

# **Review score prediction**

Yakunina Kseniia (15180875)

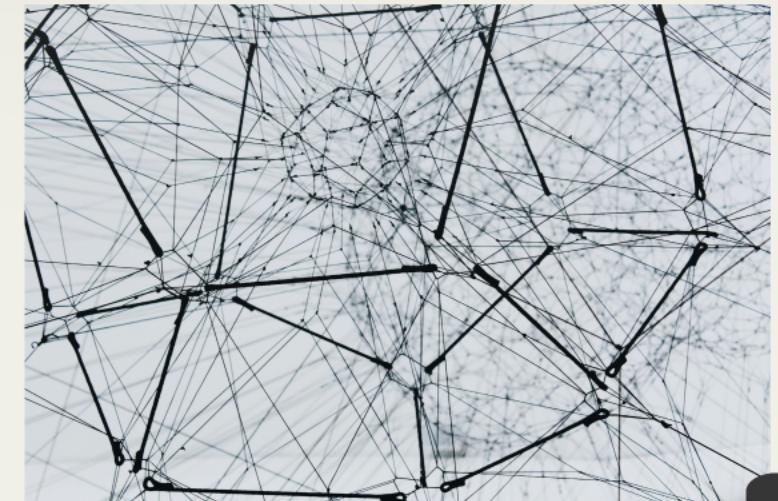
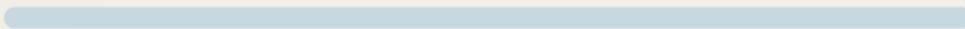




# Introduction

## Review score prediction based on text

- Can improve recommendation system
- Helps to find insights about consumer behaviour
- Can be used in stock and sales management



- Trained several models that predict the rating of a review based on its text.
- One of the hypothesis of the study was that additional parameters such as tone can improve prediction performance



# Data

- The data was collected from Kaggle - Amazon Book review Dataset

	Title	review/score	review/text	review/summary	authors	categories	ratingsCount
373484	The Spiral Dance	5.0	Being a historical recreationist, I am fairly ...	Excellent historical fantasy!	Starhawk	Social Science	2.0

- Dataset consist of 3 million reviews
- The data is quite imbalanced with positive reviews predominate.



# Pre-Processing

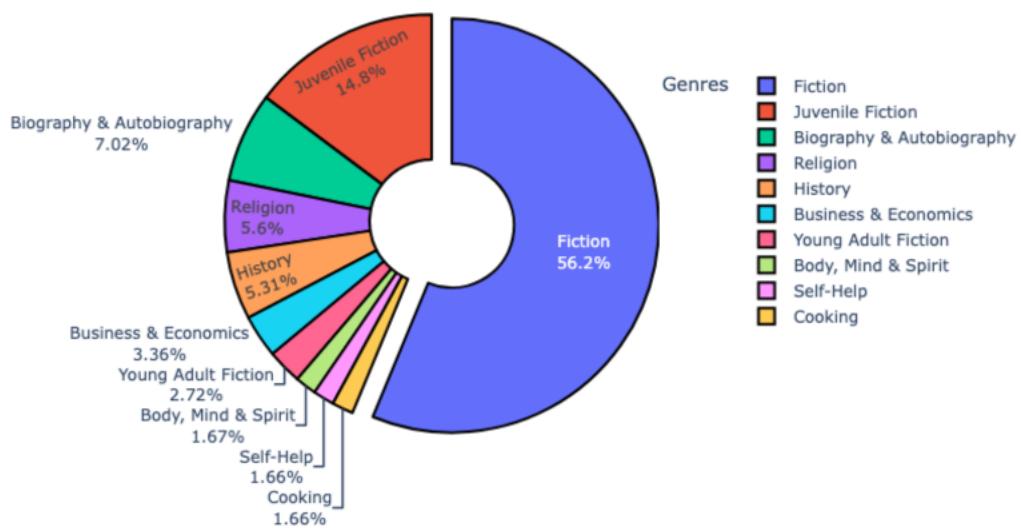
- Deleting stopwords and char symbols
  - Lemantization
  - Sentiment analysis using Bert and Vader library
  - Deleting NaN values
- 

