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CSCI 4152

11/5/21

Genre Classification and Sentiment Analysis of Game Reviews

1. Introduction / Problem Statement

The video game industry has quickly become a multibillion dollar industry and is still growing at a rapid pace. The industry is forecasted to grow at a rate of 9.17% from 2020 to 2025 at which point it will be worth $256.97 billion (Zuckerman, 2020). Steam is one of the largest online distributors of video games and as the platform also allows users to review their games, it has a lot of influence on the gaming industry. Therefore, there is a large economic incentive to understand the trends of steam users through their reviews.

Given a game review containing text and possibly emoticons, the objective is to classify each review by genre and provide a binary sentiment as output. The objectives can be summarized as follows:

a. Create a list of games using a number of games from 6 genres of the Steam Library. These are: Action, Adventure & Casual, Role-Playing, Simulation, Strategy, Sports & Racing.
b. Use Steamworks API (Steamworks Documentation, n.d.) to retrieve a number of reviews from every game on the games list we create.
c. Perform pre-processing, which will include deleting duplicate review as they provide no additional information and are likely to be ‘troll reviews’ which will improve the quality of the data. We will also search and remove some regular expressions like URLs.

d. Perform Genre classification using Embedding and Long Short-Term Memory Recurrent Neural Network.

e. Perform Binary Sentiment Analysis using Embedding and Long Short-Term Memory Recurrent Neural Network.

2. Previous Work

There is not much work in Genre Classification of video games however there is a paper by Yuhang Jian and Lukun Zheng that shows though using a recurrent neural network works, the method is only achieving a top-1 score of 44% (Jiang & Zheng, 2020).

For sentiment analysis a lot more work can be found. One paper uses Naïve Bayes and Decision Tree Classifier (Zuo, 2018) and another compares a number of models to conclude that SVM produced the best results (Bais, Odek, & Ou, 2017).

Results of various algorithms average metrics

Method	Train Accuracy	Test Accuracy	Precision	Recall	F1-score
Baseline	0.596	0.596	0.569	0.79	0.661
Naïve Bayes	0.868	0.714	0.669	0.847	0.748
Turney's	0.792	0.731	0.782	0.742	0.764
Linear SVM	0.939	0.935	0.909	0.99	0.947
Logistic Regression	0.935	0.931	0.91	0.975	0.944

Figure 1: Model Results of Sentiment Analysis (Bais, Odek, & Ou, 2017)

Though both these methods both use TF-IDF we believe it is worth evaluating the benefits of Word2Vec and GloVe Embedding techniques as well.

3. Method

Gather Data:

We will use the Steamworks API to gather reviews for about 200 games for each of the six categories of games mentioned above. The data gathered will include:

- review - text of written review

- voted_up - **true** means it was a positive recommendation (this is also our binary label)
- votes_up - the number of users that found this review helpful
- votes_funny - the number of users that found this review funny
- weighted_vote_score - helpfulness score

As the API makes use of ‘appid’ of every unique game we will need to create a subset of the steam games list publicly available which includes Genre information.

Preprocess Data:

In this stage we perform cleaning, tokenizing, and padding of the data. We will also split the data to create a test and training set. A split ratio of 0.3 will be used.

Build Models:

LSTM: Long Short-Term Memory networks are a type of network that have gotten increasingly more commonly used in complex problem domains like machine translation and speech recognition. This is because they are well suited to making predictions on time series data like speech and text. (Hochreiter & Schmidhuber, 1997)

RNN:

Embeddings:

TF-IDF

Word2Vec

GloVe

Evaluate Results:

For Genre Classification we will evaluate our results using a confusion matrix and ROC curve.

For Binary Sentiment Analysis I will use Accuracy, f1-score and ROC curve.

Works Cited

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