author_counts.values, y=author_counts.index, palette="magma")
plt.xlabel("Number of Books Published")
plt.ylabel("Author")
plt.title("Top 10 Most Published Authors")
plt.show()

print(author_counts)
```



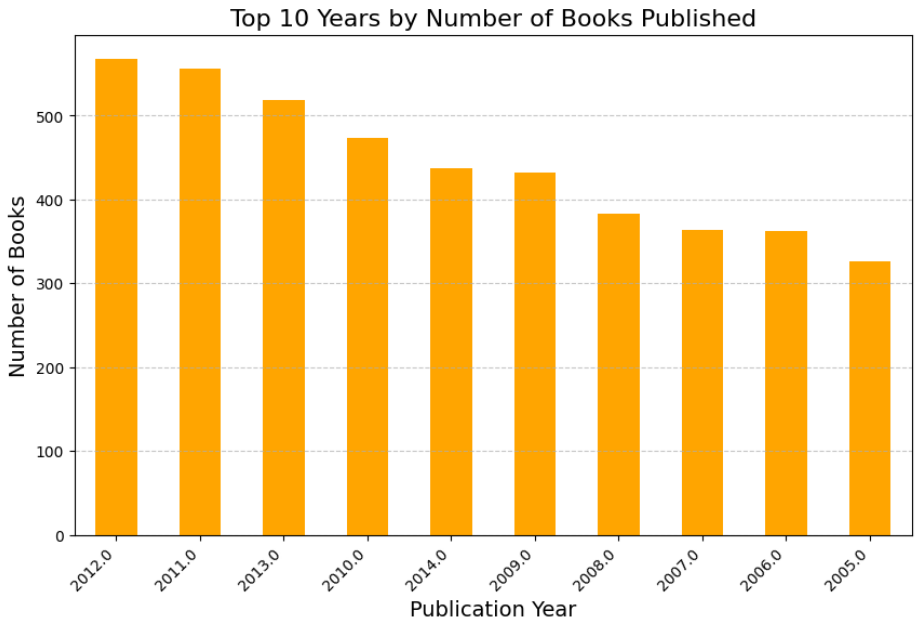
```
# Box  plot of average ratings
plt.figure(figsize=(8, 6))
sns.boxplot(x=df['average_rating'], color='orange')
plt.title('Box Plot of Average Ratings', fontsize=16)
plt.xlabel('Average Rating', fontsize=14)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```



```
# Violin plot of average ratings
plt.figure(figsize=(8, 6))
sns.violinplot(x=df['average_rating'], color='orange')
plt.title('Violin Plot of Average Ratings', fontsize=16)
plt.xlabel('Average Rating', fontsize=14)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```



```
# Top 10 years by number of books published
top_years = df['original_publication_year'].value_counts().head(10)

# Graph of the top 10 years
plt.figure(figsize=(10, 6))
top_years.plot(kind='bar', color='orange')
plt.title('Top 10 Years by Number of Books Published', fontsize=16)
plt.xlabel('Publication Year', fontsize=14)
plt.ylabel('Number of Books', fontsize=14)
plt.xticks(rotation=45, ha='right')
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```



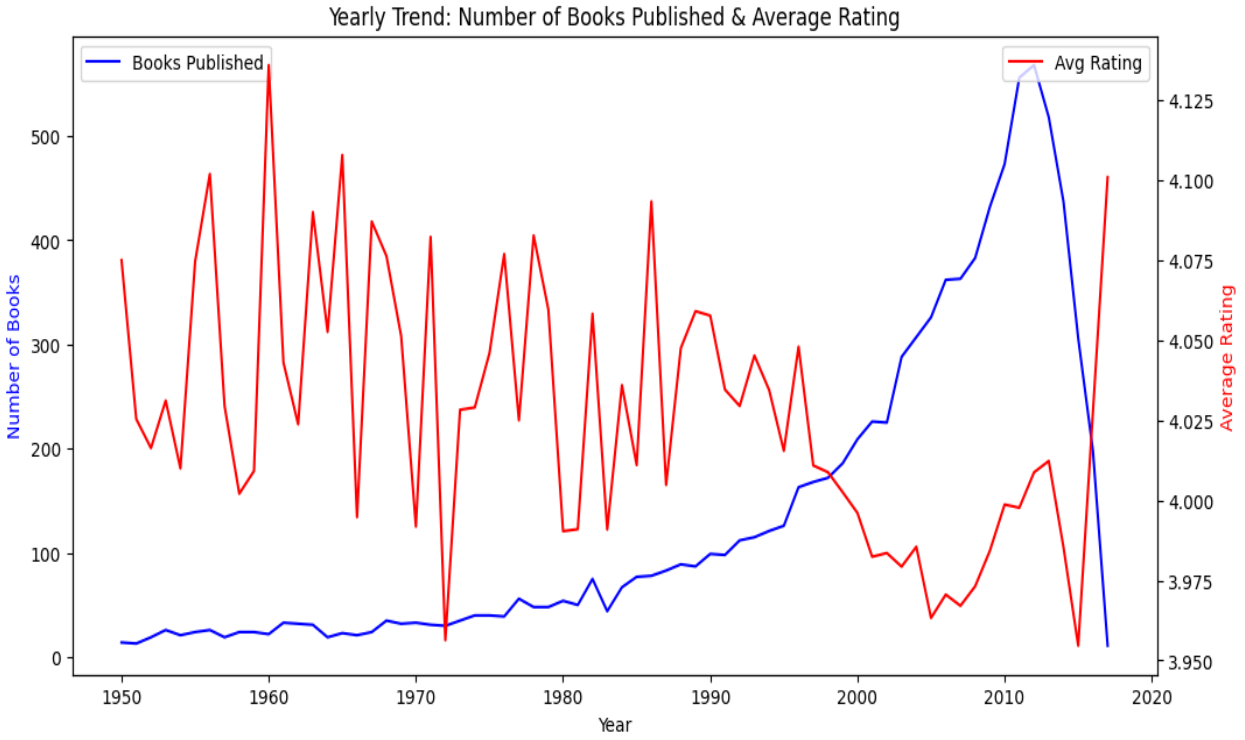
```
# Year to Year Trends
```

```
# Convert 'original_publication_year' to numeric for time-based analysis
df['original_publication_year'] = pd.to_numeric(df['original_publication_year'], errors='coerce')

# Filter for reasonable publication years (e.g., after 1800 to avoid incorrect data points)
df_filtered = df[(df['original_publication_year'] >= 1950) & (df['original_publication_year'] <= 2020)]

# Yearly Trend: Number of books published & average rating per year
yearly_data = df_filtered.groupby('original_publication_year').agg(
    num_books=('title', 'count'),
    avg_rating=('average_rating', 'mean')
).reset_index()

# Plot: Yearly trend (number of books published & average rating over time)
fig, ax1 = plt.subplots(figsize=(12,6))

# Plot number of books published per year
sns.lineplot(x=yearly_data['original_publication_year'], y=yearly_data['num_books'], ax=ax1, color="blue", label="Books Published")
ax1.set_ylabel("Number of Books", color="blue")
ax1.set_xlabel("Year")
ax1.set_title("Yearly Trend: Number of Books Published & Average Rating")

# Create a second y-axis for average ratings
ax2 = ax1.twinx()
sns.lineplot(x=yearly_data['original_publication_year'], y=yearly_data['avg_rating'], ax=ax2, color="red", label="Avg Rating")
ax2.set_ylabel("Average Rating", color="red")
```

plt.show()

