Capstone Project 2

Prediction of board game ratings based on their reviews

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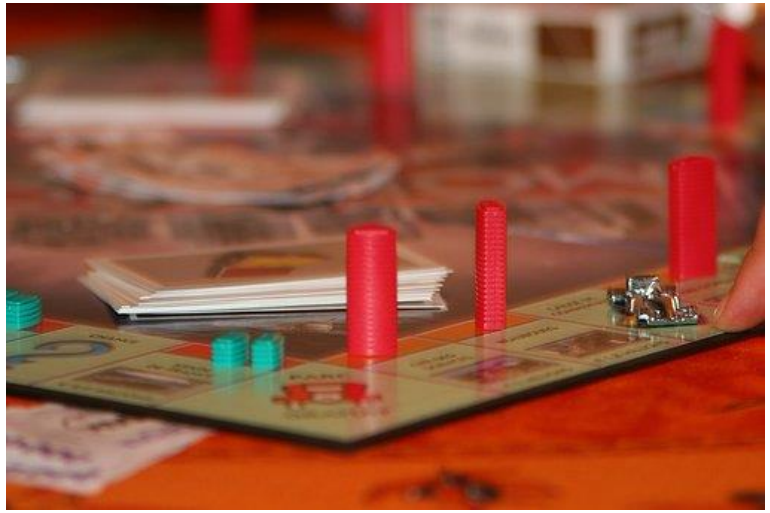
Problem Statement



- Board games have regained popularity in recent years

- **Purpose: build a model with machine learning and natural language processing to predict the ratings of board games considering the reviews of players, the number of players, the average time of a game, the number of rates… ….**

Dataset

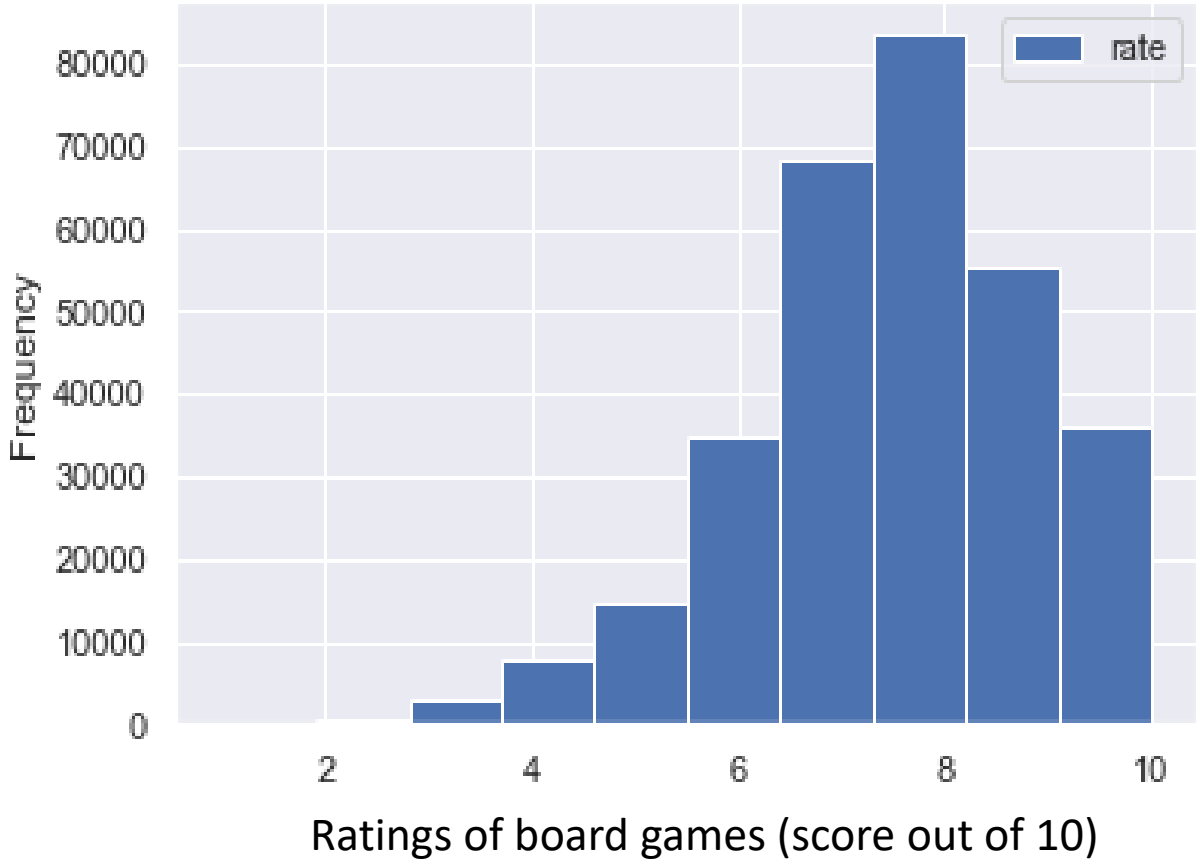
- Scraping and APIs on the website: https://boardgamegeek.com

