Book Recommendation System

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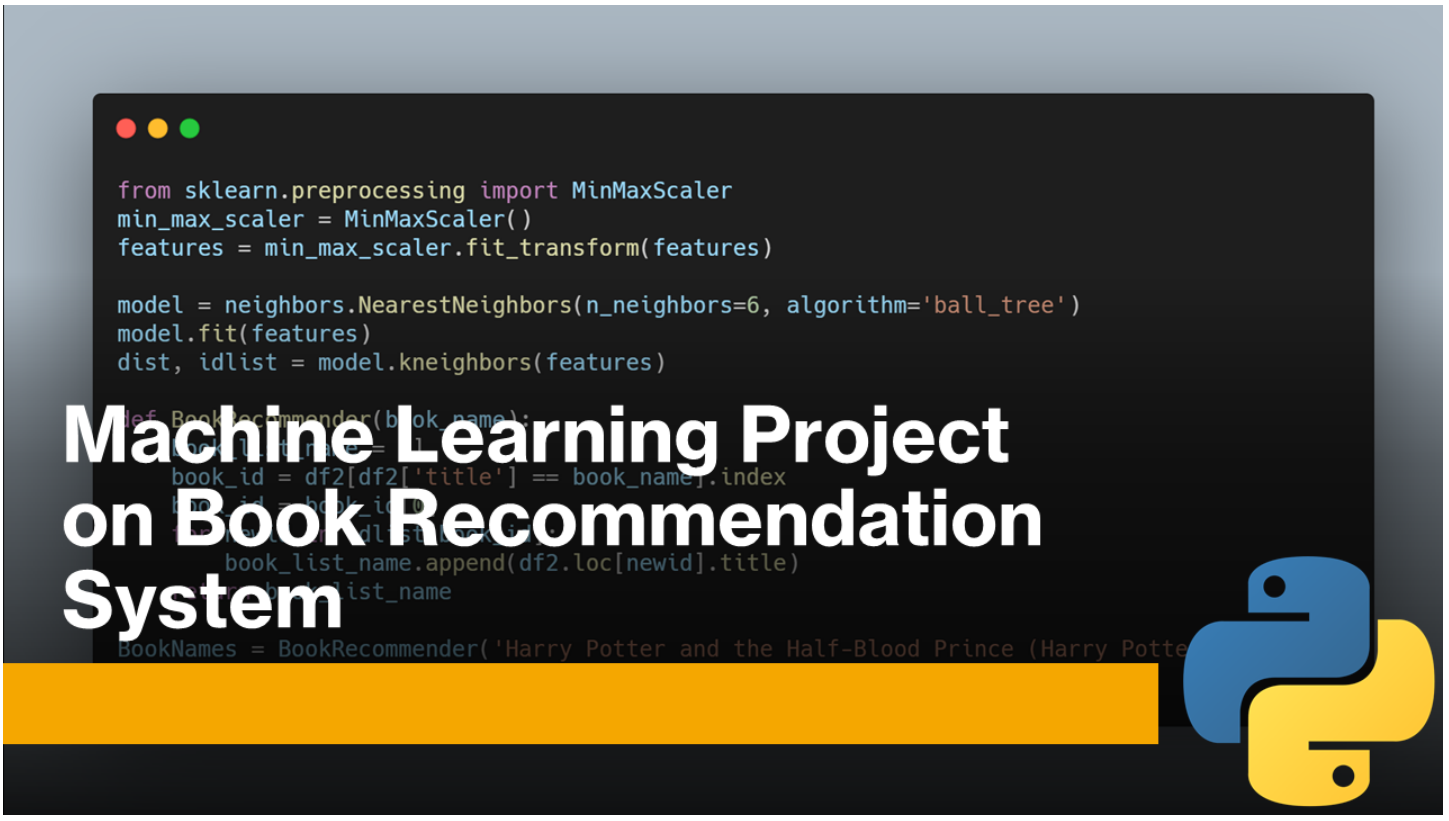


In [1]:

```
## Comment
## Observation
```

Importing All Necessary Library

In [2]:

```
## Importing All Necessary Library

import pandas as pd
import numpy as np

## for data visualisation
import matplotlib.pyplot as plt
import seaborn as sns

## for interactive plots
import ipywidgets
from ipywidgets import interact
from ipywidgets import interact_manual

## For Ignoring Warning ErrorMessage
from warnings import filterwarnings
filterwarnings('ignore')
```

Importing Dataset

In [3]:

```
df = pd.read_csv("books.csv", error_bad_lines = False)

```

```
b'Skipping line 3350: expected 12 fields, saw 13\nSkipping line 4704: expected 12 fields, saw 13\nSkipp
ing line 5879: expected 12 fields, saw 13\nSkipping line 8981: expected 12 fields, saw 13\n'
```

Dataset Description

- bookID: Unique identification number fro each book
- title: Name under which book was published
- authors: Name of the Authors of the book
- average_rating: Avarage rating of the book recevied in total.
- isbn: International standarded book number
- isbn13: 13 digit isbn to identify the book
- language_code: Primary Language of the book
- num_pages: Number of pages the book containes
- ratings_count: Total Number of ratings the book recevied.
- text_reviews_count: Total number of written reviews recevied.
- publication_date: Date when the book was first published
- publisher: Name of the Pulishers

