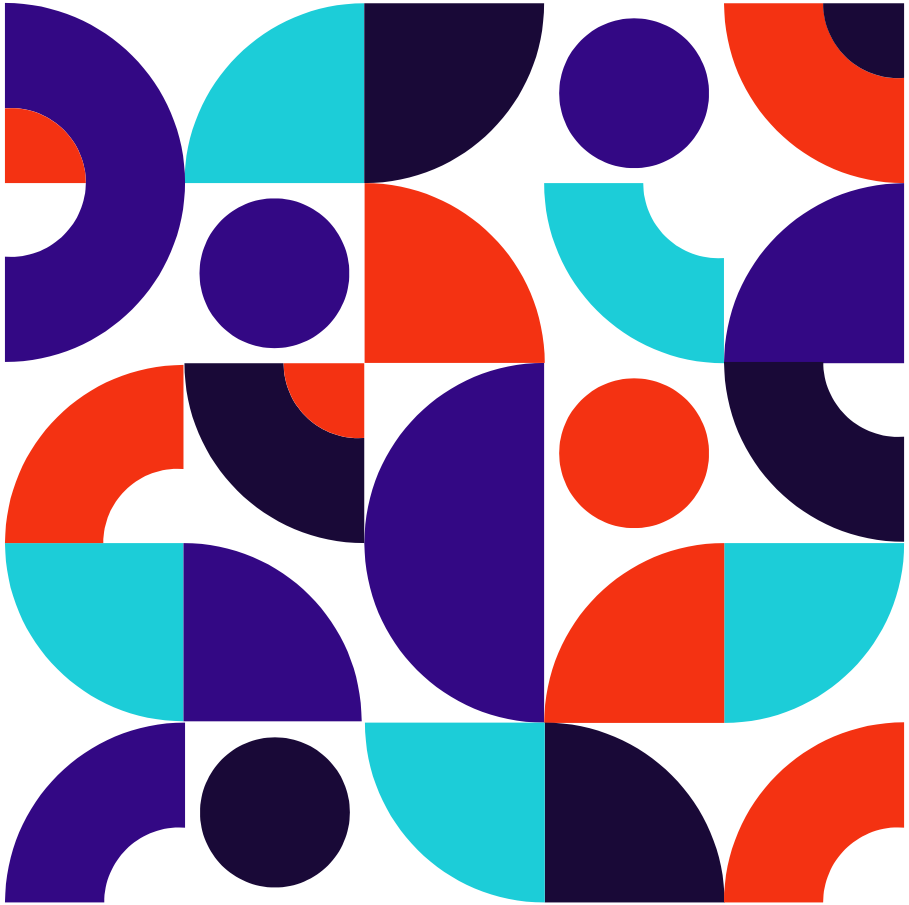
Rating discovery and genre classification from book reviews

Text Analytics

Group 7



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The dataset

It has been taken from Kaggle and contains more than **1.3M book reviews** (rows) about **25,475 books** and **18,892 users** from the *Goodreads* website

From...

- User id
- Book id
- Review id
- Rating
- Review text
- Date added
- Date updated
- Read at
- Started at
- N votes
- N comments

To...

- User id *(int)*
- Book id (int)
- Review id (int)
- Rating (from 0 to 5) → *Target*
- Review text (string)
- **Genre (string)** → *Target*

Source:
https://www.kaggle.com/competitions/goodreads-books-reviews-290312/overview

How we reach the “Genre” variable?

… Web Scraping!

