Lyrics and Popularity

Exploring the Value of Lyrics

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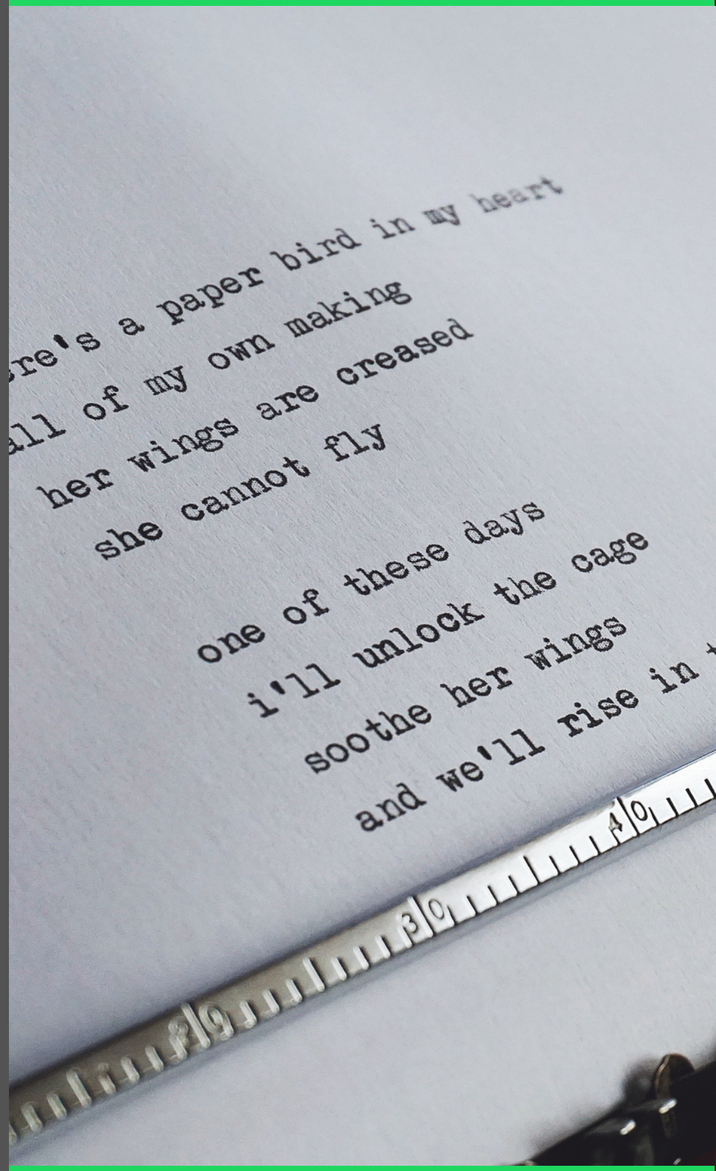
Tahoma

The Problem

Lyrics have been a **neglected component of songs when attempting to predict** song popularity.

Difficulties occur from working with text data and **differing vocabularies between genres**.



The Goal

Help songwriters create popular songs **more efficiently**.

Provide a **snapshot into the cultural themes** of a given time.

Predict **song popularity** using only **song lyrics**.