In [4]:

```
### Checking Top 5 Row
```

In [5]:

```
1 df.head(5)
```

Out[5]:

	bookID	title	authors	average_rating	isbn	isbn13	language_code	num_pages	ratings_count	text_re
0	1	Harry Potter and the Half-Blood Prince (Harry ...	J.K. Rowling/Mary GrandPré	4.57	0439785960	9780439785969	eng	652	2095690	
1	2	Harry Potter and the Order of the Phoenix (Har...	J.K. Rowling/Mary GrandPré	4.49	0439358078	9780439358071	eng	870	2153167	
2	4	Harry Potter and the Chamber of Secrets (Harry...	J.K. Rowling	4.42	0439554896	9780439554893	eng	352	6333	
3	5	Harry Potter and the Prisoner of Azkaban (Harr...	J.K. Rowling/Mary GrandPré	4.56	043965548X	9780439655484	eng	435	2339585	
4	8	Harry Potter Boxed Set Books 1-5 (Harry Potte...	J.K. Rowling/Mary GrandPré	4.78	0439682584	9780439682589	eng	2690	41428	

Checking Row & Column Of Dataset

In [6]:

```
1 df.shape
```

Out[6]:

```
(11123, 12)
```

Checking All Columns Of the dataset

In [7]:

```
1 df.columns
```

Out[7]:

```
Index(['bookID', 'title', 'authors', 'average_rating', 'isbn', 'isbn13',
       'language_code', '  num_pages', 'ratings_count', 'text_reviews_count',
       'publication_date', 'publisher'],
      dtype='object')
```

Removing Extra Spaces from All Column name

In [8]:

```
df.columns = df.columns.str.strip()
```

Checking All Columns Of the dataset

In [9]:

```
df.columns
```

Out[9]:

```
Index(['bookID', 'title', 'authors', 'average_rating', 'isbn', 'isbn13',
       'language_code', 'num_pages', 'ratings_count', 'text_reviews_count',
       'publication_date', 'publisher'],
      dtype='object')
```

Checking DataTypes of All Columns.

In [10]:

```
df.dtypes
```

Out[10]:

```
bookID                int64
title                object
authors              object
average_rating      float64
isbn                 object
isbn13                int64
language_code        object
num_pages             int64
ratings_count         int64
text_reviews_count    int64
publication_date     object
publisher            object
dtype: object
```

Checking Statistical Summary of all Numeric Columns

In [11]:

```
df.describe()
```

Out[11]:

	bookID	average_rating	isbn13	num_pages	ratings_count	text_reviews_count
count	11123.000000	11123.000000	1.112300e+04	11123.000000	1.112300e+04	11123.000000
mean	21310.856963	3.934075	9.759880e+12	336.405556	1.794285e+04	542.048099
std	13094.727252	0.350485	4.429758e+11	241.152626	1.124992e+05	2576.619589
min	1.000000	0.000000	8.987060e+09	0.000000	0.000000e+00	0.000000
25%	10277.500000	3.770000	9.780345e+12	192.000000	1.040000e+02	9.000000
50%	20287.000000	3.960000	9.780582e+12	299.000000	7.450000e+02	47.000000
75%	32104.500000	4.140000	9.780872e+12	416.000000	5.000500e+03	238.000000
max	45641.000000	5.000000	9.790008e+12	6576.000000	4.597666e+06	94265.000000

Checking Statistical Summary of all Categorical Columns

In [12]:

```
1 df.describe(include = 'object')
```

Out[12]:

	title	authors	isbn	language_code	publication_date	publisher
count	11123	11123	11123	11123	11123	11123
unique	10348	6639	11123	27	3679	2290
top	The Iliad	Stephen King	0439785960	eng	10/1/2005	Vintage
freq	9	40	1	8908	56	318

Checking Sum of all Null value Present in the Dataset.

In [13]:

```
1 df.isnull().sum()
```

Out[13]:

```
bookID                0
title                 0
authors               0
average_rating        0
isbn                  0
isbn13                0
language_code         0
num_pages             0
ratings_count         0
text_reviews_count    0
publication_date      0
publisher             0
dtype: int64
```

Checking if any Duplicate Row Present In Dataset or Not.

In [14]:

```
1 df.duplicated().any()
```

Out[14]:

```
False
```

Checking Summary of Dataset

In [15]:

```
1 df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11123 entries, 0 to 11122
Data columns (total 12 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   bookID              11123 non-null  int64  
 1   title               11123 non-null  object 
 2   authors             11123 non-null  object 
 3   average_rating      11123 non-null  float64
 4   isbn                11123 non-null  object 
 5   isbn13              11123 non-null  int64  
 6   language_code       11123 non-null  object 
 7   num_pages           11123 non-null  int64  
 8   ratings_count       11123 non-null  int64  
 9   text_reviews_count  11123 non-null  int64  
 10  publication_date    11123 non-null  object 
 11  publisher           11123 non-null  object 
dtypes: float64(1), int64(5), object(6)
memory usage: 1.0+ MB
```

Feature Engineering

- Extract Important Features
- Reducing the size of Features
- Creating new features from the existring ones

Checking All Column name present in Dataset

In [16]:

```
1 df.columns
```

Out[16]:

```
Index(['bookID', 'title', 'authors', 'average_rating', 'isbn', 'isbn13',
       'language_code', 'num_pages', 'ratings_count', 'text_reviews_count',
       'publication_date', 'publisher'],
      dtype='object')
```

Checking All Unique Rows Present in isbn Columns

In [17]:

```
1 df.isbn.nunique()
```

Out[17]:

```
11123
```

Checking All Unique Rows Present in isbn13 Columns

In [18]:

```
df.isbn13.nunique()
```

Out[18]:

```
11123
```

Droping Unnecessary Column present in Dataset.

In [19]:

```
df.drop(['bookID', 'isbn', 'isbn13'], axis = 1, inplace = True)
```

Checking All Column name Present in Dataset.