https://www.goodreads.com/book/show/ + **{ book_id }**

XPath on the page

In total we found **76** genres

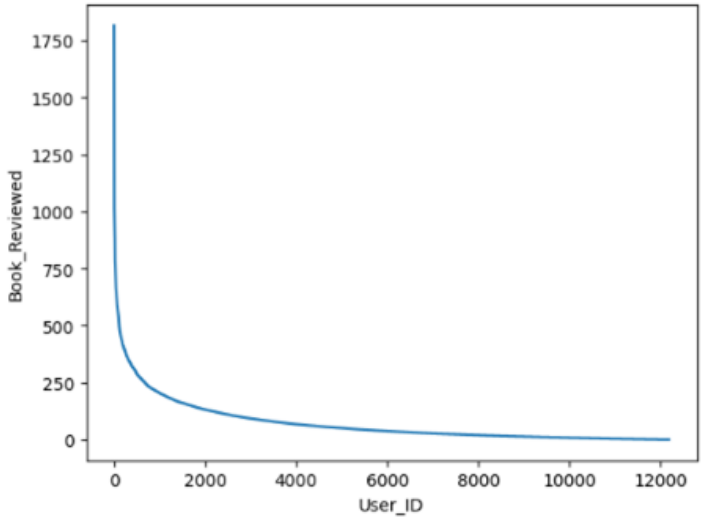
Workflow

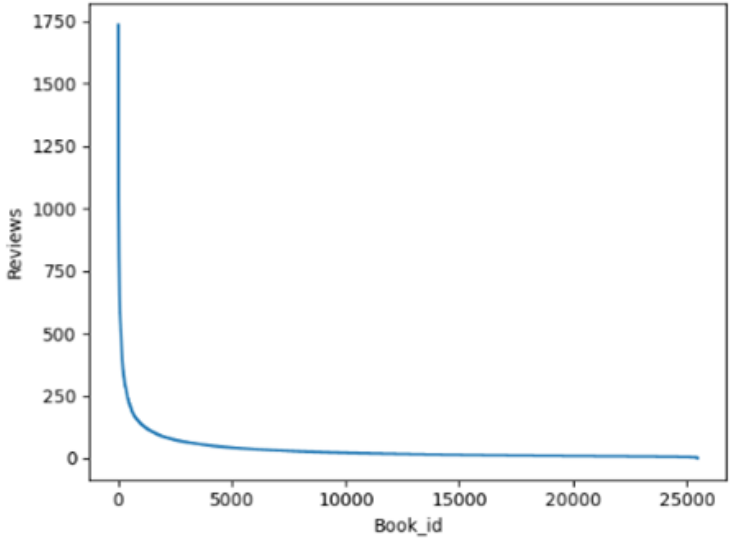
1. **Data understanding** and **preparation**
2. **Web scraping** using XPath to extract the new variable “Genre”
3. **Classification** task using *“Genre”* as target variable
4. **Classification** task using *“Ratings”* as target variable
5. **Explainability** with *SHAP* to explain the prediction of a black box classifier (as Neural network)

EDA – Preprocessing I

Power law of a **few users with lots of reviews** and **too many reviews for some books**....

... So we balanced reviews per book!





EDA – Preprocessing I

- *Cleaning*, Tokenizing, *PoS* Tagging of review texts
- *Removing* stop words, *filtering out* short words, *Lemmatizing*

Size: **8.474 words**!

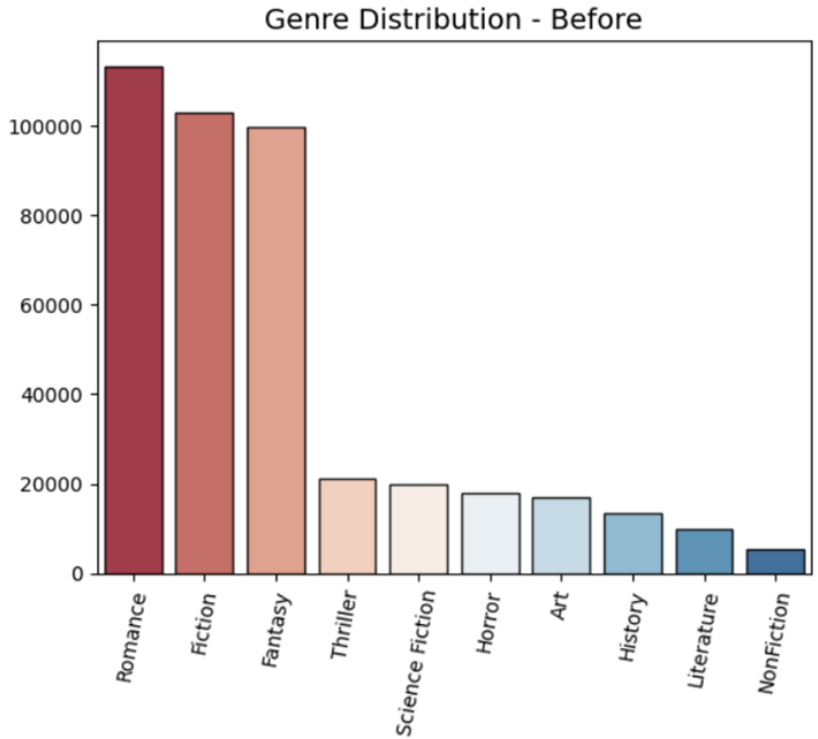
New dataset obtained:

review_text	genre	rating	book_id	tokenized_ text	postagged_ text	lemmatized_ text
i like that i hear all the character voices as...	Art	3	133765	[like, hear, character, voices, read, honestly...	[(like, IN), (hear, VBP), (character, NN), (vo...	[like, hear, character, voice, read, honestly,...