Display the first few rows of the yearly data

yearly_data.head()



Convert 'original_publication_year' to numeric and filter data from 1990 to 2023

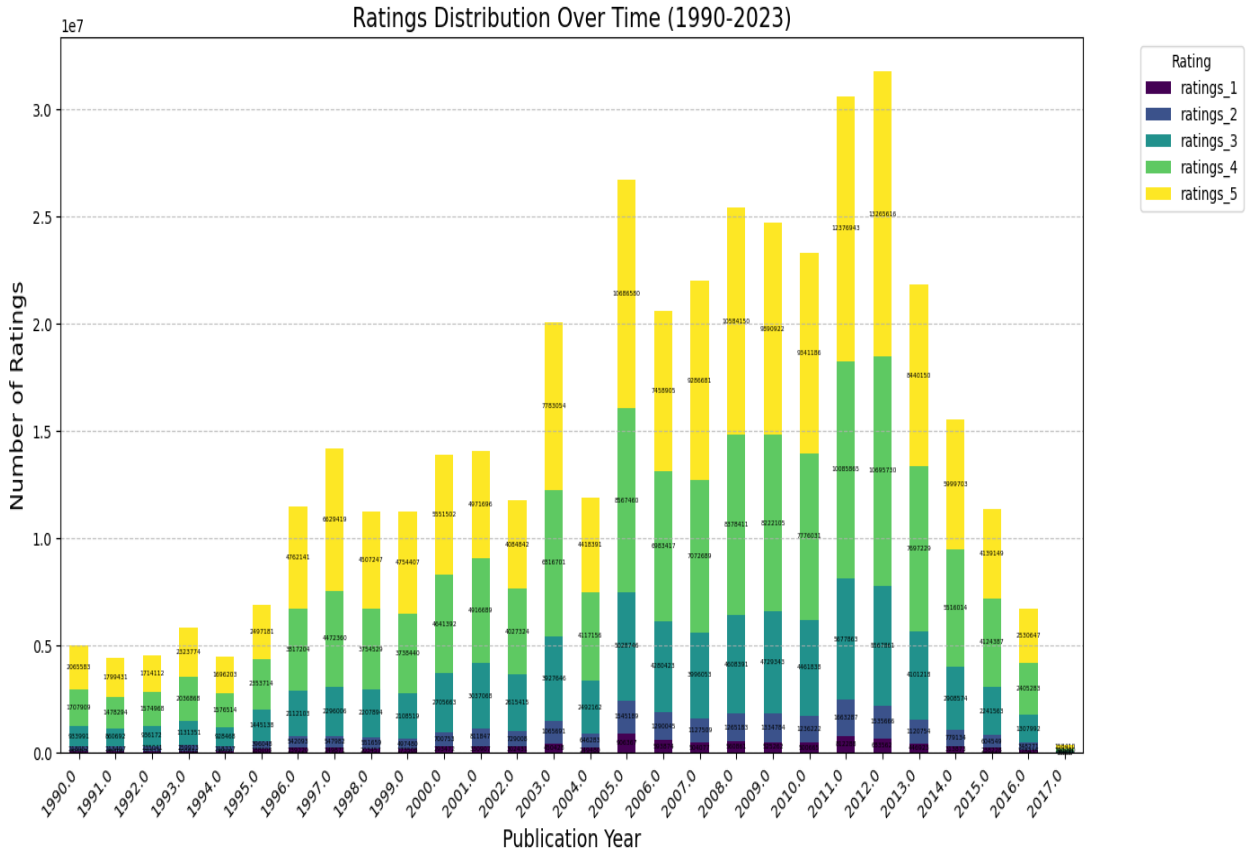
df['original_publication_year'] = pd.to_numeric(df['original_publication_year'], errors='coerce')

df_filtered = df[(df['original_publication_year'] >= 1990) & (df['original_publication_year'] <= 2023)]

Group by publication year and calculate the sum of ratings (1 to 5 stars)

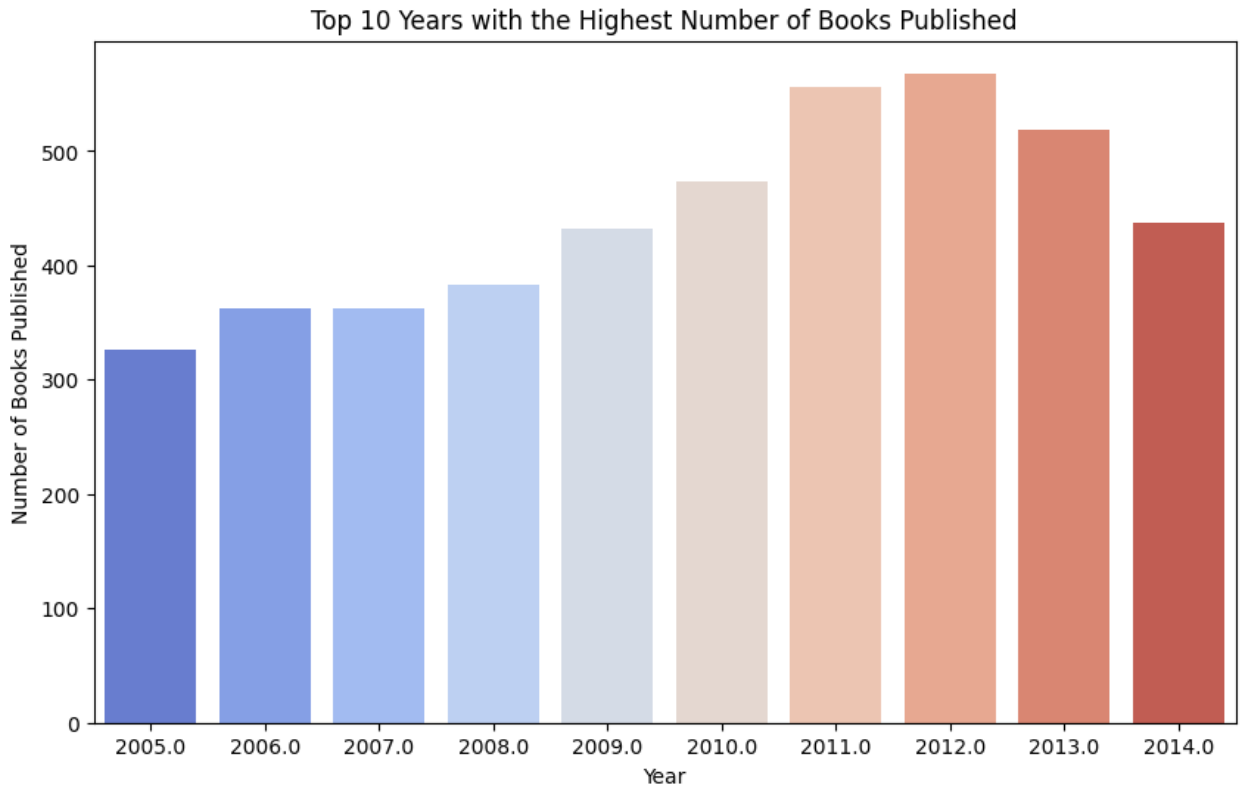
yearly_ratings_distribution = df_filtered.groupby('original_publication_year')[['ratings_1', 'ratings_2', 'ratings_3', 'ratings_4', 'ratings_5']].sum()

```
# Convert the ratings to integers
yearly_ratings_distribution = yearly_ratings_distribution.astype(int)

# Plot the stacked bar chart
plt.figure(figsize=(14, 7))
ax = yearly_ratings_distribution.plot(kind='bar', stacked=True, colormap='viridis', figsize=(14, 7))
plt.title('Ratings Distribution Over Time (1990-2023)', fontsize=16)
plt.xlabel('Publication Year', fontsize=14)
plt.ylabel('Number of Ratings', fontsize=14)
plt.xticks(rotation=45, ha='right')
plt.legend(title='Rating', bbox_to_anchor=(1.05, 1), loc='upper left')
plt.grid(axis='y', linestyle='--', alpha=0.7)

# Add data labels (number of ratings) on top of each bar segment
for container in ax.containers:
    ax.bar_label(container, label_type='center', fmt='%d', fontsize=4.5, color='black')

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



