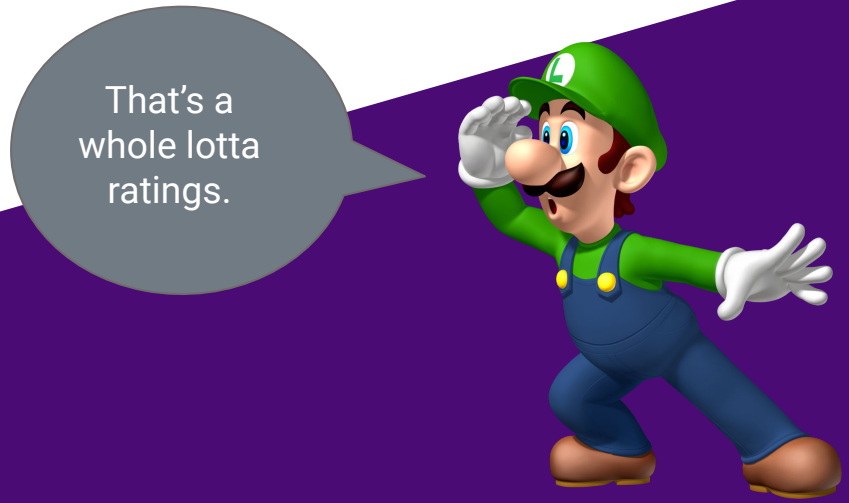
Rated ‘E’ For Everyone

The ESRB Rating Predictor



Created by Asher Katz, Hassan Akbar, Justin Rodriguez

About us

Asher Katz: Queens College Senior with a dual major in Applied Mathematics Sciences and Media and Communication Studies. I'm fascinated by the science of most things, usually to my detriment as I get distracted easily

Hassan Akbar: Brooklyn College Senior with a major in Computer Science. Currently interested in Data Science and Cyber Security and an avid fan of puzzles.

Justin Rodriguez: A Brooklyn College Senior with a major in Computer Science. I'm interested in video games and the cyber security field. I find how techniques in cyber security can be applied to games to further break them, super interesting

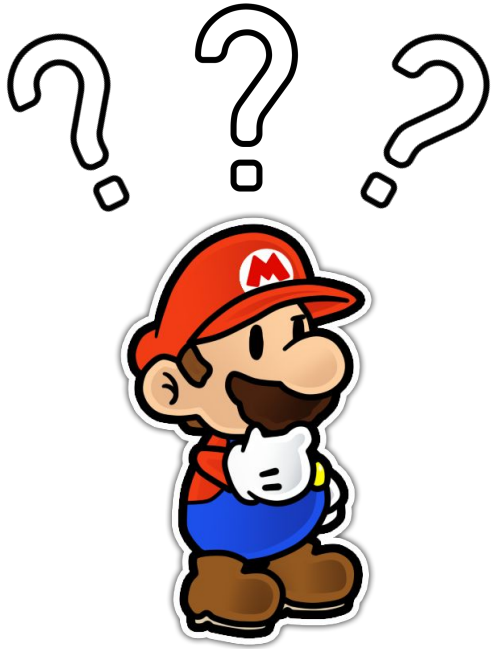
What is an ESRB Rating

- The Electronic Software Ratings Board (ESRB) has a rating system that's widely used in the video game market in the US.

- Games are required to have an 'ESRB rating' in order to be sold in most stores and/or ported for console in the US

- Historically, there have been 6 different ESRB ratings:
    - Rated A for [A]dult
    - Rated M for [M]ature
    - Rated T for [T]een
    - Rated E10+ for [E]veryone aged 10 and up
    - Rated E for [E]veryone
    - Rated EC for [E]arly [C]hildhood, retired since 2018.

What determines the rating?



- When the ESRB assigns their rating, they justify it with a combination of 30 possible descriptors.
- Some examples:
  - Cartoon violence
  - Violence
  - Blood
  - Language
  - References to alcohol
- Games are usually assigned no more than a few descriptors so the consumer can quickly size up the appropriateness of the game's content
.
- Seems reasonable but let's look at a scenario

The Issue with ESRB

Imagine you are a new Game developers.

You just finished making a game. It took you years to finish ironing all the bugs out but it is all behind you now.

