Project Proposal - Text Analytics - [GitHub Link]
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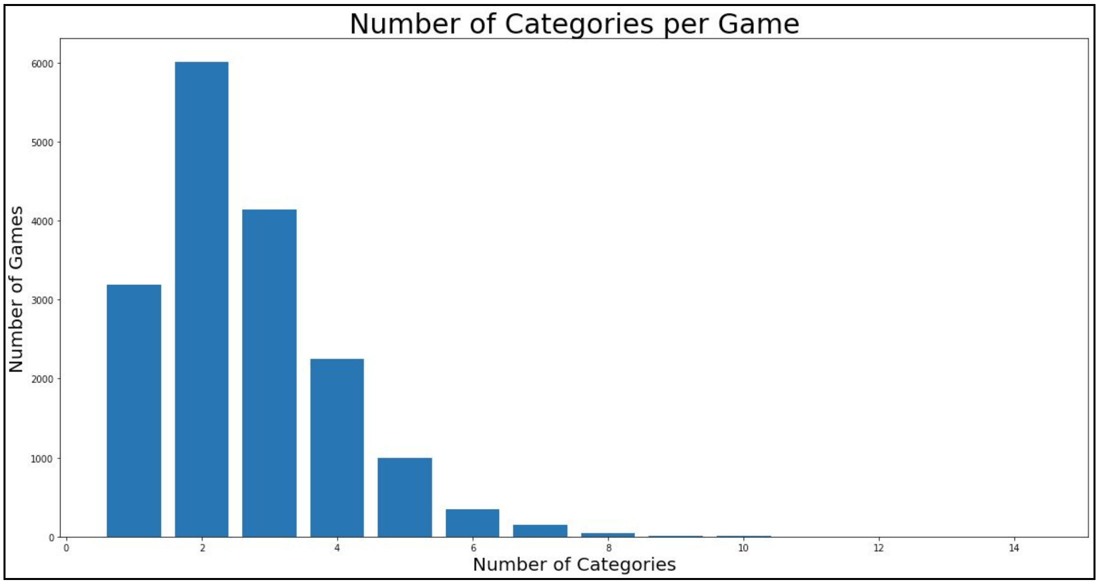
The goal of my project is to build a multi-label classification model that predicts relevant categories for a boardgame given its description. For example, a boardgame called “Gloomhaven” has the following description:

> “Gloomhaven is a game of Euro-inspired tactical combat in a persistent world of shifting motives. Players will take on the role of a wandering adventurer with their own special set of skills and their own reasons for traveling to this dark corner of the world. Players must work together out of necessity to clear out menacing dungeons and forgotten ruins. In the process, they will enhance their abilities with experience and loot, discover new locations to explore and plunder, and expand an ever-branching story fueled by the decisions they make.” [truncated for brevity]

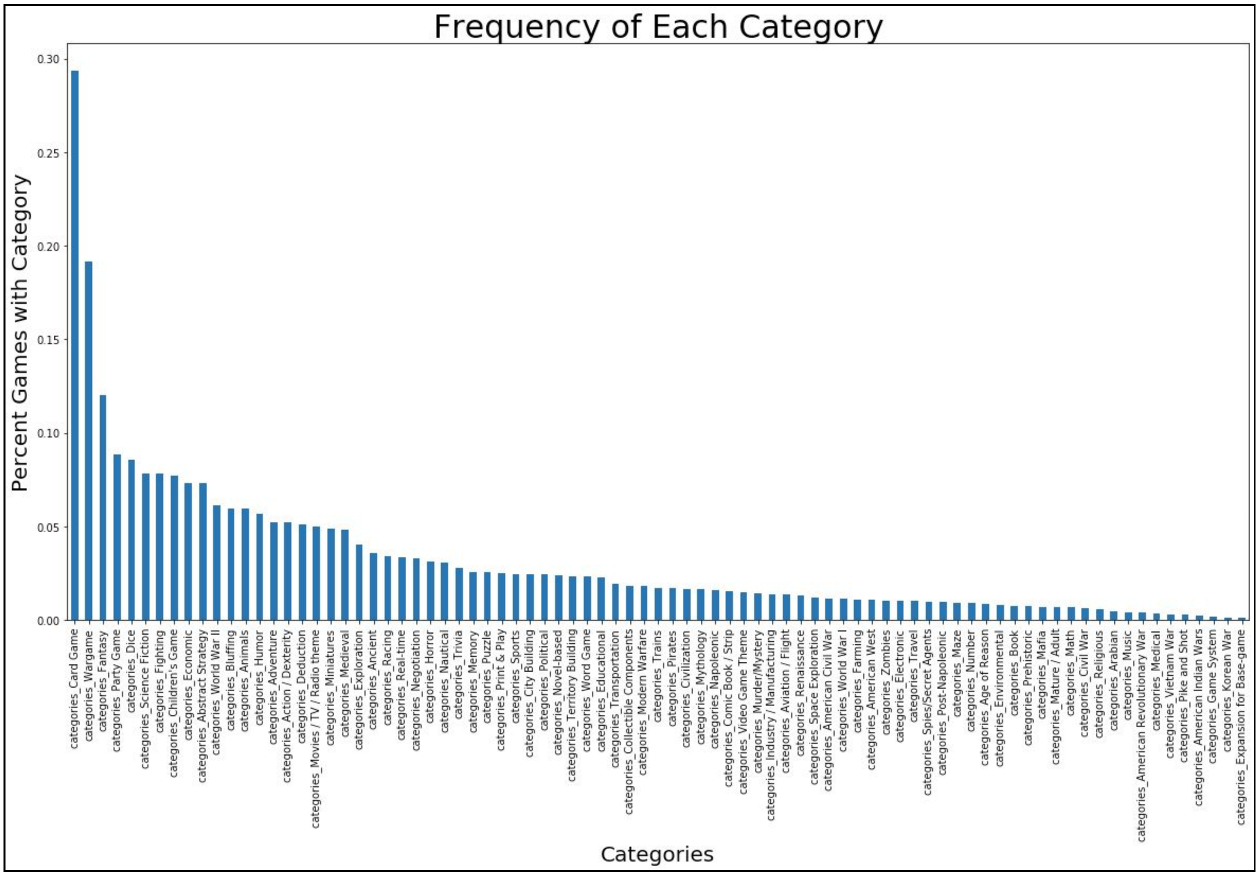
This boardgame is labelled with the following categories: 'Adventure', 'Exploration', 'Fantasy', 'Fighting', 'Miniatures'.

