Utilizing Video Descriptions to Predict YouTube View Counts

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Abstract

For YouTube content creators, the number of views their videos receive not only dictates the videos popularity, but how much ad revenue that video will receive. For those with monetary investment in YouTube, the number of views a video receives directly correlates with its contribution to their livelihood, growth of their business or increase in their social media presence.

By looking at the description of the video, it is possible to get a brief overview of the content and therefore estimate correlations between video content and number of views. This view-estimation algorithm can help guide creators on ideal content for maximum viewership.

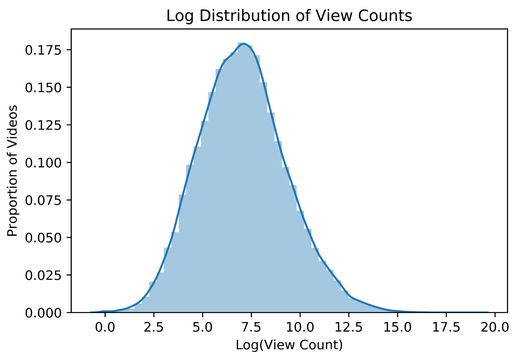
Data

Our data for this project was adapted from YouTube's 8m dataset and focuses on fitness-related videos – 92,459 videos in total.[1,2] The video title, description, view count, like/dislike count and channel are some of the features included in the dataset. **Examples of video descriptions can be seen below**:

- *'Arnold Classic Australia Qualifier 2016, Victorian Stongman Record Day, U105kg category. Best record, 21s 130kg'*
- *'Iron Man Andy muscle NO PAIN NO GAIN'*

Because the number of view follows a log-normal distribution. We plan to use the description of these videos to predict the log number of views the corresponding video will accrue. The log distribution of view counts can be seen in **Figure 1**.

Figure 1. Log Distribution of View Counts.



Methods

- **Input:** In order to represent video descriptions, I concatenated custom word embeddings up to the first twenty-five words. Shorter embeddings were zero-padded to ensure uniform embedding lengths.
- **Baseline Model:** Our baseline model was achieved by taking the average of the log(view count) for each channel. This baseline will allow us to assess if our model can be more useful for content creators than simply assuming that a new video will receive the average number of views for their videos.
- **Experimental Model:** Our experimental model is a simple two-layer LSTM model with dropout that takes concatenated video description embeddings as input. We analyzed results using two types of input: pure embeddings of video descriptions and video description embeddings + video title embeddings. This "video title" feature was added to further differentiate videos by niche. The design of our experimental model can be seen below:

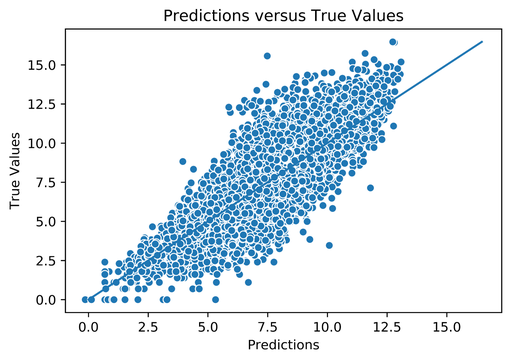
Preliminary Results

- **Metric:** Results were measured using the root mean square error (RMSE) of the predicted log(view counts) versus the true log(view counts).
- **Comparison of Models:** As can be seen in **Table 1** below, both experimental models outperformed the baseline with the model that included video title embeddings well outperforming other models. **Figure 2** visualizes the log(view count) for the best performing model versus the true log(view counts). The line plot indicates an RMSE of 0, points that stray from the line therefore contribute to error. An interesting behavior of our model is that predictions tend to be overestimated for lower view counts and underestimated for higher view counts.

Table 1. Results.

Model	Performance (RMSE)
Baseline	3.096
LSTM	2.029
LSTM (with video title embedding)	1.132

Figure 2. Predicted Log(View Counts) versus True log(View Counts) for Best Performing Experimental Model



Discussion

The ability to successfully predict YouTube views has significant implications for content creators. With only the YouTube description and title we established a model that can be used to estimate view counts more accurately than simply looking at typical view counts within a specific channel.

Applications for this model will be especially relevant for new content creators just learning how to make successful videos. By experimenting with different concepts via their description and title, they can get a better idea of which ideas tend to do better than others and which directions to pursue when trying to establish themselves on video-creation sites such as YouTube.

Although the most benefit will probably be seen in less-practiced content creators, those who have more established social media presence certainly have more stake in their video's success as for many, this success is their form of livelihood. The ability to predict how well their content will do allows them not only to test the validity of different video concepts, but also project their earnings into the future. A view prediction model therefore can assist both novel and established creators in their creative process and financial planning.

Next Steps/Future Directions

- **Explore different deep learning architectures:**
  - Deeper network
  - Convolutional Neural Network
  - Adding pooling layers
- **Look at different/multiple video topics:**
  - Health and beauty
  - Comedy
  - Music
  - Education
- **Include more features extracted from description and/or title in model:**
  - Number of capital letters in description
  - Counts of punctuation types in description/title
  - Number of URLs in description

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References

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2. YouTube. 2017. Youtube-8m dataset. Data received from: https://research.google.com/youtube8m/