You want to have your game sold on the switch. You check what's needed for that to happen and you need an ESRB rating. Now all that's left is to get that rating. You are hoping for that ET rating

You got a T Rating

The Issue with ESRB

NO

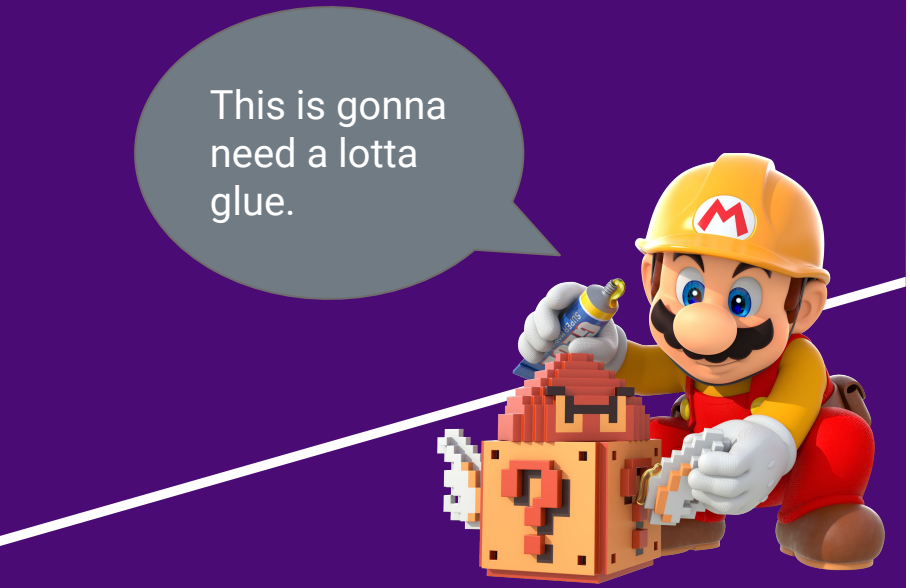
Panicked you say “it will be fine I’m sure kids will still get it, if not teens will pick it up. Let's start selling it”

That did not happen. Teens do not want to play the game and when a kid tries to get it:

The sale gets denied, because the game is too inappropriate.

There goes a lot of money and time used for the game. If only there was some way to get the rating before

How do we fix it?



- The best way to solve is to allow developers to easily understand and foresee what rating their prospective game will be awarded.
- But how can they know this? The ESRB has been know to give some pretty unexpected or overly harsh ratings.
- Using a dataset composed of many past ratings and their content descriptors, we trained a model to predict what rating a game will be awarded.

The Dataset

- **What's the breakdown of the ratings?**

  Here are the 4 ratings in our dataset and their corresponding value counts are:

  - **T**[een]: 866
  - **E**[veryone] **T**[en and up]: 516
  - **M**[ature]: 476
  - **E**[veryone]: 504

- **What are the content descriptors?**

5 levels of Substance Abuse	4 levels of Gore	7 levels of Violence	5 levels of Language	2 levels of Problematic Themes	7 levels of Sexual Content
*Alcohol_reference *Drug_reference, *Use_of_alcohol, *Use_of_drugs_and_alcohol *Simulated_gambling	*Animated_blood *Mild_blood *Blood, *Blood_and_gore,	*Mild_cartoon_violence, *Cartoon_violence, *Mild_fantasy_violence, *Fantasy_violence, *Mild_violence, *Violence *Intense_violence,	*Mild_lyrics, *Lyrics *Mild_language, *Language, *Strong_language	*Mild_suggestive_themes, *Suggestive_themes	*Crude_humor, *Mature_humor, *Sexual_content, *Sexual_themes, *Strong_sexual_content, *Partial_nudity, *nudity,