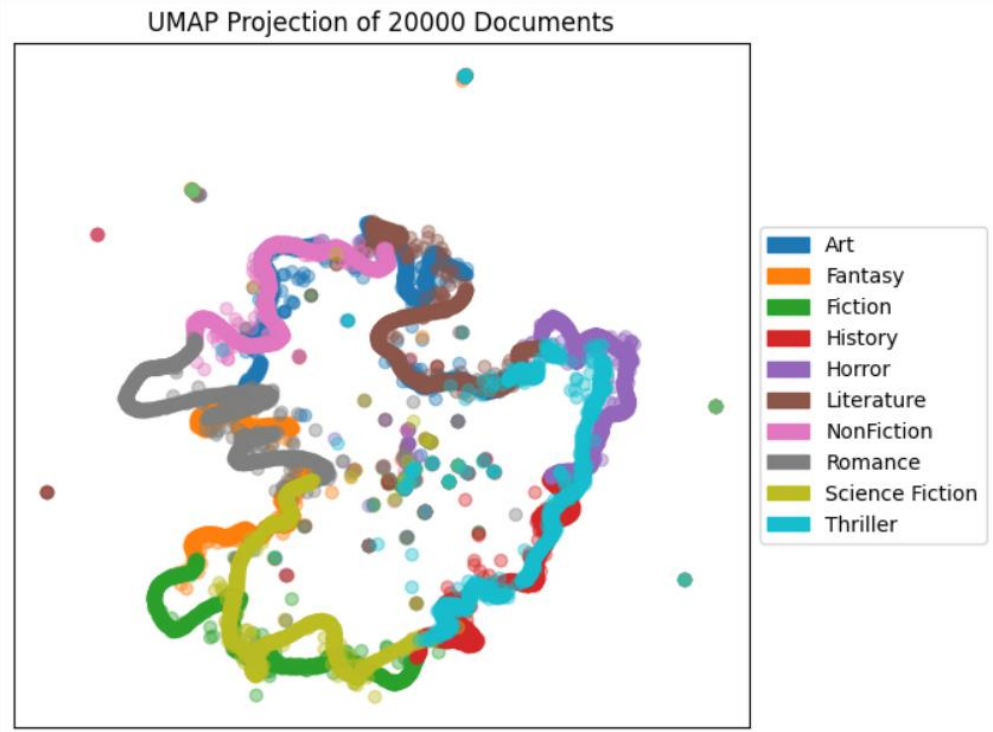
EDA – Preprocessing I

The initial 76 genres has been grouped obtaining, in total, **10 genres**.

