Capstone Project
Book Recommendation System

G. V. Kapeesh Varma

CONTENTS

PROBLEM STATEMENT

On the Internet, where the number of choices is overwhelming, there is need to filter, prioritize and efficiently deliver relevant information in order to alleviate the problem of information overload, which has created a potential problem to many Internet users.

Recommender systems solve this problem by searching through large volume of dynamically generated information to provide users with personalized content and services. Therefore, the need to use efficient and accurate recommendation techniques within a system that will provide relevant and dependable recommendations for users cannot be over-emphasized.

APPROACH

In this project, we analyze three datasets namely Books.csv, Users.csv and Ratings.csv. These datasets altogether provide information about Books, Authors, Year of publication and Ratings. Due to the large amount of data, the dataset has been subset to a lower number of records. Feature Engineering has been performed to select relevant features and crosstab of the merged data. Recommendation system is then designed through Collaborative Filtering(Item Similarity) in such a way that the top 10 relevant and highly correlated books are shown according to the input search.

DATA SUMMARY

	ISBN	Book-Title	Book-Author	Year-Of-Publication	Publisher	Image-URL-S
0	0195153448	Classical Mythology	Mark P. O. Morford	2002	Oxford University Press	http://images.amazon.com/images/P/0195153448.0...
1	0002005018	Clara Callan	Richard Bruce Wright	2001	HarperFlamingo Canada	http://images.amazon.com/images/P/0002005018.0...
2	0060973129	Decision in Normandy	Carlo D'Este	1991	HarperPerennial	http://images.amazon.com/images/P/0060973129.0...
3	0374157065	Flu: The Story of the Great Influenza Pandemic...	Gina Bari Kolata	1999	Farrar Straus Giroux	http://images.amazon.com/images/P/0374157065.0...
4	0393045218	The Mummies of Urumchi	E. J. W. Barber	1999	W. W. Norton & Company	http://images.amazon.com/images/P/0393045218.0...

First 5 rows of the Books DataFrame

	User-ID	Location	Age
0	1	nyc, new york, usa	NaN
1	2	stockton, california, usa	18.0
2	3	moscow, yukon territory, russia	NaN
3	4	porto, v.n.gaia, portugal	17.0
4	5	farnborough, hants, united kingdom	NaN

First 5 rows of the Users DataFrame

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100000 entries, 0 to 99999
Data columns (total 3 columns):
 #   Column    Non-Null Count   Dtype
---  ------    --------------   -----
 0   User-ID   100000 non-null  int64
 1   Location  100000 non-null  object
 2   Age       60269 non-null   float64
dtypes: float64(1), int64(1), object(1)
memory usage: 2.3+ MB
```

Concise summary of the Users DataFrame

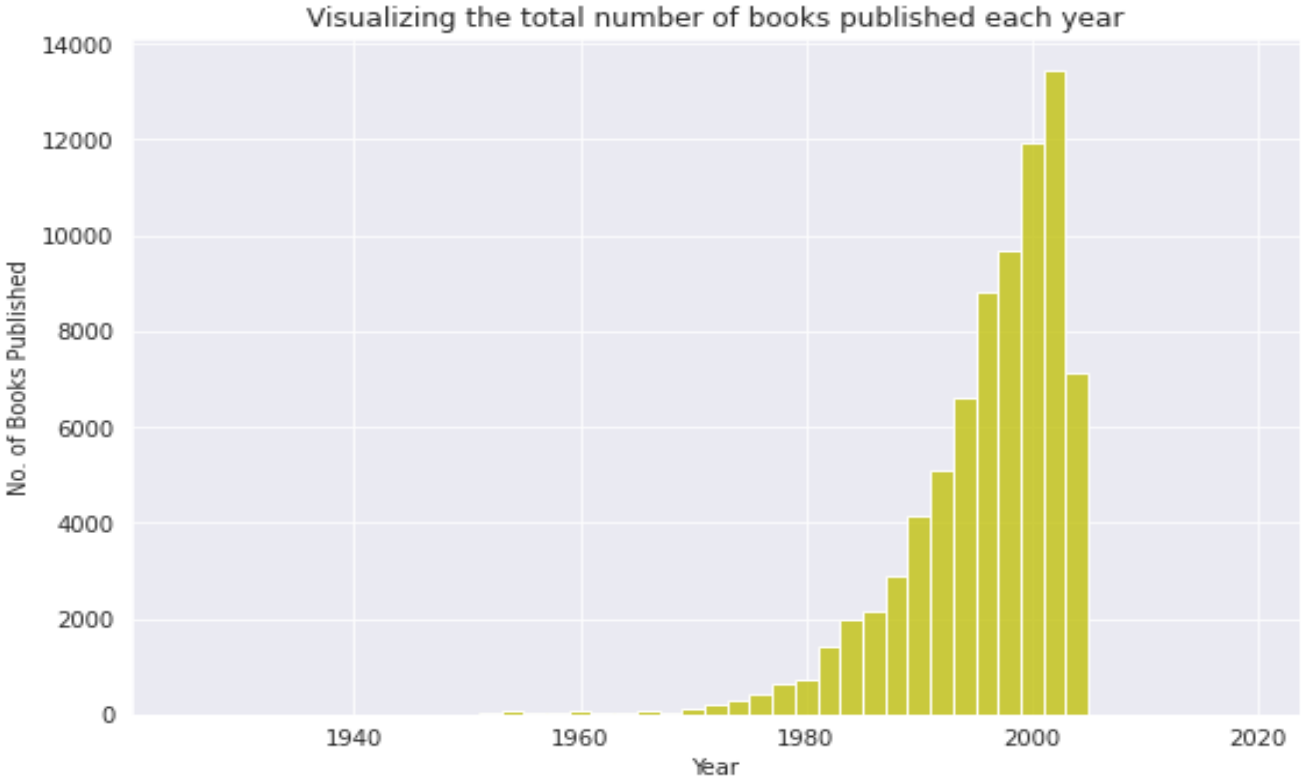
	User-ID	ISBN	Book-Rating
0	276725	034545104X	0
1	276726	0155061224	5
2	276727	0446520802	0
3	276729	052165615X	3
4	276729	0521795028	6

First 5 rows of the Ratings DataFrame

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100000 entries, 0 to 99999
Data columns (total 3 columns):
 #   Column       Non-Null Count   Dtype 
---  ------       --------------   ----- 
 0   User-ID      100000 non-null  int64 
 1   ISBN         100000 non-null  object
 2   Book-Rating  100000 non-null  int64 
dtypes: int64(2), object(1)
memory usage: 2.3+ MB
```