```
# Count the number of books published per year
books_per_year = df['original_publication_year'].value_counts()

# Select the top 10 years with the highest number of books published
top_10_years = books_per_year.nlargest(10)

# Plot the data
plt.figure(figsize=(10, 6))
sns.barplot(x=top_10_years.index, y=top_10_years.values, palette='coolwarm')
```

```
# Add labels and title
plt.xlabel('Year')
plt.ylabel('Number of Books Published')
plt.title('Top 10 Years with the Highest Number of Books Published')

# Display the plot
plt.show()
```



---

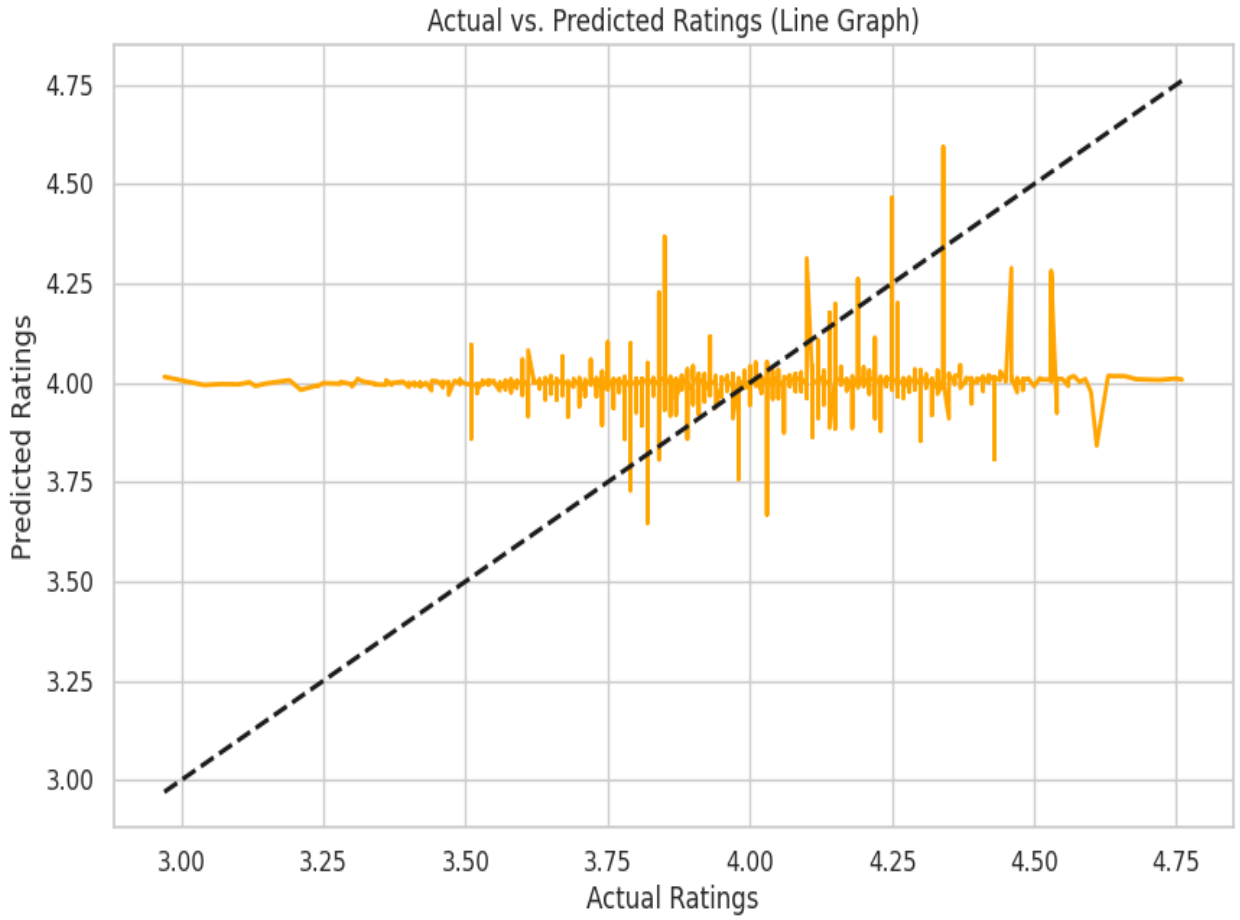
3. EXAMPLE MACHINE LEARNING PROBLEM - PREDICTING BOOK RATINGS

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

```
from sklearn.metrics import mean_squared_error

# Selecting features and target variable
X = df[['books_count', 'ratings_count', 'work_text_reviews_count']]
y = df['average_rating']

# 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)

# Initialize the Linear Regression model
model = LinearRegression()

# Training the model
model.fit(X_train, y_train)

# Make predictions
y_pred = model.predict(X_test)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
print(f'Mean Squared Error: {mse}')




# Plotting the model
import matplotlib.pyplot as plt
import numpy as np
```

```
# Plot: Line Graph of Actual vs. Predicted Ratings
plt.figure(figsize=(10, 6))

# Sort the actual and predicted values to ensure the line is connected in order
sorted_indices = np.argsort(y_test)
plt.plot(np.array(y_test)[sorted_indices], np.array(y_pred)[sorted_indices], color='orange',
linewidth=2)

# Add a line representing perfect prediction (45-degree line)
plt.plot([y_test.min(), y_test.max()], [y_test.min(), y_test.max()], 'k--', lw=2)