The Data

28 560 Lyrics

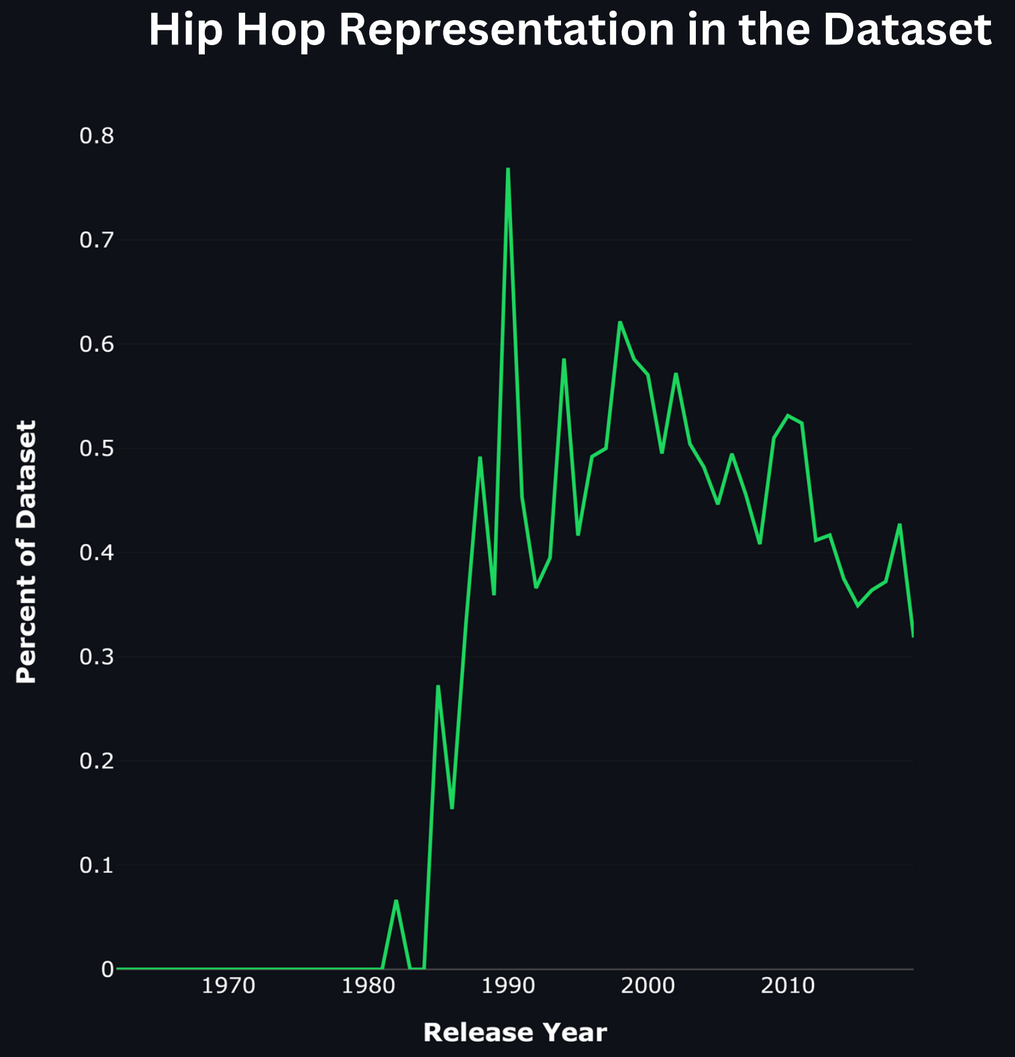
Scraped from Genius.com

1960 - 2020

Release year range

41.2%

Of the dataset was **Hip Hop**



The Target

Translation: What we are trying to predict.

Scraped **Spotify popularity rating**, using the Spotify API. This rating is defined mainly by Spotify **plays and the recency of those plays**.

Divided into three classes, **low, medium and high popularity**, based on the popularity rating.

The Models

Table 1. Modeling Results After Tuning

Model	Text Transformation	Test Accuracy	AUC of Micro-Average ROC Curve
Logistic Regression	TF-IDF	0.42	0.60
	TF-IDF + NMF	0.40	0.58
	Ada Embeddings	0.45	0.63
	Ada Embeddings + PCA	0.42	0.60
	TF-IDF + Hip Hop Only	0.43	0.62
Multinomial Naive Bayes	TF-IDF	0.42	0.60
	TF-IDF + Hip Hop Only	0.42	0.60
Random Forest	TF-IDF	0.42	0.60