In [20]:

```
df.columns
```

Out[20]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher'],
      dtype='object')
```

Checking All Rows present in publication_date

In [21]:

```
df.publication_date
```

Out[21]:

```
0         9/16/2006
1          9/1/2004
2         11/1/2003
3          5/1/2004
4         9/13/2004
            ...
11118    12/21/2004
11119     12/1/1988
11120      8/1/1993
11121     2/27/2007
11122     5/28/2006
Name: publication_date, Length: 11123, dtype: object
```

Creating New Year Columns

In [22]:

```
df['year'] = df['publication_date'].str.split('/')
df['year'] = df['year'].apply(lambda x: x[2])
```

Checking Top 2 Rows from Dataset.

In [23]:

```
1 df.head(2)
```

Out[23]:

	title	authors	average_rating	language_code	num_pages	ratings_count	text_reviews_count	publication_date	publish
0	Harry Potter and the Half-Blood Prince (Harry ...	J.K. Rowling/Mary GrandPré	4.57	eng	652	2095690	27591	9/16/2006	Scholas Ir
1	Harry Potter and the Order of the Phoenix (Har...	J.K. Rowling/Mary GrandPré	4.49	eng	870	2153167	29221	9/1/2004	Scholas Ir

Checking Datatypes for all Column name

In [24]:

```
1 df.dtypes
```

Out[24]:

```
title                 object
authors               object
average_rating       float64
language_code         object
num_pages              int64
ratings_count          int64
text_reviews_count     int64
publication_date      object
publisher             object
year                  object
dtype: object
```

Changing DataType of Year Columns from Object to Integer.

In [25]:

```
1 df['year'] = df['year'].astype('int')
```

Checking Datatypes for all Column name

In [26]:

```
1 df.dtypes
```

Out[26]:

```
title                 object
authors               object
average_rating       float64
language_code         object
num_pages              int64
ratings_count          int64
text_reviews_count     int64
publication_date      object
publisher             object
year                   int32
dtype: object
```

Checking all Column name from dataset.

In [27]:

```
1 df.columns
```

Out[27]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Checking Minimum Year Present in a Dataset.

In [28]:

```
1 df['year'].min()
```

Out[28]:

```
1900
```

Checking Maximum Year Present in a Dataset.

In [29]:

```
1 df['year'].max()
```

Out[29]:

```
2020
```

Checking all Column name from Dataset.

In [30]:

```
1 df.columns
```

Out[30]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Exploratory Data Analysis

Filter Year == 2022 and get required output based on input.

In [31]:

```
1 df[df['year'] == 2020][['title', 'authors','average_rating','language_code','publisher' ]]
```

Out[31]:

	title	authors	average_rating	language_code	publisher
9664	A Quick Bite (Argeneau #1)	Lynsay Sands	3.91	eng	Avon

Filter Year == 2018 and get required output based on input.

In [32]:

```
1 df[df['year'] == 2018][['title', 'authors','average_rating','language_code','publisher' ]]
```

Out[32]:

	title	authors	average_rating	language_code	publisher
3171	Ariel: The Restored Edition	Sylvia Plath/Frieda Hughes	4.27	eng	Harper Perennial Modern Classics
4080	El Perfume: Historia De Un Asesino	Patrick Süskind	4.02	spa	Planeta Publishing
4082	The Perfume Factory	Alex Austin	4.18	eng	Kindle
8068	El diablo de la botella	Robert Louis Stevenson/Diana Castellanos/Eleon...	3.74	spa	Grupo Editorial Norma S.A.
11085	El alquimista: una fábula para seguir tus sueños	Paulo Coelho/Juan Godó Costa	3.86	eng	Rayo

Creating Groupby function based on Year and Title column

In [33]:

```
1 df.groupby(['year'])['title'].agg('count').sort_values(ascending = False).head(20)
```

Out[33]:

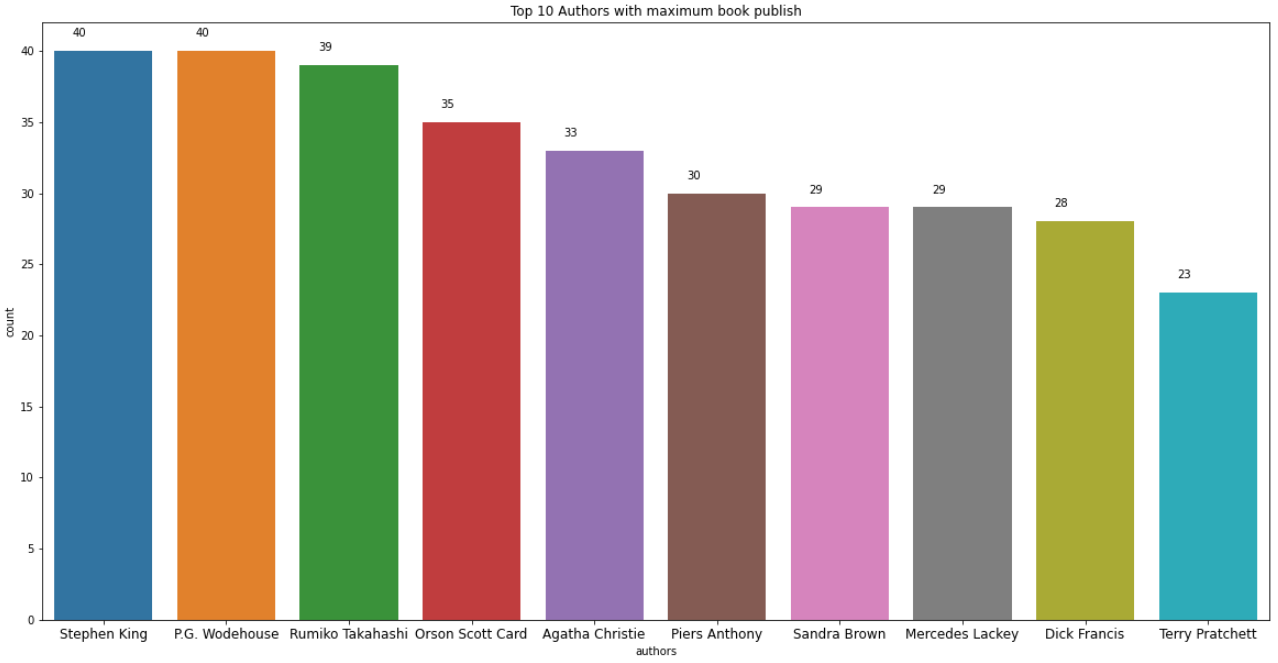
```
year
2006    1700
2005    1260
2004    1069
2003     931
2002     798
2001     656
2000     534
2007     518
1999     450
1998     396
1997     290
1996     250
1995     249
1994     220
1992     183
1993     165
1991     151
1989     118
1990     117
1987      88
Name: title, dtype: int64
```

Ploting Counplot graph for "Top 10 Authors with Maximum book Publish"

In [34]:

```
plt.figure(figsize = (20, 10))
ax = sns.countplot(x = 'authors', data = df,
             order = df['authors'].value_counts().iloc[:10].index)
plt.title("Top 10 Authors with maximum book publish")
plt.xticks(fontsize = 12)

for p in ax.patches:
    ax.annotate(format(p.get_height()), (p.get_x()+0.15, p.get_height()+1))
plt.show()
```



Checking all Column name Avaliable in dataset.

In [35]:

```
df.columns
```

Out[35]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Sort All Value Count of language_code.

In [36]:

```
1 df.language_code.value_counts()
```

Out[36]:

```
eng      8908
en-US    1408
spa       218
en-GB     214
fre       144
ger        99
jpn        46
mul        19
zho        14
grc        11
por        10
en-CA       7
ita         5
enm         3
lat         3
swe         2
rus         2
srp         1
nl          1
msa         1
glg         1
wel         1
ara         1
nor         1
tur         1
gla         1
ale         1
Name: language_code, dtype: int64
```

Creating Groupby Function base on language_code Column and getting Required Output.

In [37]:

```
df.groupby(['language_code'])[['average_rating',
                               'ratings_count',
                               'text_reviews_count']].agg('mean').style.background_gradient(cmap = 'Wistia')
```

Out[37]:

language_code	average_rating	ratings_count	text_reviews_count
ale	4.360000	102.000000	16.000000
ara	3.550000	122.000000	12.000000
en-CA	4.025714	4086.714286	324.428571
en-GB	3.923411	2463.691589	104.060748
en-US	3.914659	3773.906960	160.357244
eng	3.934062	21570.272564	645.156601
enm	3.873333	3233.666667	84.000000
fre	3.971528	3277.319444	64.513889
ger	3.950101	234.727273	8.232323
gla	4.470000	11.000000	0.000000
glg	3.360000	36.000000	2.000000
grc	3.707273	52.454545	2.454545
ita	4.078000	3234.400000	55.800000
jpn	4.268696	68.304348	3.152174
lat	4.353333	114.666667	12.333333
msa	4.110000	28.000000	6.000000
mul	4.126316	386.631579	19.263158
nl	4.180000	67.000000	9.000000
nor	3.600000	86.000000	8.000000
por	3.945000	165.100000	13.500000
rus	4.255000	4477.000000	98.500000
spa	3.929312	4636.114679	91.123853
srp	0.000000	0.000000	0.000000
swe	3.455000	2671.000000	157.000000
tur	4.420000	1000.000000	41.000000
wel	5.000000	1.000000	0.000000
zho	4.456429	20.428571	0.500000

Checking Top 20 Value Count of Title Column.

In [38]:

```
book = df['title'].value_counts()[:20]
book
```

Out[38]:

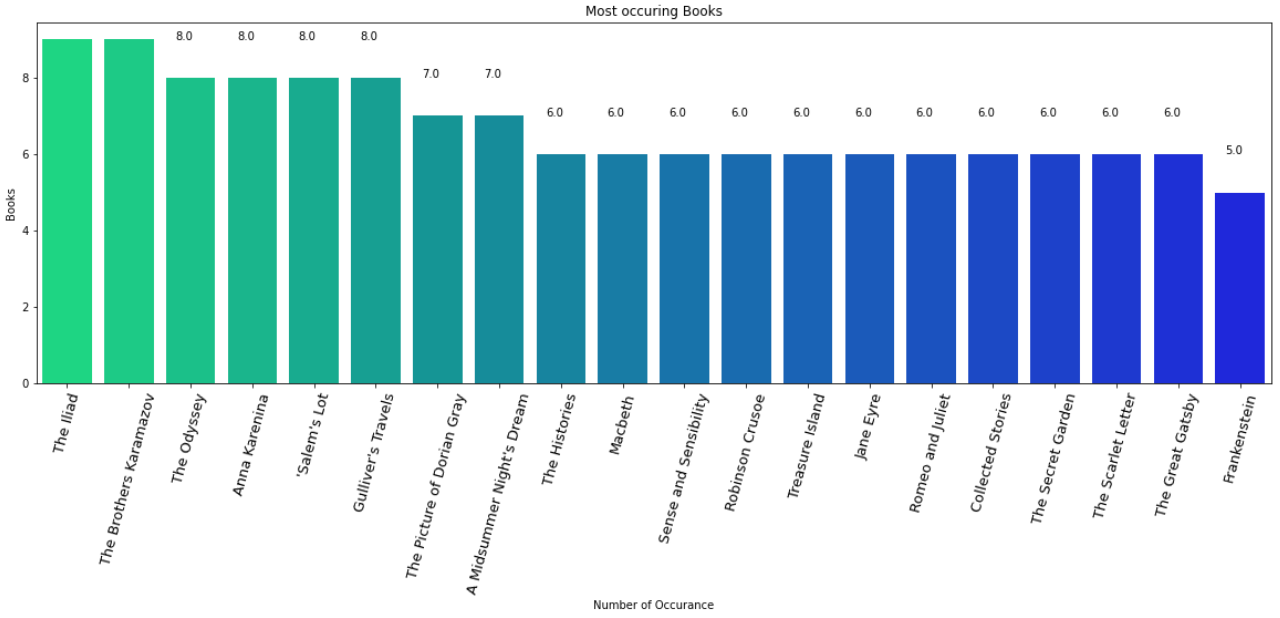
```
The Iliad                    9
The Brothers Karamazov       9
The Odyssey                  8
Anna Karenina                8
'Salem's Lot                 8
Gulliver's Travels           8
The Picture of Dorian Gray   7
A Midsummer Night's Dream    7
The Histories                6
Macbeth                      6
Sense and Sensibility        6
Robinson Crusoe              6
Treasure Island              6
Jane Eyre                    6
Romeo and Juliet             6
Collected Stories            6
The Secret Garden            6
The Scarlet Letter           6
The Great Gatsby             6
Frankenstein                 5
Name: title, dtype: int64
```

Plotting Barplot to find most occuring book in our data.

In [39]:

```
### Plotting BarPLot to find most occuring book in our data

plt.figure(figsize = (20, 6))
book = df['title'].value_counts()[:20]
ax = sns.barplot(x = book.index, y = book,
            palette = 'winter_r')
plt.title("Most occuring Books")
plt.xlabel("Number of Occurance")
plt.ylabel("Books")
plt.xticks(rotation = 75, fontsize = 13)
for p in ax.patches:
    ax.annotate(format(p.get_height()), (p.get_x()+0.15, p.get_height()+1))
plt.show()
```

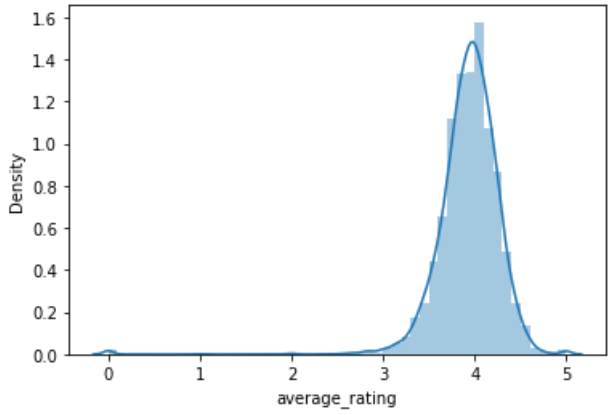


Ploting Distribution Graph on Average_Rating.m

In [40]:

```
### Ploting Distribution Graph on Average_Rating.

sns.distplot(df['average_rating'])
plt.show()
```



Sorting Dataset related with maximum Average_Rating Column

In [41]:

```
1 df[df.average_rating == df.average_rating.max()][['title','authors','language_code','publisher']]
```

Out[41]:

	title	authors	language_code	publisher
624	Comoediae 1: Acharenses/Equites/Nubes/Vespae/P...	Aristophanes/F.W. Hall/W.M. Geldart	grc	Oxford University Press USA
786	Willem de Kooning: Late Paintings	Julie Sylvester/David Sylvester	eng	Schirmer Mosel
855	Literature Circle Guide: Bridge to Terabithia:...	Tara MacCarthy	eng	Teaching Resources
1243	Middlesex Borough (Images of America: New Jersey)	Middlesex Borough Heritage Committee	eng	Arcadia Publishing
4125	Zone of the Enders: The 2nd Runner Official St...	Tim Bogenn	eng	BradyGames
4788	The Diamond Color Meditation: Color Pathway to...	John Diamond	eng	Square One Publishers
4933	Bulgakov's the Master and Margarita: The Text ...	Elena N. Mahlow	eng	Vantage Press
5023	The Complete Theory Fun Factory: Music Theory ...	Ian Martin/Katie Elliott	eng	Boosey & Hawkes Inc
5474	The Goon Show Volume 4: My Knees Have Fallen ...	NOT A BOOK	eng	BBC Physical Audio
5476	The Goon Show Volume 11: He's Fallen in the W...	NOT A BOOK	eng	BBC Physical Audio
5647	Winchester Shotguns	Dennis Adler/R.L. Wilson	eng	Chartwell Books
5648	Colossians and Philemon: A Critical and Exeget...	R. McL. Wilson	eng	T&T Clark Int'l
6184	Taxation of Mineral Rents	Ross Garnaut	eng	Oxford University Press USA
6247	The New Big Book of America	Todd Davis/Marc Frey	eng	Courage Books
6775	Delwau Duon: Peintiadau Nicholas Evans = Symph...	Nicholas Evans/Rhonda Evans	wel	Y Lolfa
8544	Fanning the Flame: Bible Cross and Mission	Chris Green/Chris Wright/Paul Douglas Gardner	eng	Zondervan
9282	Oliver Wendell Holmes in Paris: Medicine Theo...	William C. Dowling	eng	University Press of New England
9324	Tyrannosaurus Wrecks (Stanley #1)	Laura Driscoll/Alisa Klayman-Grodsky/Eric ...	eng	Disney Press
9720	The Irish Anatomist: A Study of Flann O'Brien	Keith Donohue	eng	Academica Press
9847	The American Campaign: U.S. Presidential Campa...	James E. Campbell	eng	Texas A&M University Press
9893	His Princess Devotional: A Royal Encounter Wit...	Sheri Rose Shepherd	eng	Multnomah
10262	Bill Gates: Computer Legend (Famous Lives)	Sara Barton-Wood	eng	Raintree

Checking Top 20 Publisher in Dataset

In [42]:

```
publisher = df['publisher'].value_counts()[:20]
publisher
```

Out[42]:

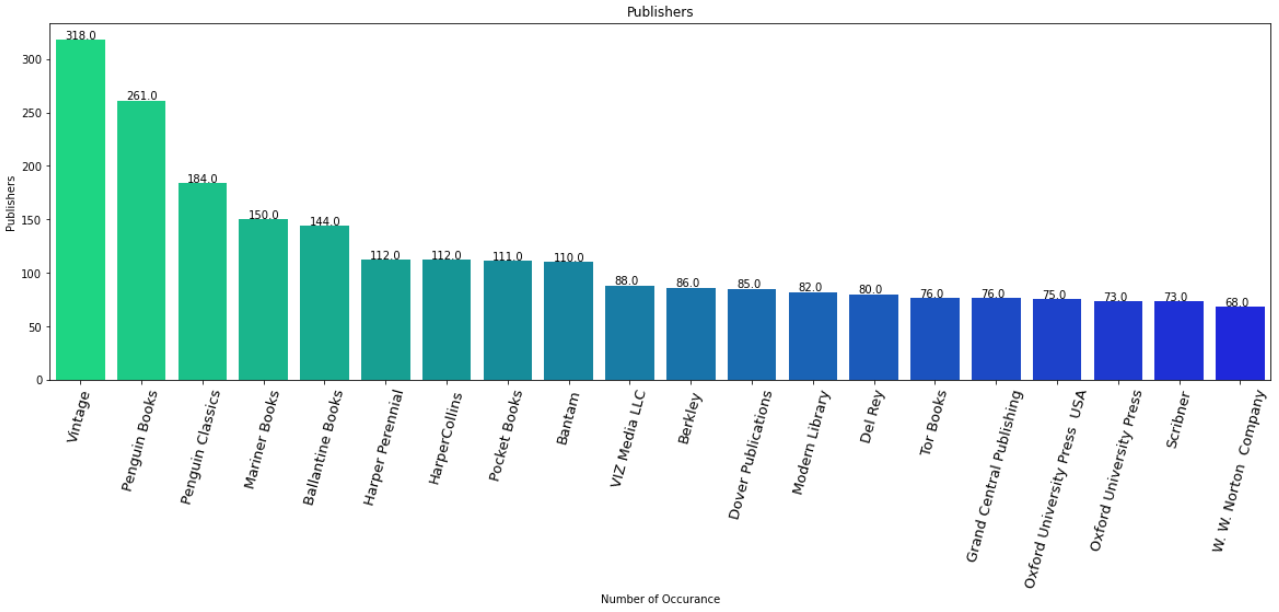
```
Vintage                          318
Penguin Books                    261
Penguin Classics                 184
Mariner Books                    150
Ballantine Books                 144
Harper Perennial                 112
HarperCollins                    112
Pocket Books                     111
Bantam                           110
VIZ Media LLC                     88
Berkley                           86
Dover Publications                85
Modern Library                    82
Del Rey                           80
Tor Books                         76
Grand Central Publishing          76
Oxford University Press  USA      75
Oxford University Press           73
Scribner                          73
W. W. Norton  Company             68
Name: publisher, dtype: int64
```

Plotting Barplot for Top 20 Publishers

In [43]:

```
## Plotting Barplot for Top 20 Publishers

plt.figure(figsize = (20, 6))
publisher = df['publisher'].value_counts()[:20]
ax = sns.barplot(x = publisher.index, y = publisher, palette = 'winter_r')
plt.title("Publishers")
plt.xlabel("Number of Occurance")
plt.ylabel("Publishers")
plt.xticks(rotation = 75, fontsize = 13)
for p in ax.patches:
    ax.annotate(format(p.get_height()), (p.get_x()+0.15, p.get_height()+1))
plt.show()
```



Now Book Recommendation System Implementation

- **Recommending Books based on Publishers**
- **Recommending Books based on Authors**
- **Recommending Books based on Language**

Recommending Books based on Publishers

In [44]:

```
## Checking Total Value count of all Top Publishers
df.publisher.value_counts()
```

Out[44]:

```
Vintage                        318
Penguin Books                  261
Penguin Classics               184
Mariner Books                  150
Ballantine Books               144
                              ...
University of Calgary Press      1
Marlowe & Company                1
University Press of America      1
Abstract Studio                  1
VeloPress                        1
Name: publisher, Length: 2290, dtype: int64
```

In [45]:

```
## Checking all Column Name from dataset
df.columns
```

Out[45]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Defining Function for Recommending Books based on Publishers

In [46]:

```
def recomd_books_publisheres(x):
    a = df[df['publisher'] == x][['title', 'average_rating']]
    a = a.sort_values(by = 'average_rating', ascending = False)
    return a.head(10)
```

In [47]:

```
### Checking Function of Recommending Books based on Publishers name "Vintage"
recomd_books_publisheres('Vintage')
```

Out[47]:

	title	average_rating
7371	Remembrance of Things Past: Volume II - The Gu...	4.53
335	The Power Broker: Robert Moses and the Fall of...	4.51
10838	The Civil War Vol. 1: Fort Sumter to Perryville	4.42
1775	The Son Avenger (The Master of Hestviken #4)	4.40
1505	A Fine Balance	4.36
9626	Nobody Knows My Name	4.35
2267	The Stories of Vladimir Nabokov	4.30
3112	All of Us: The Collected Poems	4.30
8787	Selected Stories	4.28
4019	Selected Stories	4.28

In [48]:

```
### Checking Function of Recommending Books based on Publishers name "Penguin Books"
recomd_books_publisheres('Penguin Books')
```

Out[48]:

	title	average_rating
4244	The Complete Maus	4.55
5564	The Penguin Companion to European Literature	4.50
1381	Before The Mayflower A History of Black America	4.44
4602	Selected Non-Fictions	4.43
3011	The Read-Aloud Handbook	4.41
4551	Life With Jeeves (Jeeves #6 2 & 4)	4.39
1275	East of Eden	4.37
3304	Ludwig Wittgenstein: The Duty of Genius	4.36
4980	Life at Blandings	4.35
10867	The Portable Dorothy Parker	4.34

Creating Interactive Plotting using ipywidgets

In [49]:

```
### Creating Interactive Plotting using ipywidgets for Recommending Books based on Publishers

@interact
def recomd_books_publishers(publisher_name = list(df['publisher'].value_counts().index)):
    a = df[df['publisher'] == publisher_name][['title', 'average_rating']]
    a = a.sort_values(by = 'average_rating', ascending = False)
    return a.head(10)
```

publisher_... Oxford University Press USA

	title	average_rating
6184	Taxation of Mineral Rents	5.00
624	Comoediae 1: Acharenses/Equites/Nubes/Vespae/P...	5.00
9276	Manic-Depressive Illness: Bipolar Disorders an...	4.40
9011	Battle Cry of Freedom	4.35
1741	Ride of the Second Horseman: The Birth and Dea...	4.29
8298	The Oxford Handbook of Philosophy of Mathemati...	4.25
1049	The Selected Journals Of L.M. Montgomery Vol....	4.24
9750	Power Sex Suicide: Mitochondria and the Mean...	4.24
9318	The Oxford Dictionary of Quotations	4.20
670	Jane Austen's Letters	4.16

In [50]:

```
df.columns
```

Out[50]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Recommending Books based on Authors

In [51]:

```
### Creating Interactive Plotting using ipywidgets for Recommending Books based on Authors

@interact
def recomd_books_authors(authors_name = list(df['authors'].value_counts().index)):
    a = df[df['authors'] == authors_name][['title', 'average_rating']]
    a = a.sort_values(by = 'average_rating', ascending = False)
    return a.head(10)
```

authors_na… James Patterson

	title	average_rating
2067	Suzanne's Diary for Nicholas	4.17
3631	School's Out—Forever (Maximum Ride #2)	4.15
8734	Saving the World and Other Extreme Sports (Max...	4.15
3637	Along Came a Spider (Alex Cross #1)	4.11
3643	The Angel Experiment (Maximum Ride #1)	4.08
8735	1st To Die (The Women's Murder Club #1)	4.08
3629	1st to Die (Women's Murder Club #1)	4.08
3636	Roses Are Red (Alex Cross #6)	4.04
8730	Roses Are Red (Alex Cross #6)	4.04
3635	Pop Goes the Weasel (Alex Cross #5)	4.00

In [52]:

```
df.columns
```

Out[52]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year'],
      dtype='object')
```

Recommending Books based on Language

In [53]:

```
### Creating Interactive Plotting using ipywidgets for Recommending Books based on Language

@interact
def recomd_books_lang(language = list(df['language_code'].value_counts().index)):
    a = df[df['language_code'] == language][['title', 'average_rating']]
    a = a.sort_values(by = 'average_rating', ascending = False)
    return a.head(10)
```

language en-US

	title	average_rating
9430	Little Big Book for God's Children	4.88
4811	The Feynman Lectures on Physics Vols 7-8	4.80
4810	The Feynman Lectures on Physics Vols 3-4	4.71
7042	The Sibley Field Guide to Birds of Western Nor...	4.69
6196	Discovery of the Presence of God: Devotional N...	4.61
1611	The Feynman Lectures on Physics 3 Vols	4.60
1040	The World's First Love: Mary Mother of God	4.59
4812	The Feynman Lectures on Physics Vols 5-6	4.59
8648	The More Than Complete Hitchhiker's Guide (Hit...	4.58
4052	The Complete Lyrics of Cole Porter	4.53

Data Preprocessing

In [54]:

```
### Checking Top 2 Rows
df.head(2)
```

Out[54]:

	title	authors	average_rating	language_code	num_pages	ratings_count	text_reviews_count	publication_date	publish
0	Harry Potter and the Half-Blood Prince (Harry ...	J.K. Rowling/Mary GrandPré	4.57	eng	652	2095690	27591	9/16/2006	Scholas lr
1	Harry Potter and the Order of the Phoenix (Har...	J.K. Rowling/Mary GrandPré	4.49	eng	870	2153167	29221	9/1/2004	Scholas lr

Creating Function for Converting Number to Object on Average_Rating Column.