- Tokenization
- Padding
- Train Test split

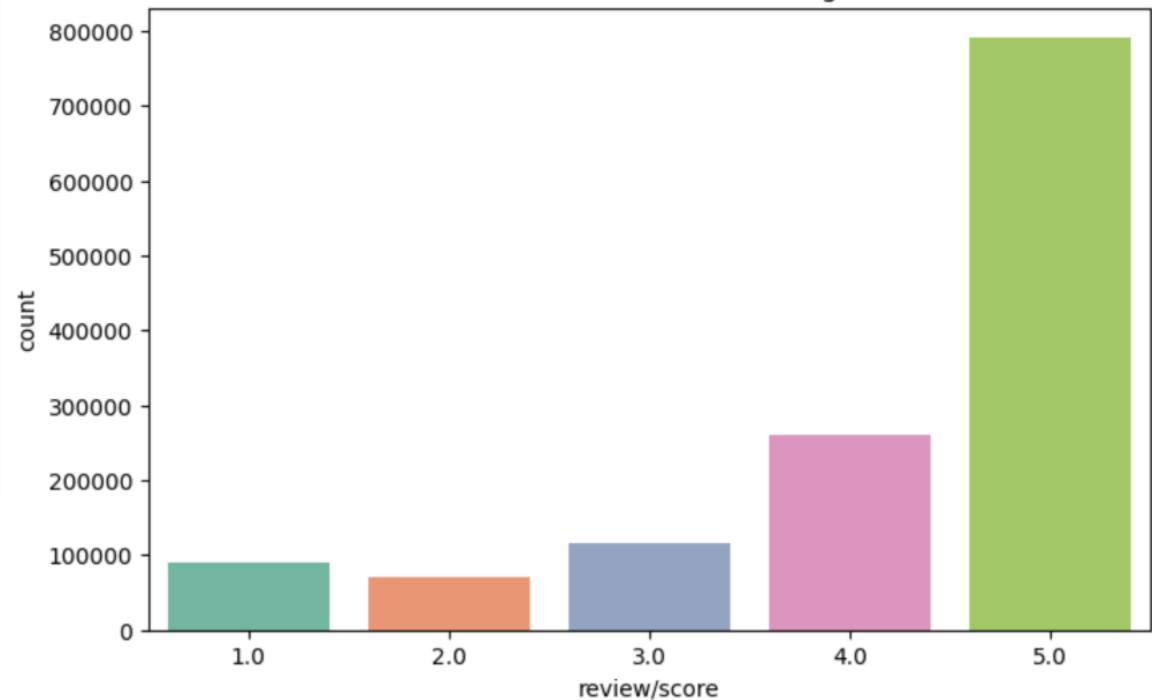


# EDA

Distribution of Books Based on Genre



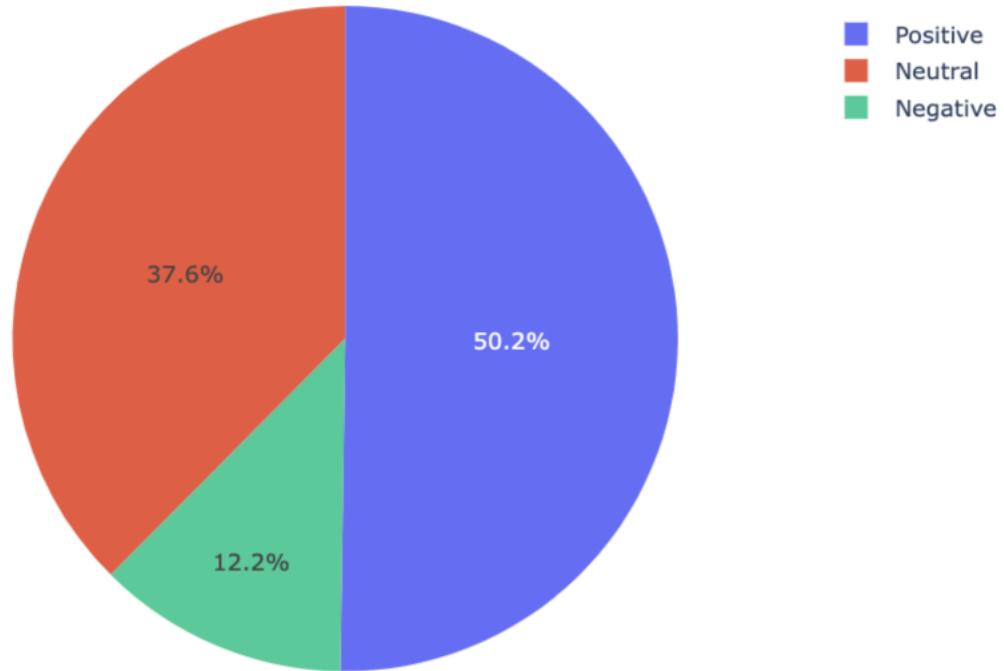
Distribution of Review Ratings





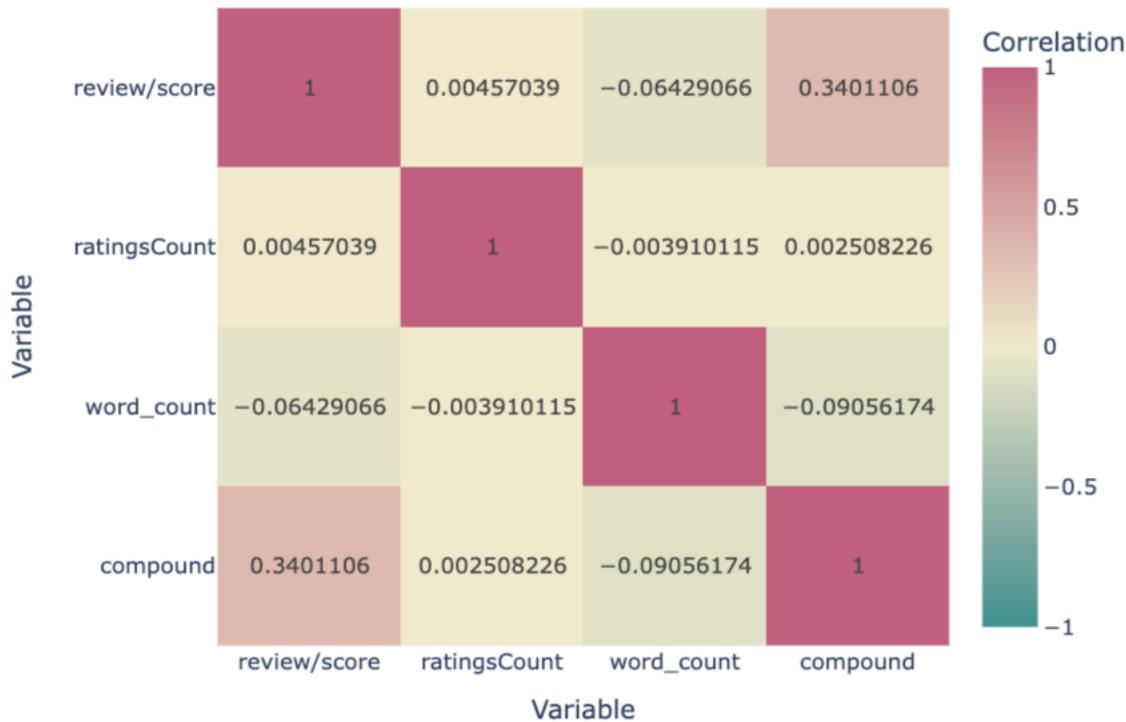
# EDA

Distribution of Tone

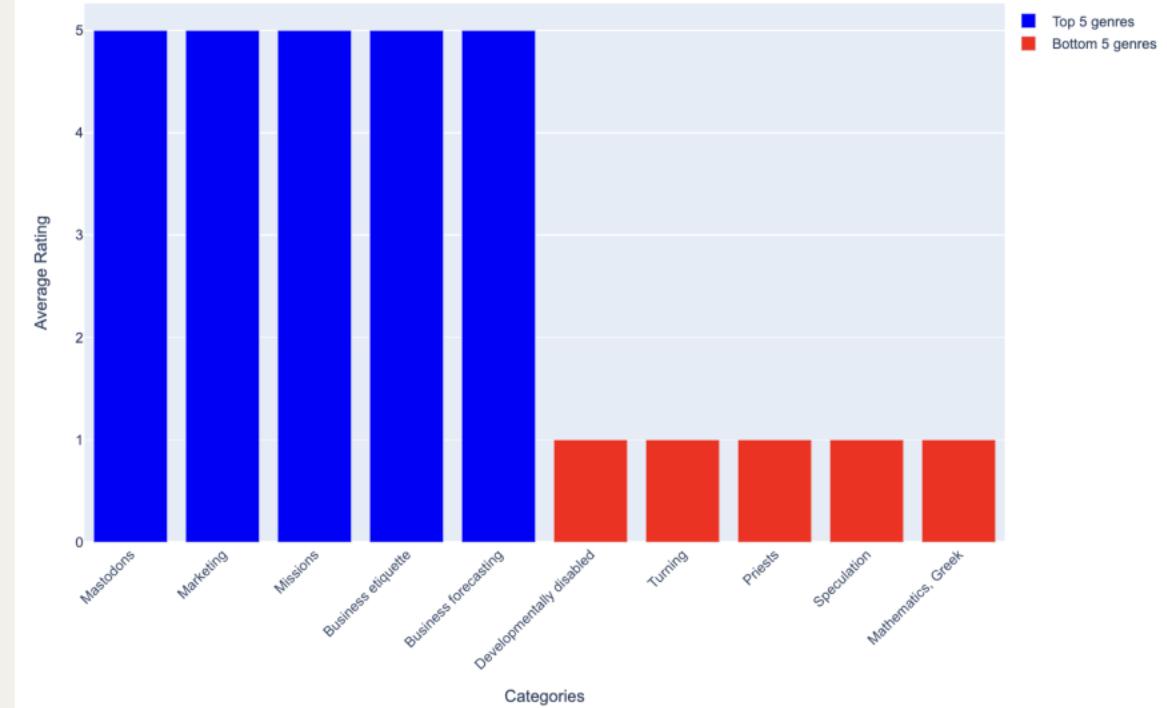


# EDA

## Correlation Analysis



Average Ratings by Book Genres





# Model Training



# Models

Baseline  
model