# Titles and labels
plt.title('Actual vs. Predicted Ratings (Line Graph)')
plt.xlabel('Actual Ratings')
plt.ylabel('Predicted Ratings')

plt.show()
```

```
Mean Squared Error: 0.06089775787882723
```

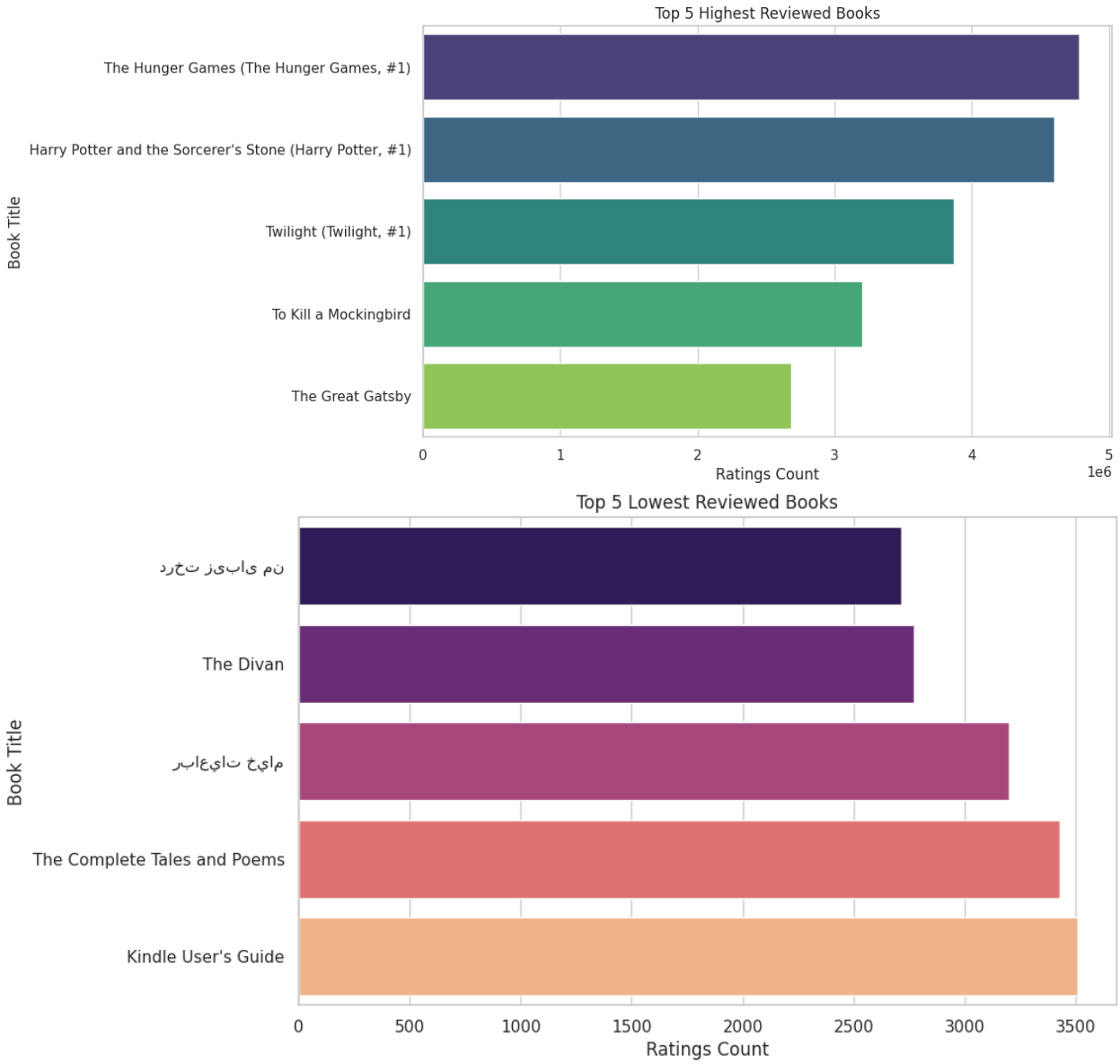


---

4. SERIES OF PLOTS FOR ANALYSIS

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

# Sort by ratings_count in ascending order (lowest reviewed books)
lowest_reviewed_books = df.sort_values(by='ratings_count').head(5)

# Sort by ratings_count in descending order (highest reviewed books)
highest_reviewed_books = df.sort_values(by='ratings_count', ascending=False).head(5)
```

```
# Set the aesthetic style of the plots
sns.set(style="whitegrid")

# Plot the top 5 highest reviewed books
plt.figure(figsize=(10, 6))
sns.barplot(x='ratings_count', y='title', data=highest_reviewed_books, palette='viridis')
plt.title('Top 5 Highest Reviewed Books')
plt.xlabel('Ratings Count')
plt.ylabel('Book Title')
plt.show()

# Plot the top 5 lowest reviewed books
plt.figure(figsize=(10, 6))
sns.barplot(x='ratings_count', y='title', data=lowest_reviewed_books, palette='magma')
plt.title('Top 5 Lowest Reviewed Books')
plt.xlabel('Ratings Count')
plt.ylabel('Book Title')
plt.show()
```



```
# Remove rows with missing publication years
df = df.dropna(subset=['original_publication_year'])

# Convert years to integers
df['original_publication_year'] = df['original_publication_year'].astype(int)
```

Filter books published between 1920 and 2020

df_decade = df[(df['original_publication_year'] >= 1920) & (df['original_publication_year'] <= 2020)]

Group by decade

df_decade['Decade'] = (df_decade['original_publication_year'] // 10) * 10

decade_counts = df_decade['Decade'].value_counts().sort_index()

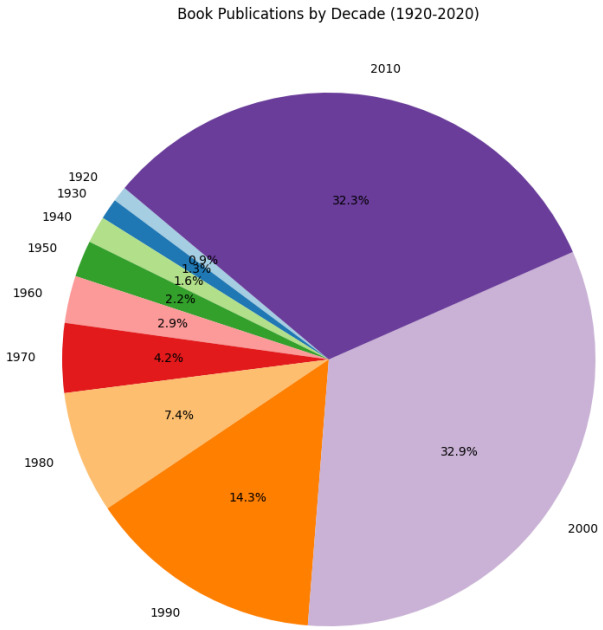
Plot pie chart

plt.figure(figsize=(10, 10))