In [55]:

```
### Creating Function for Converting Number to Object on Average_Rating Column.

def num_to_obj(x):
    if x >0 and x <=1:
        return "between 0 and 1"
    if x > 1 and x <= 2:
        return "between 1 and 2"
    if x > 2 and x <=3:
        return "between 2 and 3"
    if x >3 and x<=4:
        return "between 3 and 4"
    if x >4 and x<=5:
        return "between 4 and 5"
df['rating_obj'] = df['average_rating'].apply(num_to_obj)
```

In [56]:

```
### Now Checking Total Value for each Converted Objects.
df['rating_obj'].value_counts()
```

Out[56]:

```
between 3 and 4    6285
between 4 and 5    4735
between 2 and 3      69
between 1 and 2       7
between 0 and 1       2
Name: rating_obj, dtype: int64
```

In [57]:

```
## Creating One-Hot Encoding on Rating columns

rating_df = pd.get_dummies(df['rating_obj'])
rating_df.head()
```

Out[57]:

	between 0 and 1	between 1 and 2	between 2 and 3	between 3 and 4	between 4 and 5
0	0	0	0	0	1
1	0	0	0	0	1
2	0	0	0	0	1
3	0	0	0	0	1
4	0	0	0	0	1

In [58]:

```
df.columns
```

Out[58]:

```
Index(['title', 'authors', 'average_rating', 'language_code', 'num_pages',
       'ratings_count', 'text_reviews_count', 'publication_date', 'publisher',
       'year', 'rating_obj'],
      dtype='object')
```

In [59]:

```
## Creating One-Hot Encoding on language_code columns

language_df = pd.get_dummies(df['language_code'])
language_df.head()
```

Out[59]:

	ale	ara	en-CA	en-GB	en-US	eng	enm	fre	ger	gla	...	nl	nor	por	rus	spa	srp	swe	tur	wel	zho
0	0	0	0	0	0	1	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	1	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	1	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	1	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0

5 rows × 27 columns

In [60]:

```
### Performing Concatenation Function for Joining two Dataframe

features = pd.concat([rating_df,language_df, df['average_rating'],
                      df['ratings_count'], df['title']], axis = 1)
features.set_index('title', inplace= True)
features.head()
```

Out[60]:

title	between 0 and 1	between 1 and 2	between 2 and 3	between 3 and 4	between 4 and 5	ale	ara	en-CA	en-GB	en-US	...	por	rus	spa	srp	swe	tur	wel	zho	av
Harry Potter and the Half-Blood Prince (Harry Potter #6)	0	0	0	0	1	0	0	0	0	0	...	0	0	0	0	0	0	0	0	
Harry Potter and the Order of the Phoenix (Harry Potter #5)	0	0	0	0	1	0	0	0	0	0	...	0	0	0	0	0	0	0	0	
Harry Potter and the Chamber of Secrets (Harry Potter #2)	0	0	0	0	1	0	0	0	0	0	...	0	0	0	0	0	0	0	0	
Harry Potter and the Prisoner of Azkaban (Harry Potter #3)	0	0	0	0	1	0	0	0	0	0	...	0	0	0	0	0	0	0	0	
Harry Potter Boxed Set Books 1-5 (Harry Potter #1-5)	0	0	0	0	1	0	0	0	0	0	...	0	0	0	0	0	0	0	0	

5 rows × 34 columns

Feature Scaling

In [61]:

```
### Importing MinMax SCaler on dataset

from sklearn.preprocessing import MinMaxScaler
```

In [62]:

```
scaler = MinMaxScaler()
features_scaled = scaler.fit_transform(features)
```

In [63]:

```
features_scaled
```

Out[63]:

```
array([[0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 9.14000000e-01, 4.55816060e-01],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 8.98000000e-01, 4.68317403e-01],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 8.84000000e-01, 1.37743803e-03],
       ...,
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 7.92000000e-01, 1.78351363e-04],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 7.44000000e-01, 1.67258779e-04],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, ...,
        0.00000000e+00, 7.82000000e-01, 2.45776879e-05]])
```

Model Building

In [64]:

```
### IMporting Neighbors Library.

from sklearn import neighbors
```

In [65]:

```
### Model Fitting

model = neighbors.NearestNeighbors(n_neighbors=5, algorithm = 'ball_tree',
                                   metric = 'euclidean')
model.fit(features_scaled)
dist, idlist = model.kneighbors(features_scaled)
```

In [66]:

```
df['title'].value_counts()
```

Out[66]:

```
The Iliad                                                 9
The Brothers Karamazov                                    9
The Odyssey                                               8
Anna Karenina                                             8
'Salem's Lot                                              8
                                                         ..
The Noonday Demon: An Atlas of Depression                 1
The Noonday Demon: An Anatomy of Depression               1
My Secret: A PostSecret Book                              1
The Secret Lives of Men and Women: A PostSecret Book      1
Las aventuras de Tom Sawyer                               1
Name: title, Length: 10348, dtype: int64
```

In [67]:

```
### Creating Book Recommendation System while using Book Title through Interactive Plotting Library.

@interact
def BookRecomender(book_name = list(df['title'].value_counts().index)):
    book_list_name = []
    book_id = df[df['title'] == book_name]
    book_id = book_id.index[0]
    for newid in idlist[book_id]:
        book_list_name.append(df.iloc[newid].title)
    return book_list_name
```

book_name Romeo and Juliet

```
['Romeo and Juliet',
 'Lord of the Flies',
 'Of Mice and Men',
 'The Da Vinci Code (Robert Langdon  #2)',
 'Animal Farm']
```

Thank You