Adding  
Sentiment

ANN  
models

LSTM

# Baseline model

Using Pre-trained model Bert

Pre-trained model was trained to predict score of review by text

Model link : [nlptown/bert-base-multilingual-uncased-sentiment](https://huggingface.co/nlptown/bert-base-multilingual-uncased-sentiment)

**Score**

Accuracy: 48%  
F1 Score: 40%

# Combinations of Layers

Experiments with different layers

- Adding BatchNormalization
- Adding Conv layers
- Adding Dropout layers
- Adding Pooling layers

Imbalance class problem

- Experiments with class weight adjustment
- Experiments with Undersampling

**Best score**

Accuracy : 63%  
F1 score : 56%

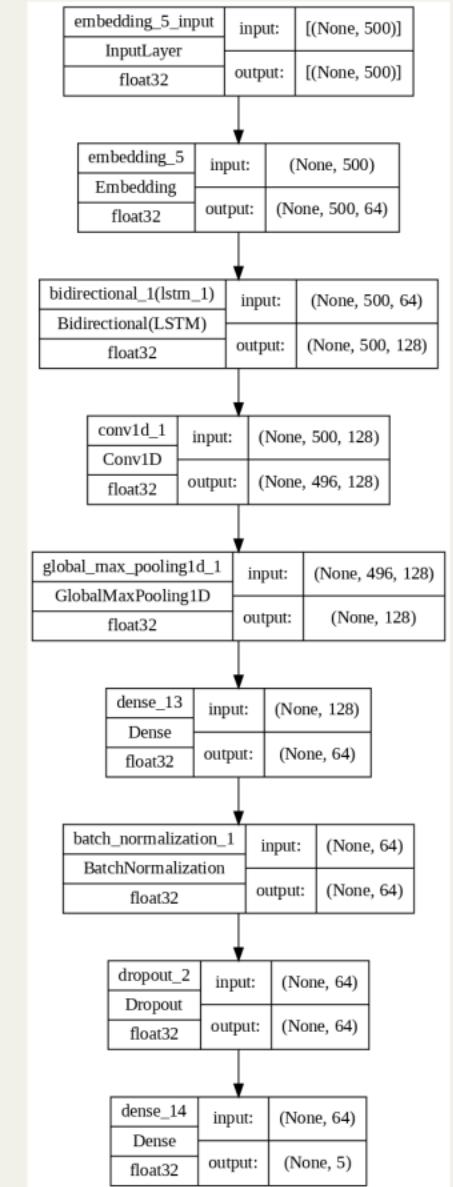
# Best Model

Experiments with layers + adding new parameters

- All LSTM variations produced the highest results
- Can be used in further modification of a task
- Can be used model for review score prediction