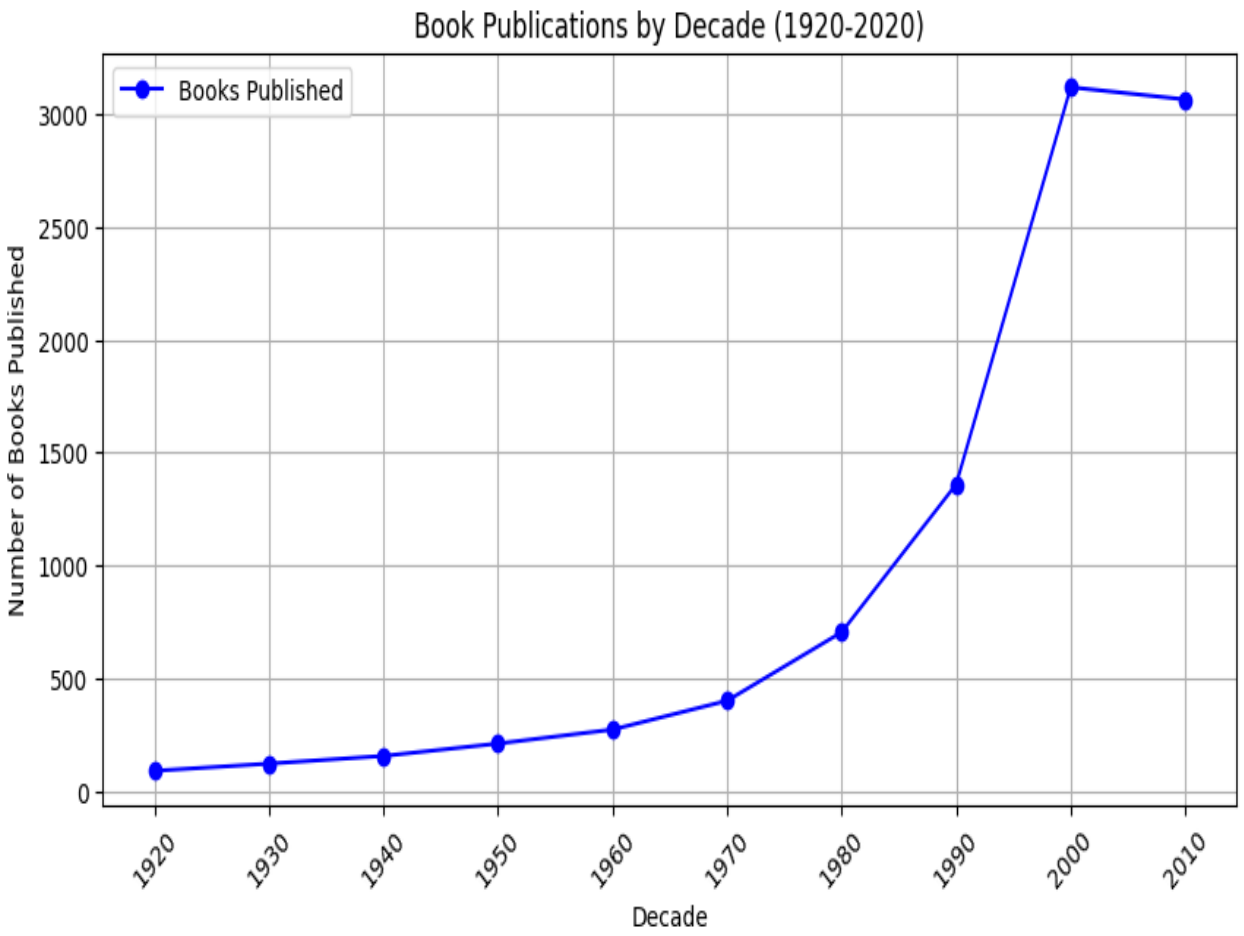
plt.pie(decade_counts, labels=decade_counts.index, autopct='%1.1f%%', startangle=140, colors=plt.cm.Paired.colors)

plt.title('Book Publications by Decade (1920-2020)')

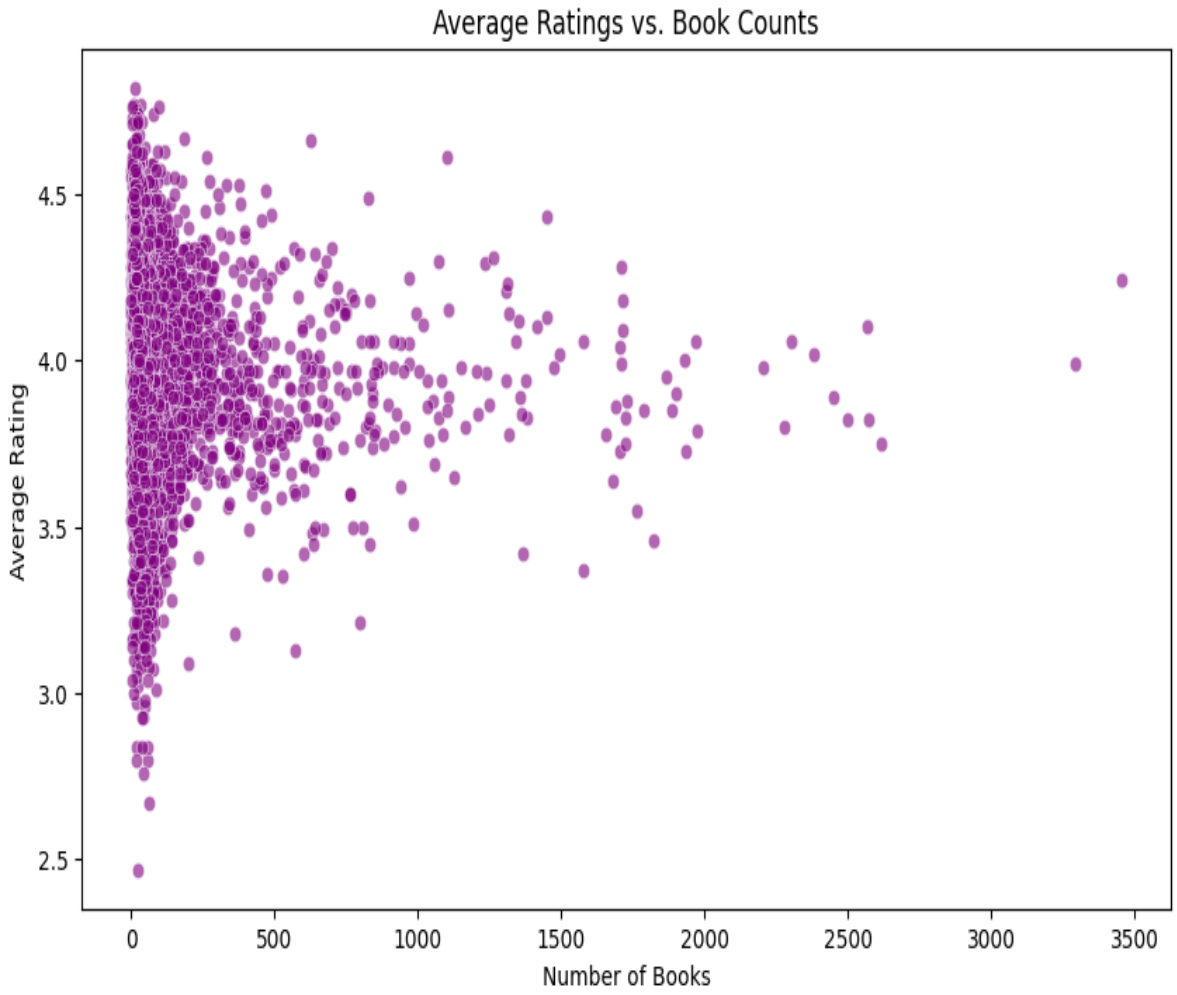
plt.show()