Concise summary of the Ratings DataFrame

DATA VISUALIZATIONS



```
Ballantine Books                2799
Pocket                          2455
Berkley Publishing Group        2214
Warner Books                    1969
Bantam Books                    1828
                                ...
McGraw Hill (Tx)                   1
Harlequin Sales Corp (Mm)          1
BÃ¶hme und Erb                     1
FC&amp;amp;A Publishing            1
PublicaÃ§Ãµes Dom Quixote           1
Name: Publisher, Length: 4434, dtype: int64
```

Publishers ranked according to the total number of publications

```
2002    7152
2001    6283
1999    6072
2000    5841
2003    5358
        ...
1925       1
1945       1
1927       1
1939       1
1938       1
Name: Year-Of-Publication
```

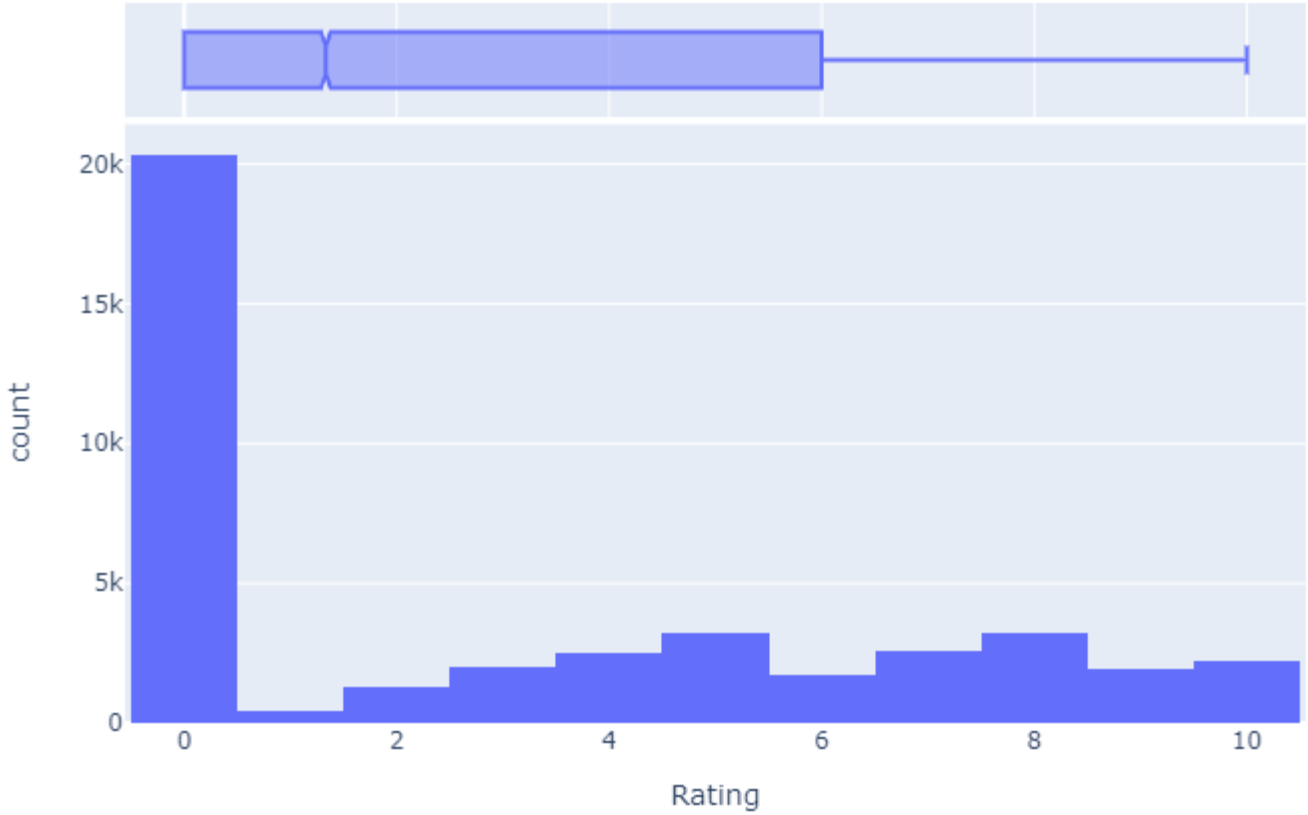
Years ranked according to the total number of publications