Quick Facts about the data:

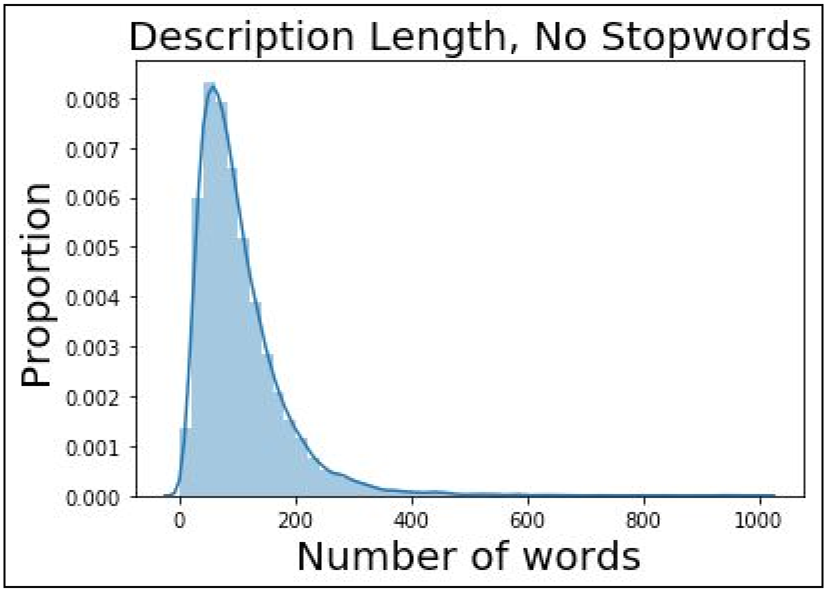
- 17, 146 games with descriptions retrieved from Boardgamegeek.com
- 83 unique categories, 2.64 categories per game on average



- Only ~20 categories occur in more than 5% of games. The rest of the categories are rarer.



- After tokenizing and removing stopwords, there are 1,805,528 words with a vocabulary size of 60,429. The average number of tokens in a description is 105.