The Dataset

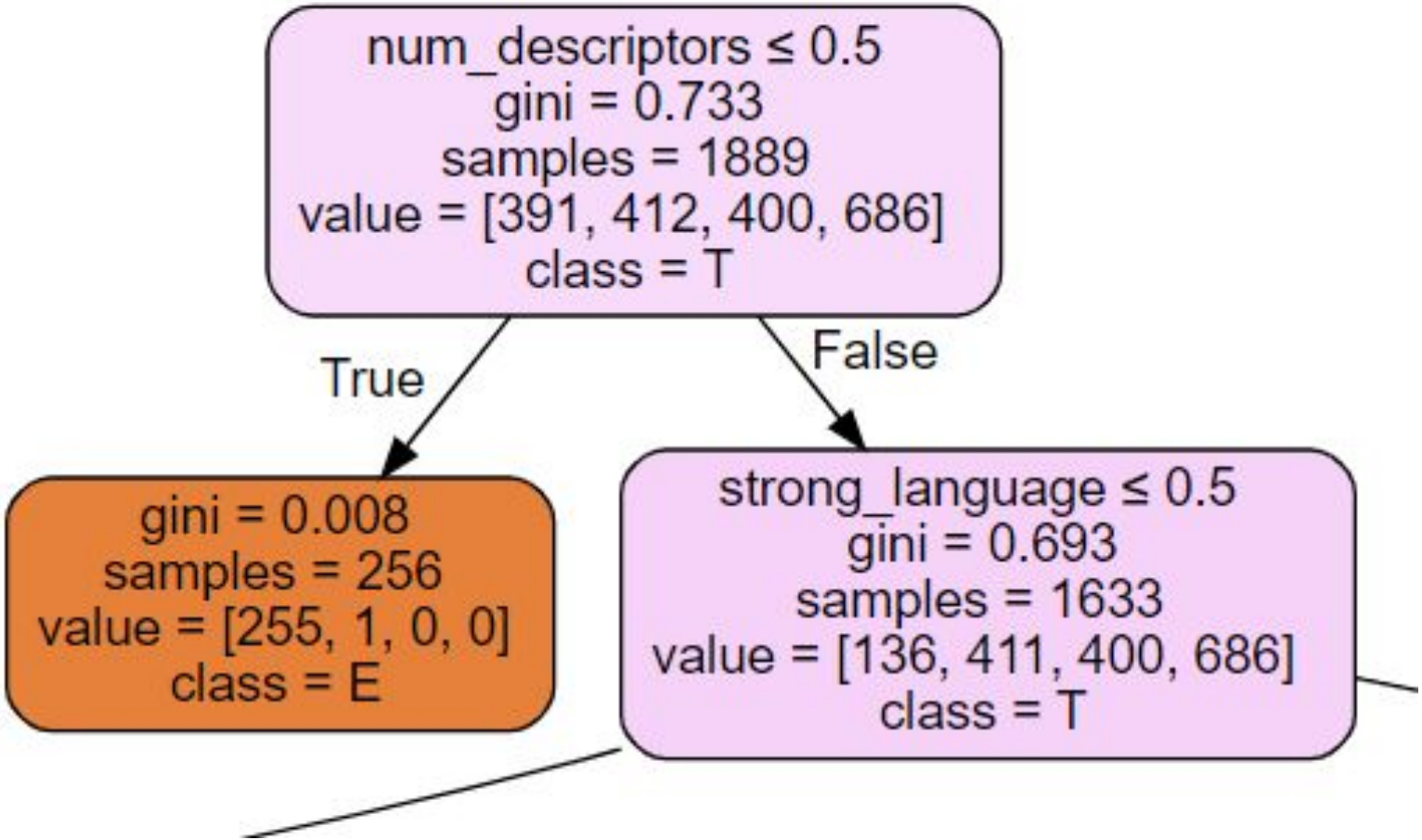
- **Additionally, we added two features:**
  - **ReleaseDate**
    - This was helpful in salvaging many of the duplicates as they turned out to be re-releases
    - It also helped predictive performance. Standards of society change with time.
    - Unfortunately, since we could only get 80% of the release dates, the improvement wasn't so significant
  - **Number of descriptors**
    - Simply how many descriptors does the game have.
    - In the M example to the right, the answer would be 3.
    - The theory being that a crowded rating might push it over the edge to the next highest rating.

Model Explanation And Predictive modeling of ESRB data

After trying several models such as RandomForestClassifier, DecisionTreeClassifier Scikit-learn's Softmax Regression, and K-Clustering. We found that Random Forest was the most accurate with it.

A Random Forest Classifier works by using many Decision Tree Classifiers to try and find out what class the data belongs too.

And Decision Tree Classifiers work in a way similar to 20 Questions. The model tries to find the best questions to ask to split the data and uses the info you give it to split the odds.



Here we can see the questions a Decision Tree might ask while trying to classify the data.

Model Results

Weighted Averages of Performance Metrics

- Accuracy (Correct Predictions/All Predictions)
  - 87%
- Recall (True Positive/(True Positives + False Negatives))
  - 87%
- Precision (True Positives / (True Positives + False Positives))
  - 87%
- F-1 Score (2*((Precision * Recall)/(Precision + Recall)))
  - 87%

The rating with the worst performance was ET. It had a Precision score of 81%, Recall score of 78% and an F-1 Score of 79%. We believe this is because it is a boundary category between E and T so games with an ET rating probably have a lot in common with E and T games.

ESRB Descriptors

- Alcohol reference
- Animated blood
- blood
- Blood and gore
- Cartoon violence
- Crude humor
- Drug reference
- Fantasy violence
- Intense violence
- Language
- Lyrics
- Mature humor
- Mild blood
- Mild cartoon violence
- Mild fantasy violence
- Mild language
- Mild lyrics
- Mild suggestive themes
- Mild violence
- nudity
- Partial nudity
- Sexual content
- Sexual themes
- Simulated gambling
- Strong language
- Strong sexual content
- Suggestive themes
- Use of alcohol
- Use of drugs and alcohol
- violence

Limitations

One major limitation of our data was that it was very small in comparison to the number of games actually released and rated by the ESRB. It notably lacked older titles since it only catalogues PS4 and Xbox One games. It also does not contain PC and the Nintendo Switch games.

The data was also a bit unbalanced with T rated games being almost twice as much as the other categories. This could be balanced by random selection of Teen games or accepted as perhaps T rated games are the most numerous as it is a boundary age.

Future Avenues of Research

- When games are remade or remastered how do the changes in society impact the new rating of the game?
- How does the console a game is available on affect its rating? Many developers stopped releasing their games on Nintendo consoles due to viewing it as a child based demographic.
- People online like this dataset but ESRB has a much better database with probably 10x games. Can we get that?