Title	Rating	Num_of_ratings
Wild Animus	0.954315	197
The Lovely Bones: A Novel	4.504673	107
The Secret Life of Bees	5.294872	78
The Da Vinci Code	5.078947	76
Life of Pi	3.985915	71
The Nanny Diaries: A Novel	4.214286	70
Divine Secrets of the Ya-Ya Sisterhood: A Novel	4.000000	70
The Red Tent (Bestselling Backlist)	4.484375	64
A Painted House	3.468750	64
Bridget Jones's Diary	3.269841	63

Popularity of Books

```
Author
Stephen King            741
Nora Roberts            508
John Grisham            486
James Patterson         426
Mary Higgins Clark      404
Dean R. Koontz          357
Tom Clancy              309
Danielle Steel          289
Janet Evanovich         285
Sue Grafton             259
Name: Title, dtype: int64
```

Top 10 most Prolific Authors



Average Rating count

FEATURE ENGINEERING

```
# Create a pivot table/crosstab with the DataFrame
data_pivot = data.pivot_table(index="user_id", columns="Title", values="Rating")
data_pivot.head()
```

Title	A Light in the Storm: The Civil War Diary of Amelia Martin, Fenwick Island, Delaware, 1861 (Dear America)	Beyond IBM: Leadership Marketing and Finance for the 1990s	It Takes Two	Little Comic Shop of Horrors (Give Yourself Goosebumps, Book 17)	Murder of a Sleeping Beauty (Scumble River Mysteries (Paperback))	Q-Space (Star Trek The Next Generation, Book 47)	Tales of Terror and Suspense	$oft Money: The True Power in Our Nation's Capital	' Sie belieben wohl zu scherzen, Mr. Feynman.'. Abenteuer eines neugierigen Physikers.	' Small g'. Eine Sommeridylle.
user_id										
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
12	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

GENERATING RECOMMENDATIONS

	Title	Correlation	Num_of_ratings
1306	The Da Vinci Code	1.000000	76
1261	The Brethren	1.000000	47
1606	The Summons	0.845626	42
1286	The Client	0.739153	51
1519	The Pelican Brief	0.702524	60
1498	The Nanny Diaries: A Novel	0.633792	70
605	Harry Potter and the Sorcerer's Stone (Harry P...	0.575758	53
1692	Timeline	0.519361	44
640	House of Sand and Fog	0.505445	53
1619	The Testament	0.495832	52

Recommendations for “The Da Vinci Code”

	Title	Correlation	Num_of_ratings
731	Life of Pi	1.000000	71
1225	The Brethren	1.000000	47
1218	The Bonesetter's Daughter	1.000000	42
571	Harry Potter and the Sorcerer's Stone (Harry P...	0.987878	53
1059	She's Come Undone (Oprah's Book Club (Paperback))	0.925641	42
1060	She's Come Undone (Oprah's Book Club)	0.800641	42
1256	The Client	0.726184	51
1149	Summer Sisters	0.705996	52
567	Harry Potter and the Chamber of Secrets (Book 2)	0.583695	48
1501	The Secret Life of Bees	0.559739	78

Recommendations for “Life of Pi”

	Title	Correlation	Num_of_ratings
1904	The Secret Life of Bees	1.000000	78
1935	The Summons	0.906217	42
1326	She's Come Undone (Oprah's Book Club)	0.607815	42
910	Life of Pi	0.559739	71
2030	Timeline	0.461361	44
2155	White Oleander : A Novel	0.444252	53
1643	The Five People You Meet in Heaven	0.371427	41
713	Harry Potter and the Sorcerer's Stone (Harry P...	0.349561	53
1848	The Pilot's Wife : A Novel	0.347149	48
1725	The Joy Luck Club	0.303152	50

Recommendations for “The Secret Life of Bees”

CONCLUSIONS

1. The top 3 most prolific authors are Stephen King, Nora Roberts and John Grisham.
2. The most popular novels/books are The Secret Life of Bees, The Da Vinci Code and The Lovely Bones.
3. The Year in which highest number of book have been published is 2002 and the Publisher with highest number of publications is "Ballantine Books".
4. The Recommendation system has been implemented using Collaborative Filtering and correlation property on unlabeled data. The top 10 most relevant and correlated books can be recommended for any given book in the data using this function.