- For each of the 50 most rated boardgames:

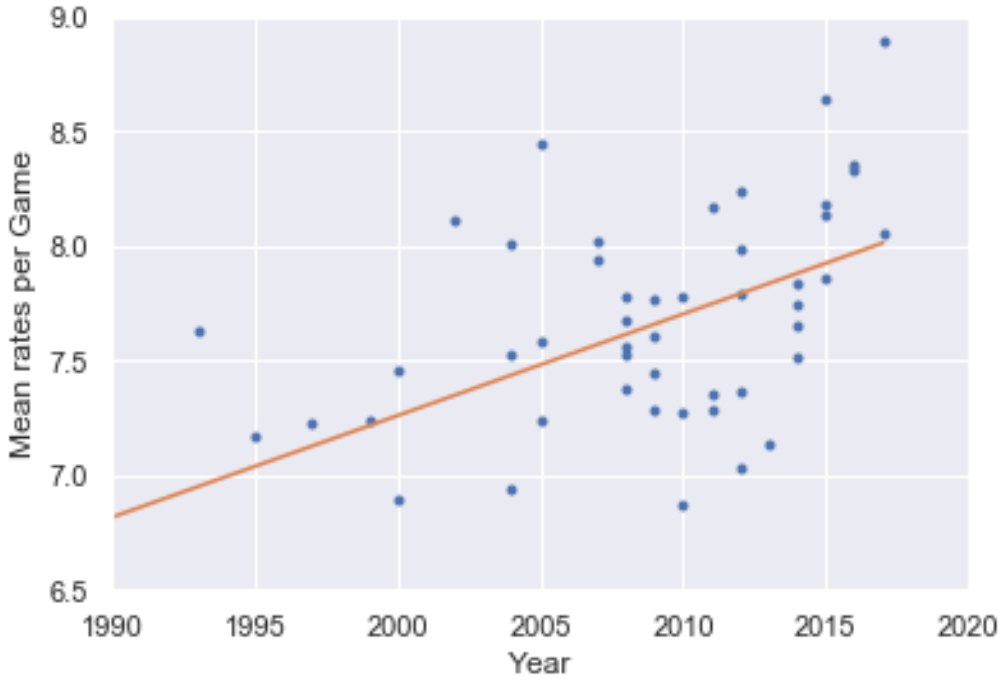
  - ID
  - Name
  - Year of design
  - Minimum and maximum number of players required
  - Minimum and maximum number of minutes required to complete the game
  - Minimum age required
  - Category
  - Number of rates
  - Username of players
  - Reviews
  - Ratings (score out of 10)