Furthermore, the distribution has been **balanced using with an Undersampling**



EDA – Visualizazing genres with UMAP

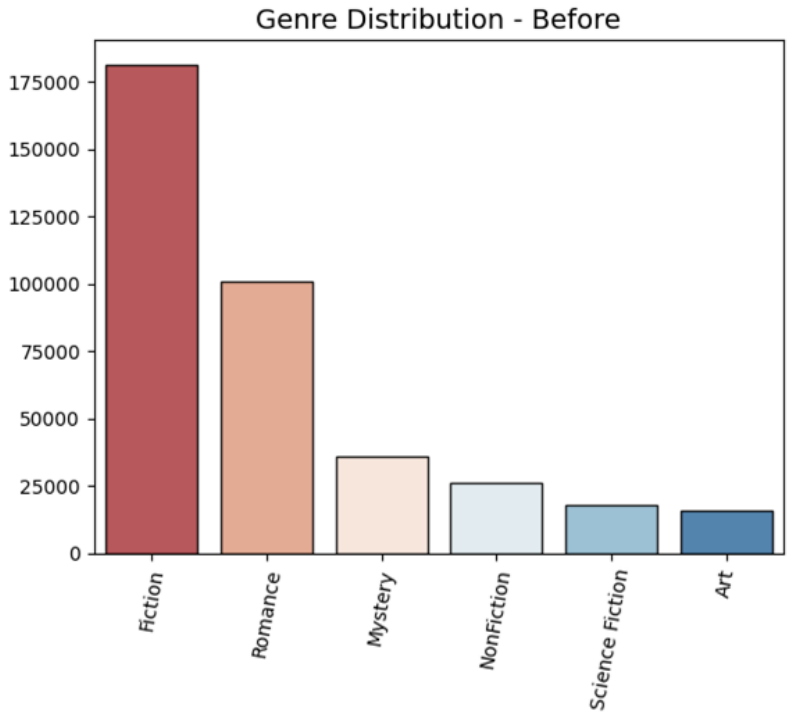


... It can be seen a **similarity** with some genres

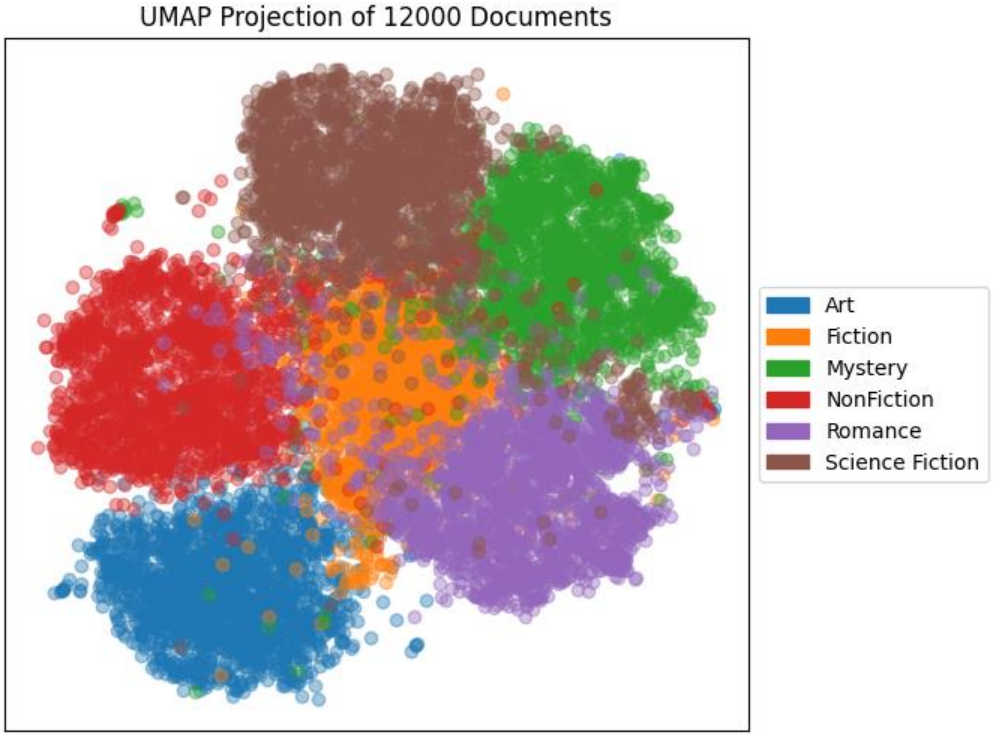
EDA – Preprocessing II

After testing some classifiers we further merged from 10 to **6 genres** according to the visual closeness we saw in the UMAP plot

Then, the distribution has been balanced using a stratified **Undersampling** technique **(2.000 records per genre)**



EDA – Visualizazing genres with UMAP



... After **merging the genres** based on the previous Umap, we got a *new clearer visualization*

Topic Modeling

	genre	freq	cluster	Topic words
0	Art	36	4	ghost
1	Fiction	64	5	narrator
2	Non Fiction	85	5	narrator
3	Romance	211	2	sexy
4	Science Fiction	254	1	alien
5	Mystery	98	4	ghost

Steps:

- Extracting the top n° Topic words (**equal to n° of genres)** treating them as clusters
- Extracting the **maximum frequency for each genre** of the Topic words and looking at their semantics

Sentiment Analysis – Rating/Sentiment metric and correlation

	Precision	Recall	F-1 measure
1	0.12	0.59	0.20
2	0.20	0.21	0.21
3	0.35	0.23	0.28
4	0.46	0.29	0.35
5	0.47	0.44	0.45

***Accuracy**: 0.32*

***Correlation** between rating and sentiment:* 0.29

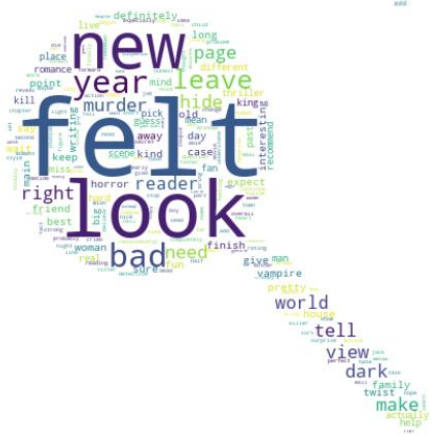
...Conclusions:
Sentiment Analysis is **not** a good predictor of the ratings

Some WordClouds on genres

Romance

Fiction

Mystery



Art

From Classification with 6 genres...

	Validation Accuracy
BERT	***62%***
Naïve	***17%***
LSTM	***... Work in progress!***