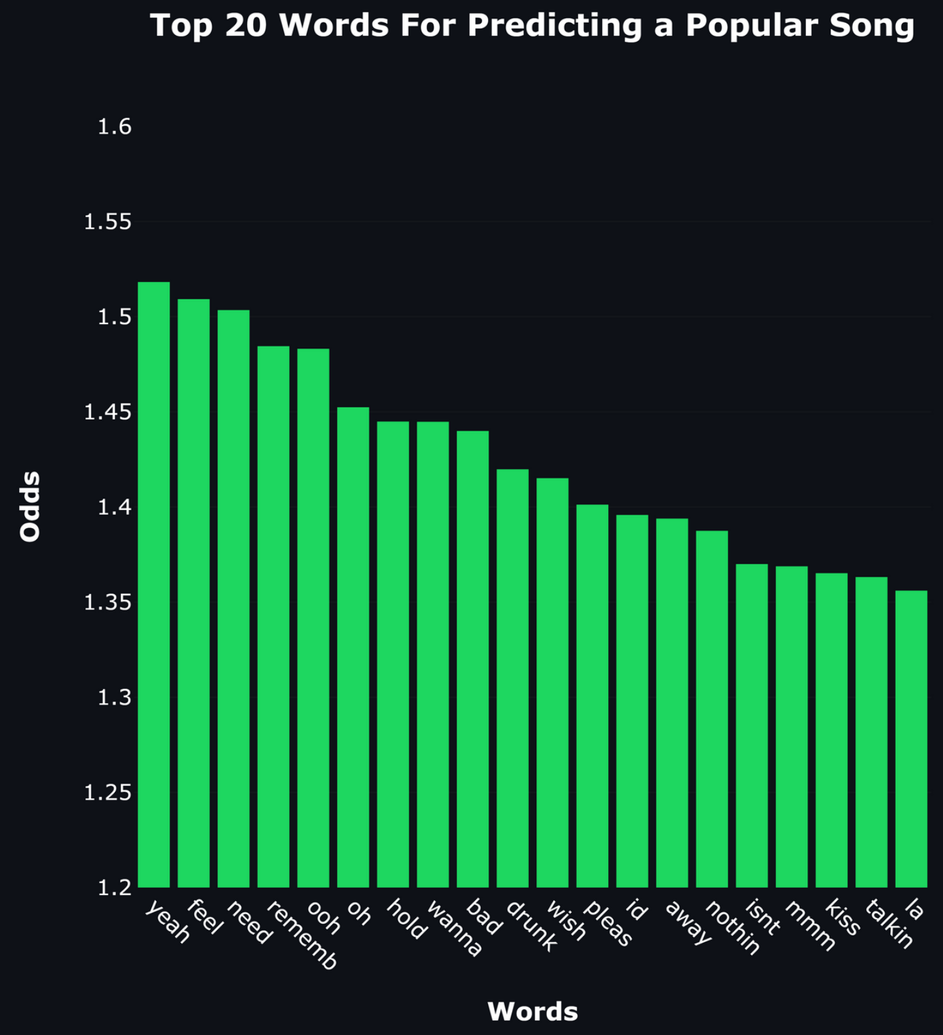
Using Only Lyrics is Difficult.

The Findings

High Popularity

Words that dealt with **positive feelings and physical connection** demonstrated increased odds of being predicted as having **High popularity**.