- Dataset with 304864 raws

Distribution of all the rates

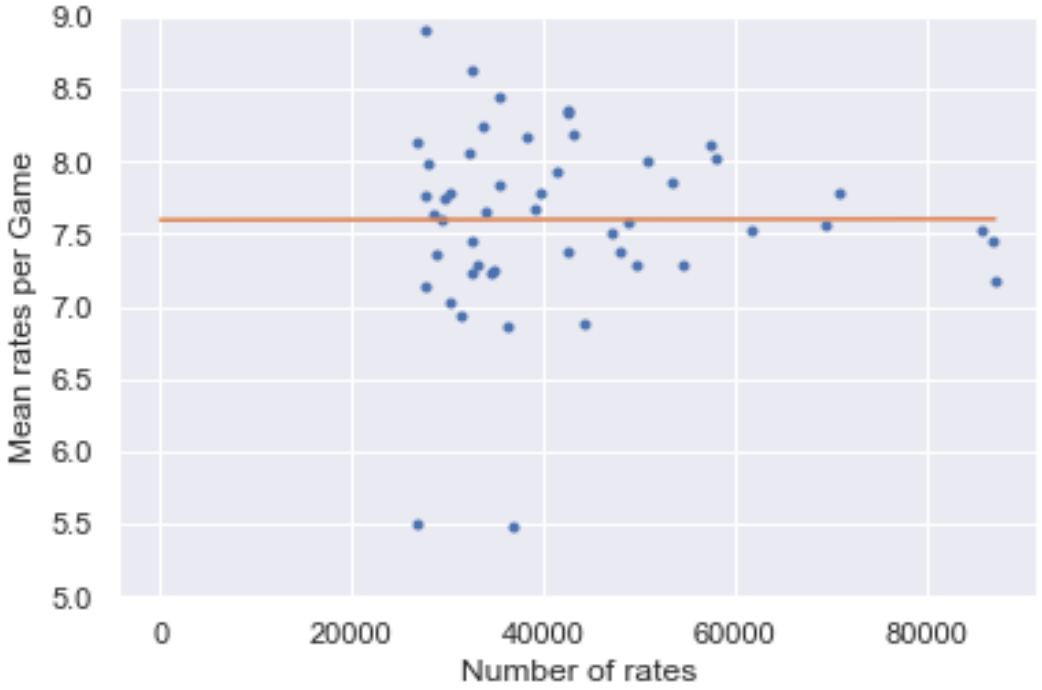


Relationship between year of design and mean rates per game



- **Positive correlation between the *year of the design of a game* and the *mean of ratings of this game*. More a boardgame is recent and more it seems to have higher mean ratings.**

Relationship between the mean rates per boardgame and the number of rates per games



- No correlation between the *number of ratings of a game* and the *mean of ratings of this game*.
- No bias in the rates related to the fact we took the 50 most rated games from boardgamegeek.com.

Linear Regression Model

$R^2 = 0.636$

Most significant features ($p < 0.05$):

Features	+ / -	Coefficients
Year	+	0.043
Max_play	-	0.099
Min_age	+	0.095
Nb_rate	+	8.42^{e-06}

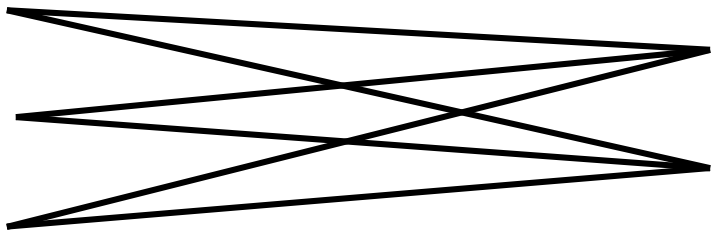
Predict ratings of boardgames

FIRST STEP

Convert only “review” column to a matrix of token counts:

Natural Language Processing

- CountVectorizer
- TdidfVectorizer
- Doc2Vectorizer



SECOND STEP

Predict ratings of boardgames with all the columns of dataset:

Machine Learning Algorithm

- Random Forest Regressor
- Support Vector Regressor

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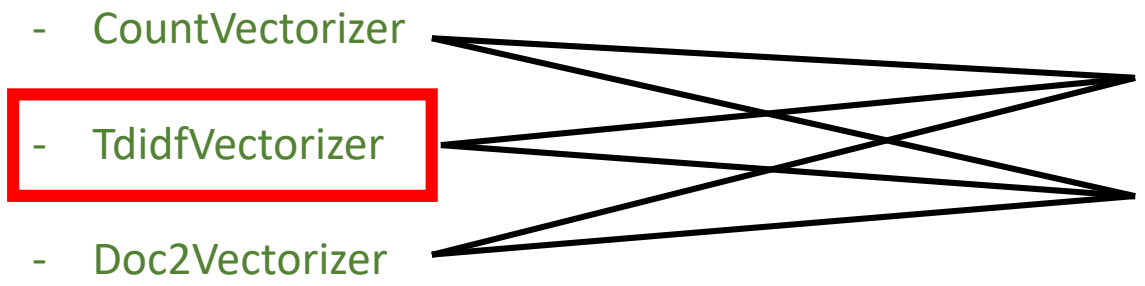

In a pipeline and using a cross-validation with 5 folds:

R^2 training data = 0.21
R^2 test data = 0.21

Best predictor words

=> New model with only reviews as features

‘Good words’	‘Bad words’
Love	Precio
Favorite	Better
Great	Long
Best	Like
Perfect	Felt
Excellent	Bad
Fantastic	Maybe
Amazing	Wa
Awesome	Random
Firm	Boring

Conclusion

➔We choose the model with TfidfVectorizer to process the ‘review’ column and Random Forest Regressor as machine learning algorithm.

➔Managers of gaming shops or department stores should focus on more recently created games, games with a minimum age not too low and a maximum number of players not too high.

➔We need to improve the natural language processing of the ‘review’ column with a more powerful computer to improve the model.