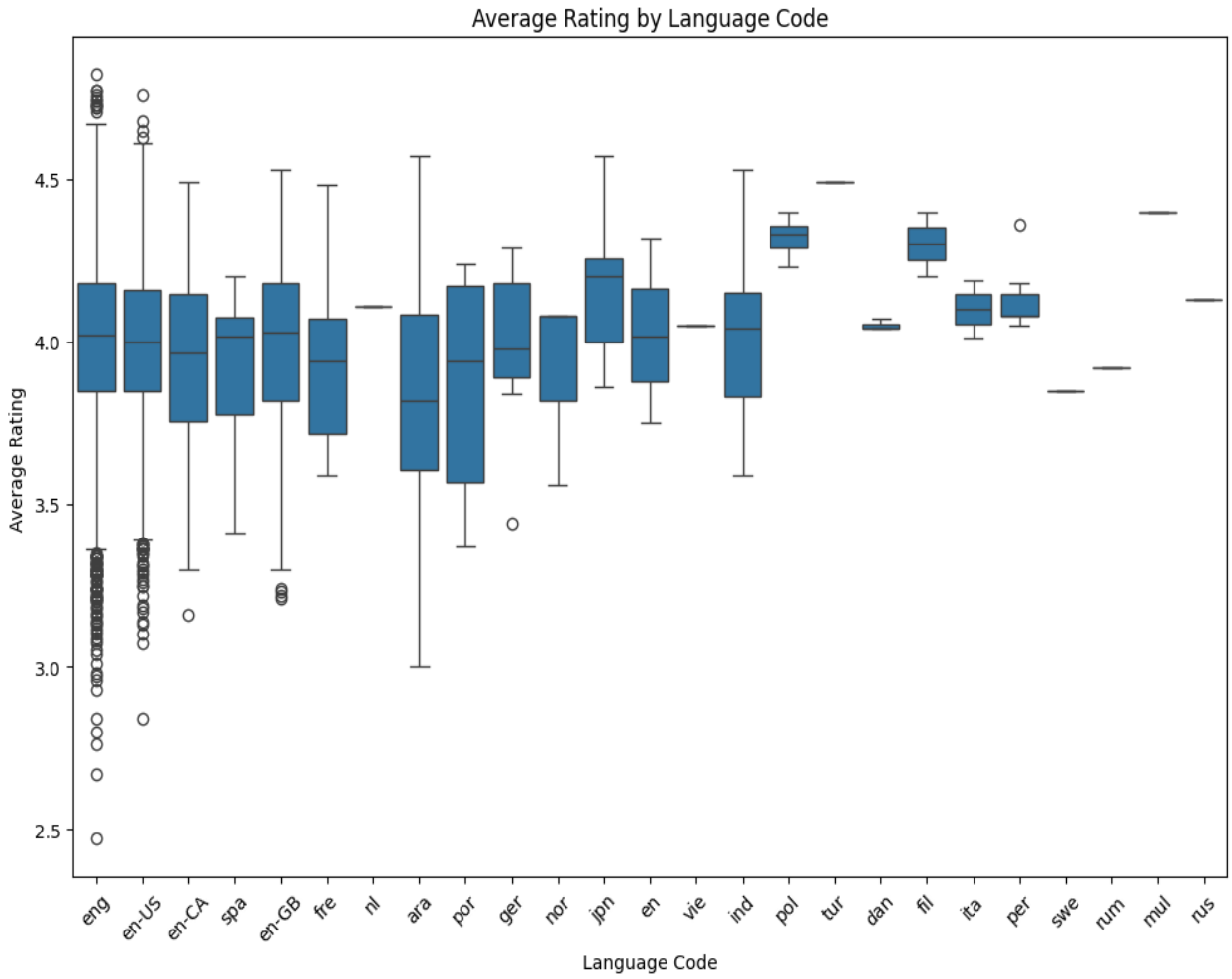
```
# Remove rows with missing publication years
df = df.dropna(subset=['original_publication_year'])

# Convert years to integers
df['original_publication_year'] = df['original_publication_year'].astype(int)

# Filter books published between 1920 and 2020
df_decade = df[(df['original_publication_year'] >= 1920) & (df['original_publication_year'] <= 2020)]

# Group by decade and count books
df_decade['Decade'] = (df_decade['original_publication_year'] // 10) * 10
decade_counts = df_decade['Decade'].value_counts().sort_index()

# Plot line graph
plt.figure(figsize=(10, 5))
plt.plot(decade_counts.index, decade_counts.values, marker='o', linestyle='-', color='b', label='Books Published')

# Formatting the plot
plt.xlabel('Decade')
plt.ylabel('Number of Books Published')
plt.title('Book Publications by Decade (1920-2020)')
plt.xticks(decade_counts.index, rotation=45)  # Rotate x-axis labels for clarity
plt.grid(True)
plt.legend()
plt.show()
```



```
# Scatter plot of average ratings vs. book counts
plt.figure(figsize=(10, 6))
sns.scatterplot(x='books_count', y='average_rating', data=df, alpha=0.6, color='purple')
plt.title('Average Ratings vs. Book Counts')
plt.xlabel('Number of Books')
plt.ylabel('Average Rating')
plt.show()
```



```
# Plot : Box Plot of Average Rating by Language Code
plt.figure(figsize=(12, 8))  # Adjusted size for better readability
sns.boxplot(x='language_code', y='average_rating', data=df)
plt.title('Average Rating by Language Code')
plt.xlabel('Language Code')
plt.ylabel('Average Rating')
plt.xticks(rotation=45)
plt.show()
```



Plot : World Cloud

from wordcloud import WordCloud

titles = ' '.join(df['title'].dropna())

wordcloud = WordCloud(width=800, height=400, background_color='white').generate(titles)

plt.figure(figsize=(10, 6))

plt.imshow(wordcloud, interpolation='bilinear')

```
plt.axis('off')
plt.title('Word Cloud of Book Titles')
plt.show()
```