**Best Score**

Accuracy : 69%  
F1 score : 67%

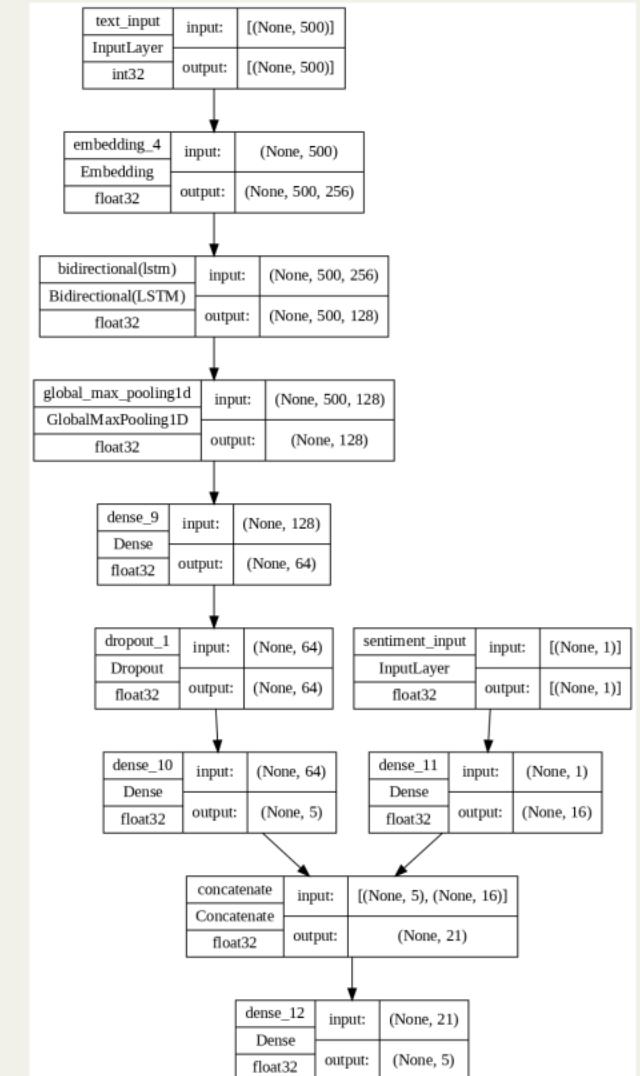


# Adding Sentiment to model

- Sentiment can improve performance
- Can improve understanding of context
- Can be better with handling of ambiguity

Best score

Accuracy : 63%  
F1 score : 56%



# Results

- Best scores was achieved using Lstm model
- Sentiment doesn't improve model performance.
- Techniques for dealing with imbalance data decrease performance quality.
- Models do a good job of predicting extreme review ratings (1 and 5), but they do a poor job of predicting the middle classes.

Model	Accuracy	F1
Baseline	48%	40%
Model 1	62%	54%
Model 2 Weights update	50%	53%
Model 3 Undersampling	18%	11%
Model 4 More Layers	63%	56%
<b>Model 5 Lstm 1</b>	<b>69%</b>	<b>67%</b>
Model 6 Lstm 2	69%	66%
Model 7 Lstm 3	69%	66%
Model 8 LSTM with Setiment	63%	56%

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# Conclusion

- The 9 models were trained. It is possible to predict review rating based on text with a good level of accuracy
  - There is a correlation between Tonality and Rating Score
  - LSTM models have the highest performance among all tested models
  - Sentiment doesn't improve models quality
- 
- Further researches can be made in terms of adding new parameters like emotions and genres or trying to use different model architecture (Gru)



## Review score prediction

Takototo Koenra (110005)

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- Trained several models that predict the rating of a review based on its text.
- One of the hypothesis of the study was that additional parameters such as tone can improve prediction performance.

### Data

- The data was collected from Kaggle - Amazon Book Review Dataset
- Dataset consists of 1 million reviews
- The data is quite imbalanced with positive reviews predominance



### Pre-Processing

- Removing stop words and other symbols
  - Lemmatization
  - Stopwords removal using停用词和Value Element
  - Deleting Null values
- Tokenization
  - Padding
  - Choice Tree split



### Model Training

- Trained several models

### EDA



### Models

- XGBoost model
- LSTM
- Attention mechanism

### Results

- Best results were obtained using XGBoost and LSTM
  - XGBoost outperforms all other models
  - To compare the results with the baseline, the following table is provided:
  - Shows that the proposed model outperforms the baseline by up to 10% depending on the metric used
- | Metric   | Baseline | XGBoost | LSTM |
|----------|----------|---------|------|
| Accuracy | 0.78     | 0.82    | 0.81 |
| F1 Score | 0.78     | 0.82    | 0.81 |
| AUC      | 0.78     | 0.82    | 0.81 |
| RMSLE    | 0.15     | 0.14    | 0.15 |

### Conclusion

- Five models were trained. It is possible to predict review rating based on text with a good level of accuracy
- The best result was obtained using XGBoost and LSTM
- LSTM model have the highest performance among of three models
- Model with LSTM has the best quality



**Thank you for attention !**