Yeah Need Wish
Feel Kiss Hold



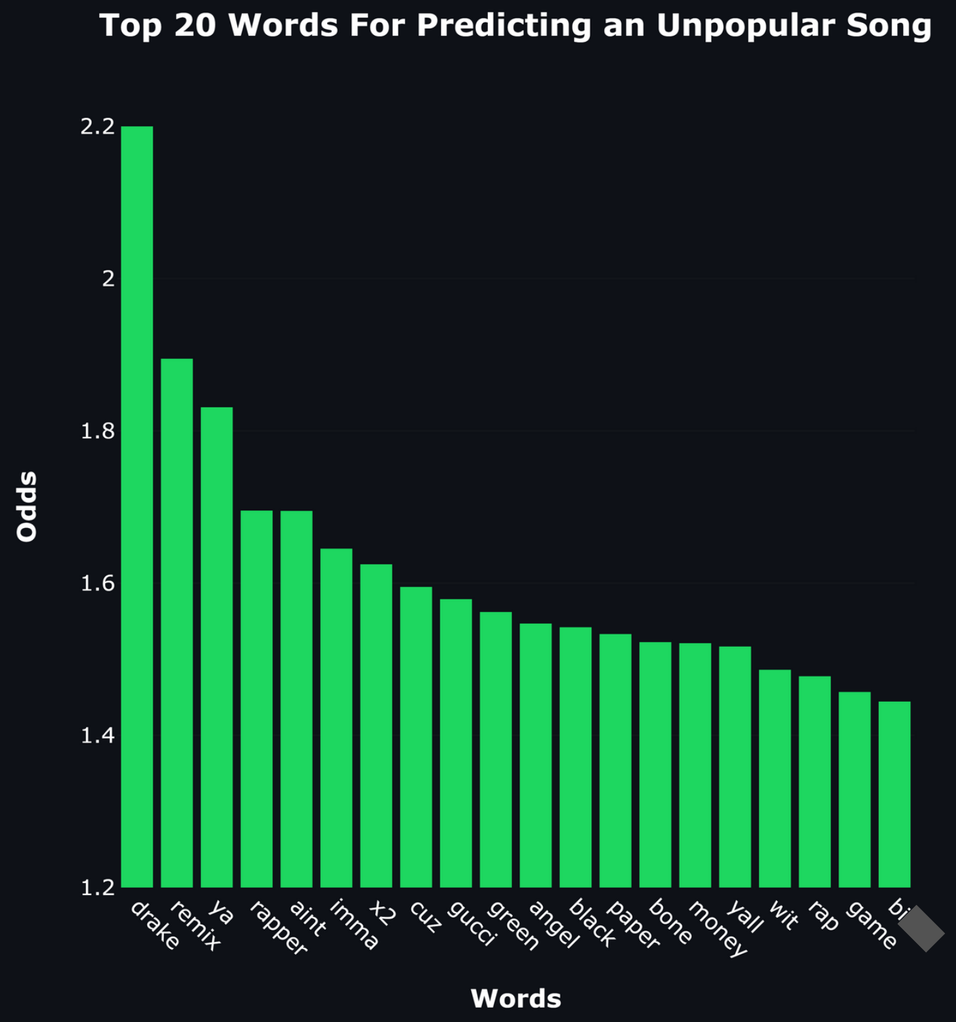
The Findings

Low Popularity

Words that dealt with **generic "SoundCloud rapper" themes** demonstrated increased odds of being predicted as having **Low popularity**.

Mentioning **Drake** increased the odds of predicting a low popularity song by a staggering 2.2 times.