---

5. INTERACTIVE DISTRIBUTION OF THE TOP 5 BOOKS WITH RATINGS USING PLOTLY EXPRESS

```
# Install Plotly if not already installed
!pip install plotly
```

```
# Import necessary libraries

import pandas as pd

import plotly.express as px


# Load the data from the provided CSV content

import io

import requests


# Replace this URL with the actual URL of your CSV file if hosted online

# For now, we'll use the provided CSV content as a string

csv_content = """

book_id,goodreads_book_id,best_book_id,work_id,books_count,isbn,isbn13,authors,original_publication_year,original_title,title,language_code,average_rating,ratings_count,work_ratings_count,work_text_reviews_count,ratings_1,ratings_2,ratings_3,ratings_4,ratings_5,image_url,small_image_url

1,2767052,2767052,2792775,272,439023483,9.78043902348e+12,Suzanne Collins,2008.0,The Hunger Games,"The Hunger Games (The Hunger Games, #1)",eng,4.34,4780653,4942365,155254,66715,127936,560092,1481305,2706317,https://images.gr-assets.com/books/1447303603m/2767052.jpg,https://images.gr-assets.com/books/1447303603s/2767052.jpg

2,3,3,4640799,491,439554934,9.78043955493e+12,"J.K. Rowling, Mary GrandPré",1997.0,Harry Potter and the Philosopher's Stone,"Harry Potter and the Sorcerer's Stone (Harry Potter, #1)",eng,4.44,4602479,4800065,75867,75504,101676,455024,1156318,3011543,https://images.gr-assets.com/books/1474154022m/3.jpg,https://images.gr-assets.com/books/1474154022s/3.jpg

3,41865,41865,3212258,226,316015849,9.78031601584e+12,Stephenie Meyer,2005.0,Twilight,"Twilight (Twilight, #1)",en-US,3.57,3866839,3916824,95009,456191,436802,793319,875073,1355439,https://images.gr-assets.com/books/1361039443m/41865.jpg,https://images.gr-assets.com/books/1361039443s/41865.jpg

4,2657,2657,3275794,487,61120081,9.78006112008e+12,Harper Lee,1960.0,To Kill a Mockingbird,To Kill a Mockingbird,eng,4.25,3198671,3340896,72586,60427,117415,446835,1001952,1714267,https://images.gr-assets.com/books/1361975680m/2657.jpg,https://images.gr-assets.com/books/1361975680s/2657.jpg
```

5,4671,4671,245494,1356,743273567,9.78074327356e+12,F. Scott Fitzgerald,1925.0,The Great Gatsby,The Great Gatsby,eng,3.89,2683664,2773745,51992,86236,197621,606158,936012,947718,https://images.gr-assets.com/books/1490528560m/4671.jpg,https://images.gr-assets.com/books/1490528560s/4671.jpg

6,11870085,11870085,16827462,226,525478817,9.78052547881e+12,John Green,2012.0,The Fault in Our Stars,The Fault in Our Stars,eng,4.26,2346404,2478609,140739,47994,92723,327550,698471,1311871,https://images.gr-assets.com/books/1360206420m/11870085.jpg,https://images.gr-assets.com/books/1360206420s/11870085.jpg

7,5907,5907,1540236,969,618260307,9.7806182603e+12,J.R.R. Tolkien,1937.0,The Hobbit or There and Back Again,The Hobbit,en-US,4.25,2071616,2196809,37653,46023,76784,288649,665635,1119718,https://images.gr-assets.com/books/1372847500m/5907.jpg,https://images.gr-assets.com/books/1372847500s/5907.jpg

8,5107,5107,3036731,360,316769177,9.78031676917e+12,J.D. Salinger,1951.0,The Catcher in the Rye,The Catcher in the Rye,eng,3.79,2044241,2120637,44920,109383,185520,455042,661516,709176,https://images.gr-assets.com/books/1398034300m/5107.jpg,https://images.gr-assets.com/books/1398034300s/5107.jpg

9,960,960,3338963,311,1416524797,9.78141652479e+12,Dan Brown,2000.0,Angels & Demons ,"Angels & Demons (Robert Langdon, #1)",en-CA,3.85,2001311,2078754,25112,77841,145740,458429,716569,680175,https://images.gr-assets.com/books/1303390735m/960.jpg,https://images.gr-assets.com/books/1303390735s/960.jpg

10,1885,1885,3060926,3455,679783261,9.78067978327e+12,Jane Austen,1813.0,Pride and Prejudice,Pride and Prejudice,eng,4.24,2035490,2191465,49152,54700,86485,284852,609755,1155673,https://images.gr-assets.com/books/1320399351m/1885.jpg,https://images.gr-assets.com/books/1320399351s/1885.jpg

"""

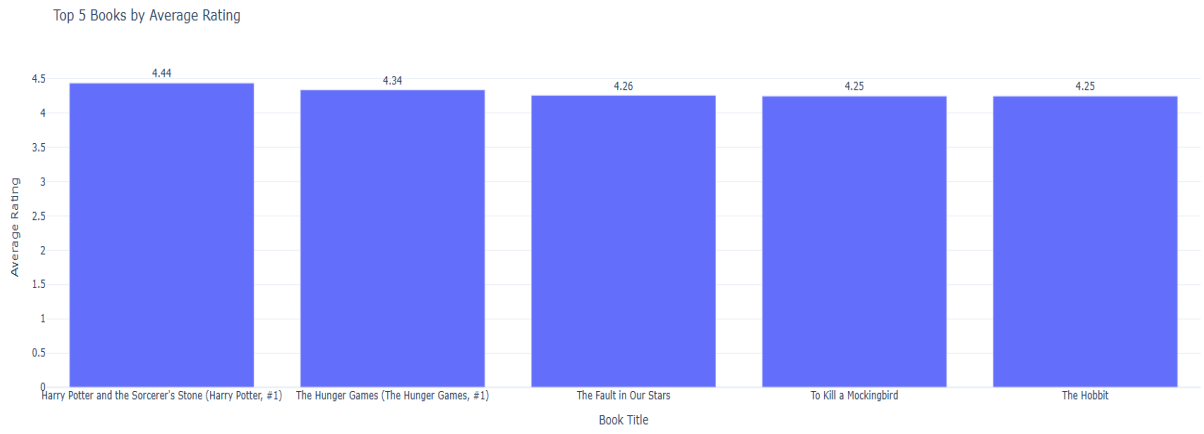
Load the CSV content into a pandas DataFrame

df = pd.read_csv(io.StringIO(csv_content))

Sort the dataframe by average_rating in descending order and select the top 5 books

top_5_books = df.sort_values(by='average_rating', ascending=False).head(5)

```
# Create a bar chart using Plotly Express
fig = px.bar(top_5_books,
             x='title',
             y='average_rating',
             title='Top 5 Books by Average Rating',
             labels={'average_rating': 'Average Rating', 'title': 'Book Title'},
             text='average_rating')

# Update the layout for better visualization
fig.update_traces(textposition='outside')
fig.update_layout(xaxis_title='Book Title',
                  yaxis_title='Average Rating',
                  template='plotly_white')

# Show the plot
fig.show()
```