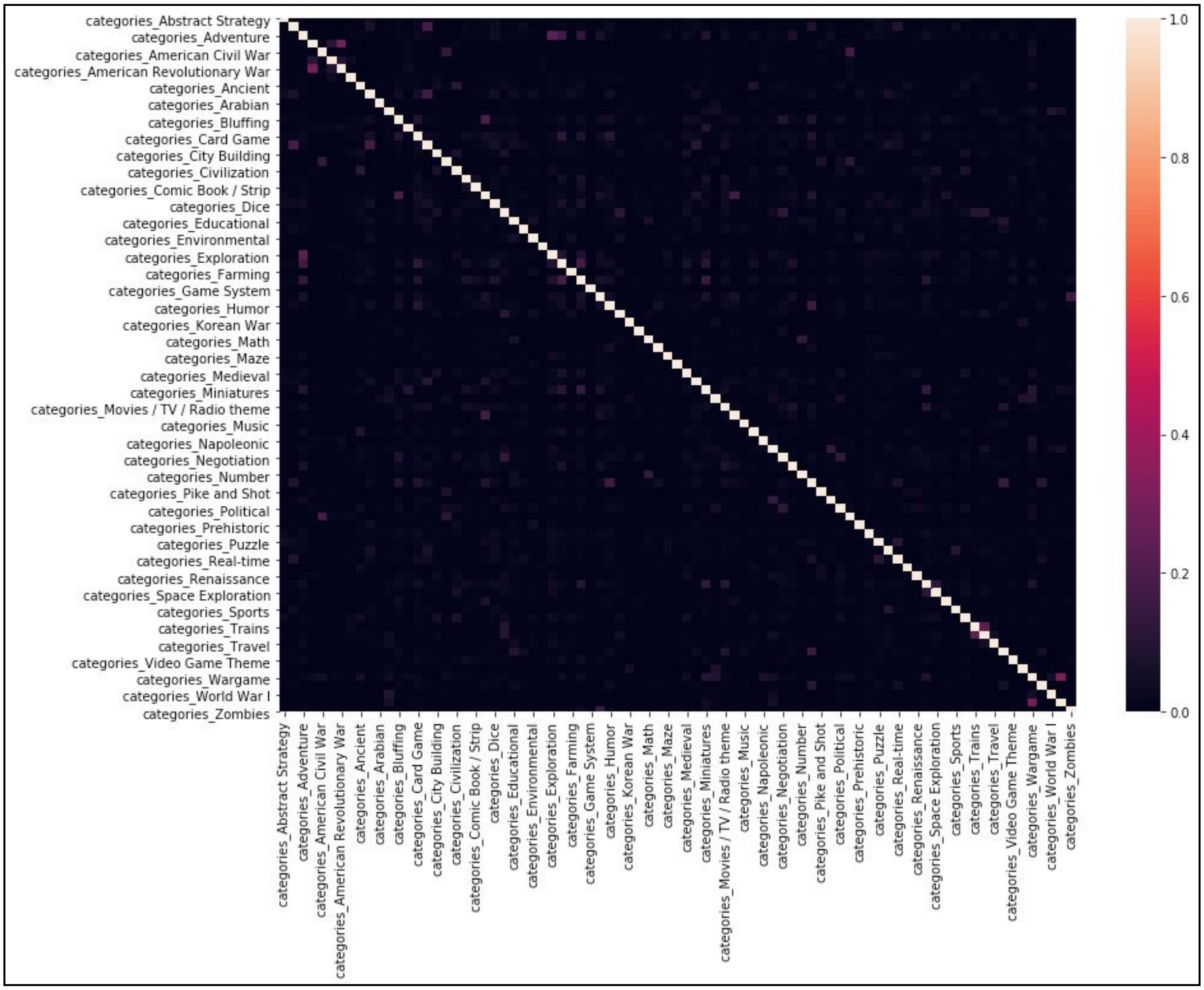


- See this notebook for a bit more EDA on descriptions and categories

I am planning on using Logistic Regression with BOW and TFIDF as a baseline model. I might try SVM as well. My ultimate goal will be to train a Neural Network with binary_crossentropy loss function and sigmoid activation function for the output layer. In effect, probabilities for each category will be calculated in a one-vs-rest fashion.

At this stage, I am wondering how I can reduce the dimensionality of my categories i.e. how I can combine the categories. Principal Component Analysis? Singular Value Decomposition? AutoEncoder? Also, should I standardize my data in any way?

As a first step in investigating, I calculated pairwise Jaccard Similarity between all categories, but the below matrix shows that categories, in general, have low Jaccard Similarity i.e. few categories "go hand in hand"


categories_Abstract Strategy
categories_Adventure
categories_American Civil War
categories_American Revolutionary War
categories_Ancient
categories_Arabian
categories_Bluffing
categories_Card Game
categories_City Building
categories_Civilization
categories_Comic Book / Strip
categories_Dice
categories_Educational
categories_Environmental
categories_Exploration
categories_Farming
categories_Game System
categories_Humor
categories_Korean War
categories_Math
categories_Maze
categories_Medieval
categories_Miniatures
categories_Movies / TV / Radio theme
categories_Music
categories_Napoleonic
categories_Negotiation
categories_Number
categories_Pike and Shot
categories_Political
categories_Prehistoric
categories_Puzzle
categories_Real-time
categories_Renaissance
categories_Space Exploration
categories_Sports
categories_Trains
categories_Travel
categories_Video Game Theme
categories_Wargame
categories_World War I
categories_Zombies