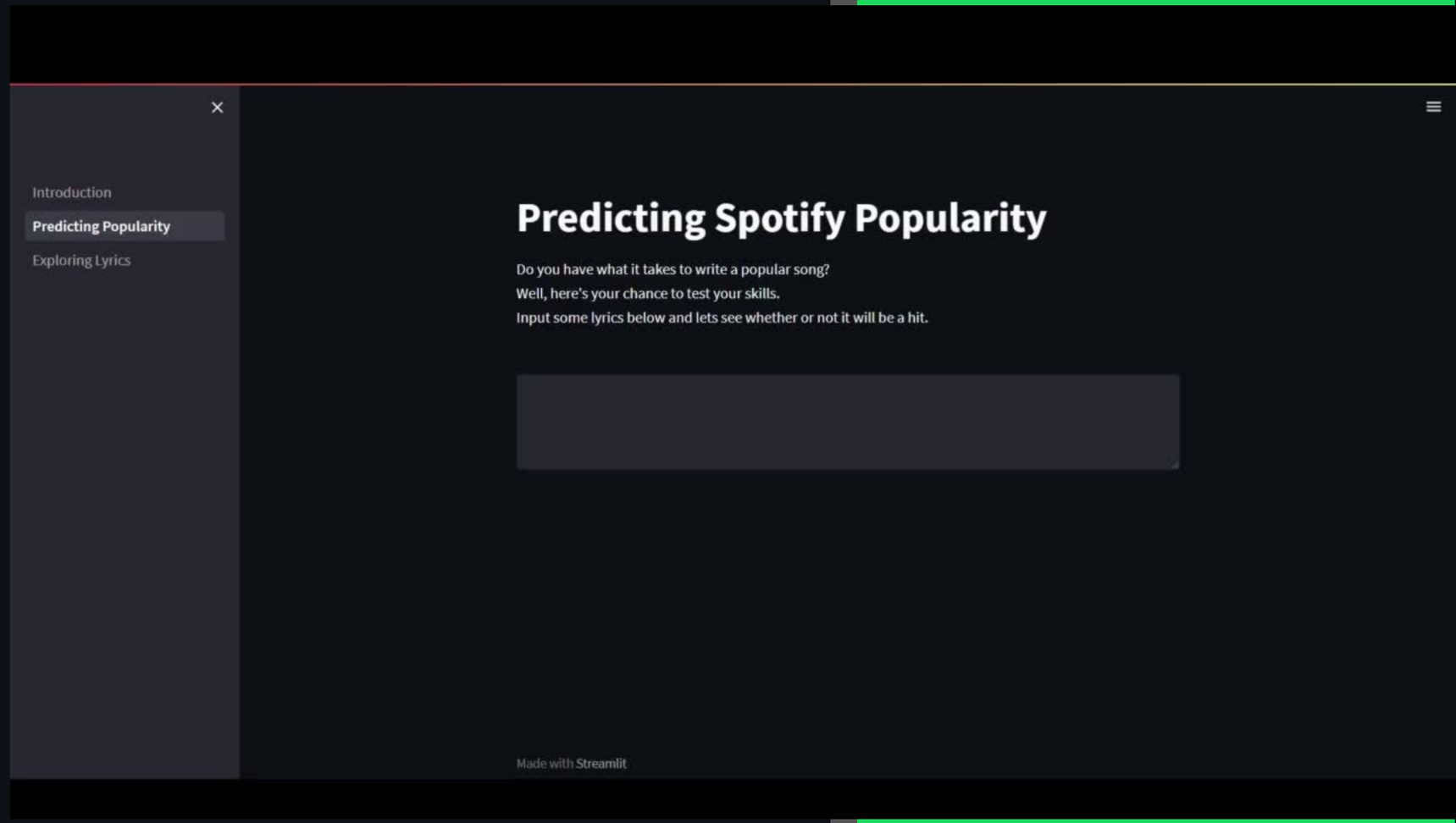
Money Gucci Green Paper



The App

Allows for user input of lyrics and **produces a prediction** on the songs popularity.

Users can also get a more **in-depth look into the dataset**.



https://0-justin-ng-lyrics-and-popularity-appintroduction-mcg5kw.streamlit.app/Predicting_Popularity

The Future

Current analysis dealt with mainly **discrete word counts through the entire lyric**.

Could take a more granular approach looking more **in-depth into chorus, verses and hooks**.

Most of the models **misclassified medium popularity** songs**.** Increase depth of analysis on these songs.

The End

Supplementary Slides

Text Cleaning

Removed **tags identifying parts of a song** (chorus, verse, hook, etc.).

Removed **all punctuation and uncapitalized** all words.

Removed stop words. These words are considered **insignificant in NLP** (the, a, etc.).

Stemmed the lyrics. Convert words to their root. Ex. **Running** is converted to **Run**.

Text Transformations

Vectorizers

CountVectorizers - Count how many **times a word occurs in a lyric** and assigns that number for that word. Do this with all words that appear in a certain percentage of songs.

TF-IDF - **Assigns the frequency of a word instead of a count**. Also includes a factor based on how uncommon a word is. The **more uncommon a word** is the larger the value will be.