BONUS POINT ACTIVITY

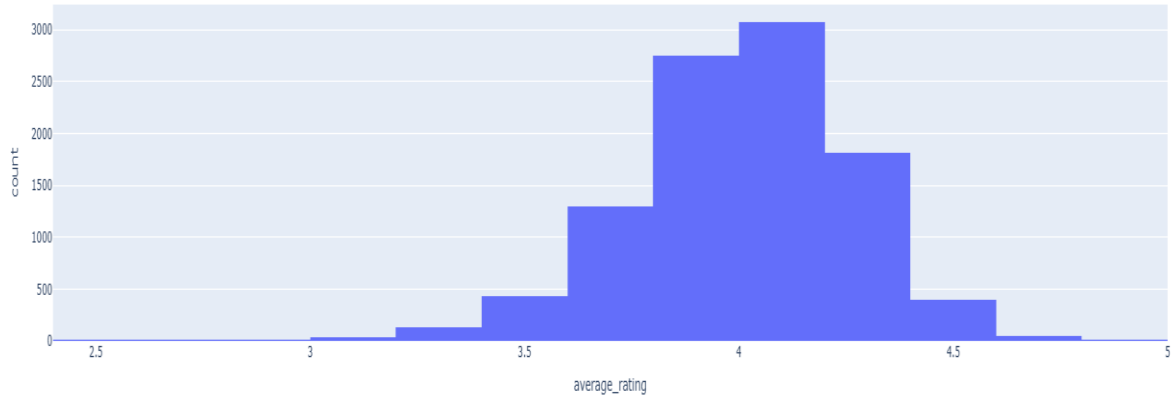
```
# INTERACTIVE DASHBOARD
import pandas as pd
import plotly.express as px
from dash import Dash, dcc, html, Input, Output
from flask import Flask
import os
from pyngrok import ngrok

# Read the uploaded CSV file
df = pd.read_csv(list(uploaded.keys())[0])

# Flask Server
server = Flask(__name__)
app = Dash(__name__, server=server)

# Layout of Dashboard
app.layout = html.Div([
    html.H1("Books Dashboard"),
    dcc.Dropdown(
        id='author-filter',
        options=[{'label': authors, 'value': authors} for authors in df['authors'].unique()],
        multi=True,
        placeholder="Filter by Author"
    ),
    dcc.Graph(id='rating-distribution')
])
```

```
# Callbacks for Interactivity
@app.callback(
    Output('rating-distribution', 'figure'),
    Input('author-filter', 'value')
)
def update_chart(selected_authors):
    filtered_df = df if not selected_authors else df[df['authors'].isin(selected_authors)]
    fig = px.histogram(filtered_df, x='average_rating', nbins=20, title='Book Ratings Distribution')
    return fig
```

Books Dashboard

Filter by Author

Book Ratings Distribution



Books Dashboard

Filter by Author

Suzanne Collins

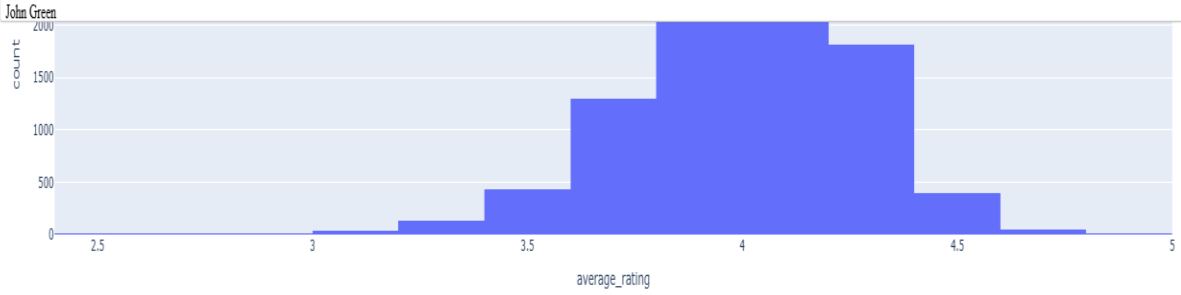
J.K. Rowling, Mary GrandPré

Stephenie Meyer

Harper Lee

F. Scott Fitzgerald

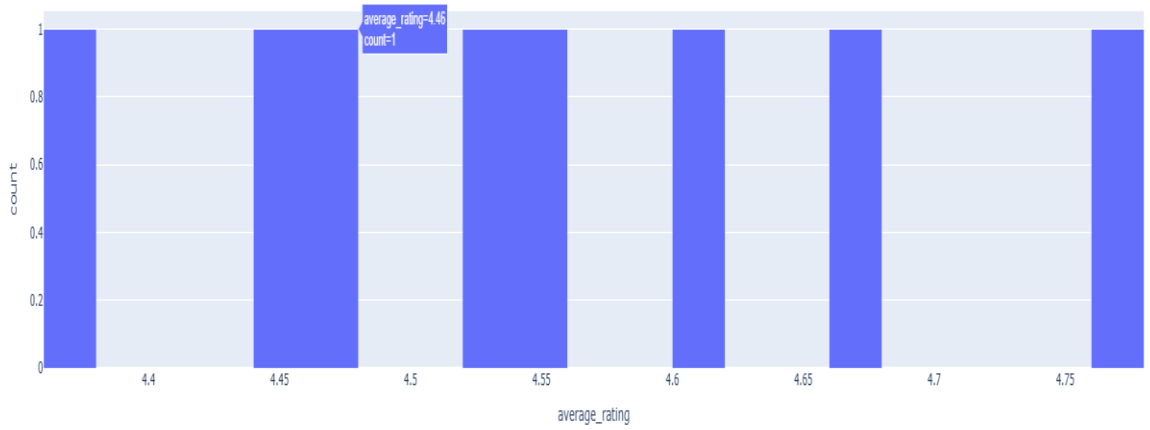
John Green



Books Dashboard

J.K. Rowling, Mary GrandPré

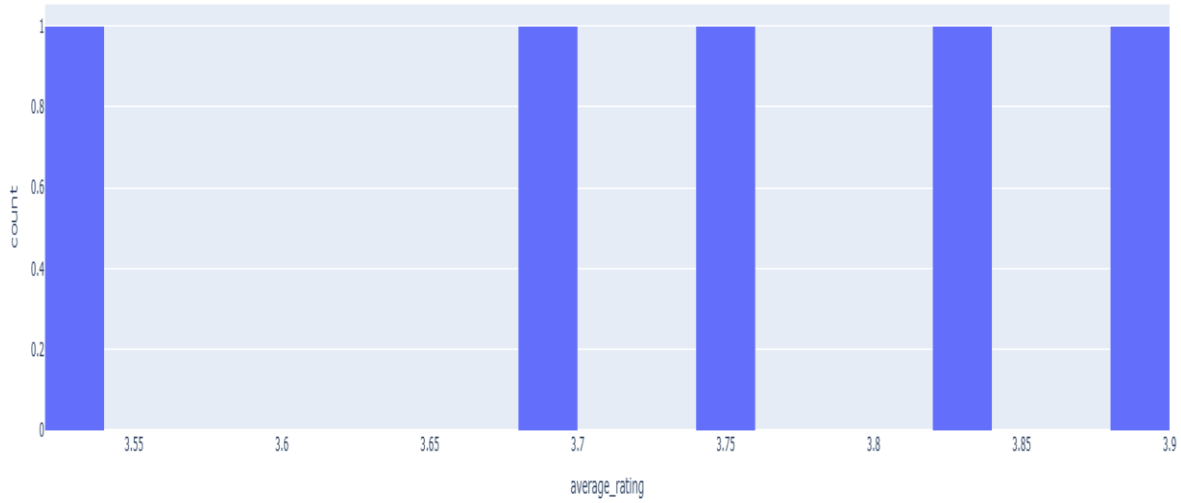
Book Ratings Distribution



Books Dashboard

F. Scott Fitzgerald

Book Ratings Distribution



Books Dashboard

x F. Scott Fitzgerald x J.K. Rowling, Mary GrandPré x ▾

Book Ratings Distribution