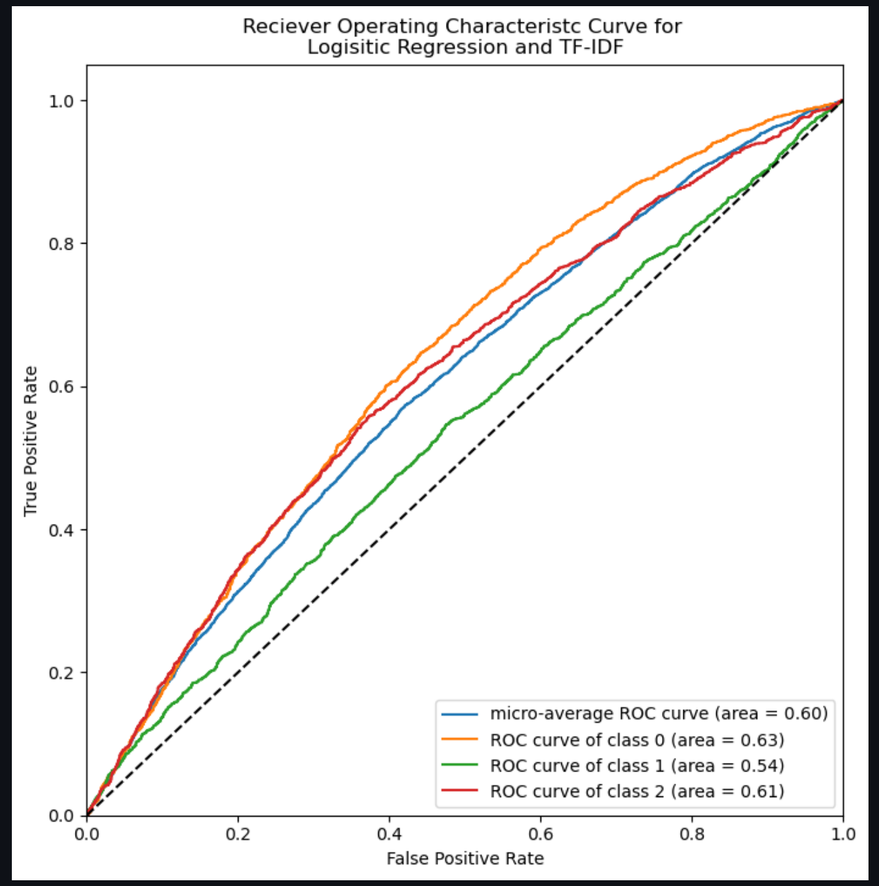
Text Transformations

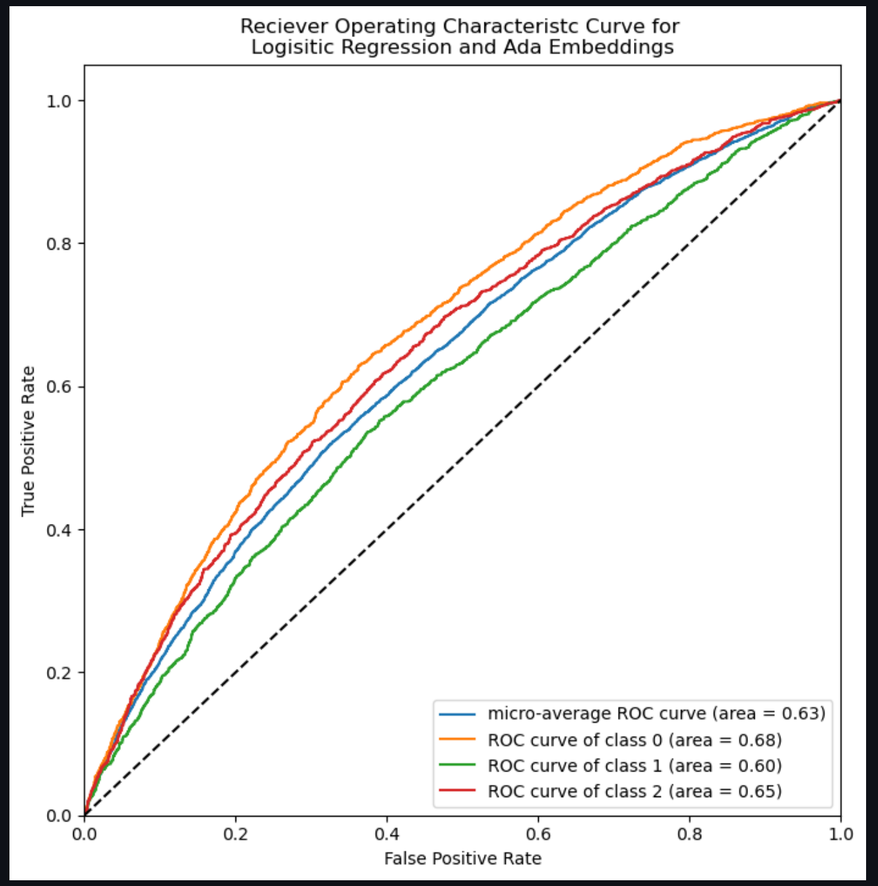
Embeddings

LexVec Embeddings - Vectors that represent complex relationships between words. Model was trained on **English Wikipedia 2015**.

Ada Embeddings - OpenAI second generation text embedding. This model converts text into a ~1500 dimensional vector that **captures semantics and other relationships** between words.

Model Evaluation
AUC-ROC Plots





Model Used in App

Best Performing Model