

## Video Classifier Using Keywords in User Comments

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### ABSTRACT

Today in this world of media, the gigantic amount of videos are ready to be fetched. But it is very difficult to find and search appropriate videos. A huge amount of human effort required to categorize those video files. Various approaches have been started from so many years to help viewers to have appropriate solutions. Videos are rich in data which can be used to classify them by drawing features from basic three modalities- text, audio, and visual but due to social media content available on the web, we analyzed them to filter out video into various categories on the basis of their genre. We have summarized the method which we have used to classify them on the basis of the content of the web page.

**Keywords:** YouTube genre, user comments, special keywords, data cleaning, association rule

### INTRODUCTION

Now a days, people can access huge amount of video data . This work is based on finding a good technique for video classification. There are many types of the genre of videos according to their content. Some of these are shown in the fig1. Several studies have been conducted on this topic [1],[2],[3],[4]. This classification will help a person to choose the video of his interest. This classification is different from low-level feature extraction. classification as there are opinions which are analyzed in the form of comments which a user writes to show their personal perspective about the content of a video. This is sometimes called as sentimental [5][6][7] views which are ready to be used for analysis and with the help of this we can easily classify the videos. YouTube is one of the videos-sharing website which says that approximately 300 hours of new videos are uploaded to the website per minute. In this research, we are analyzing videos from YouTube.

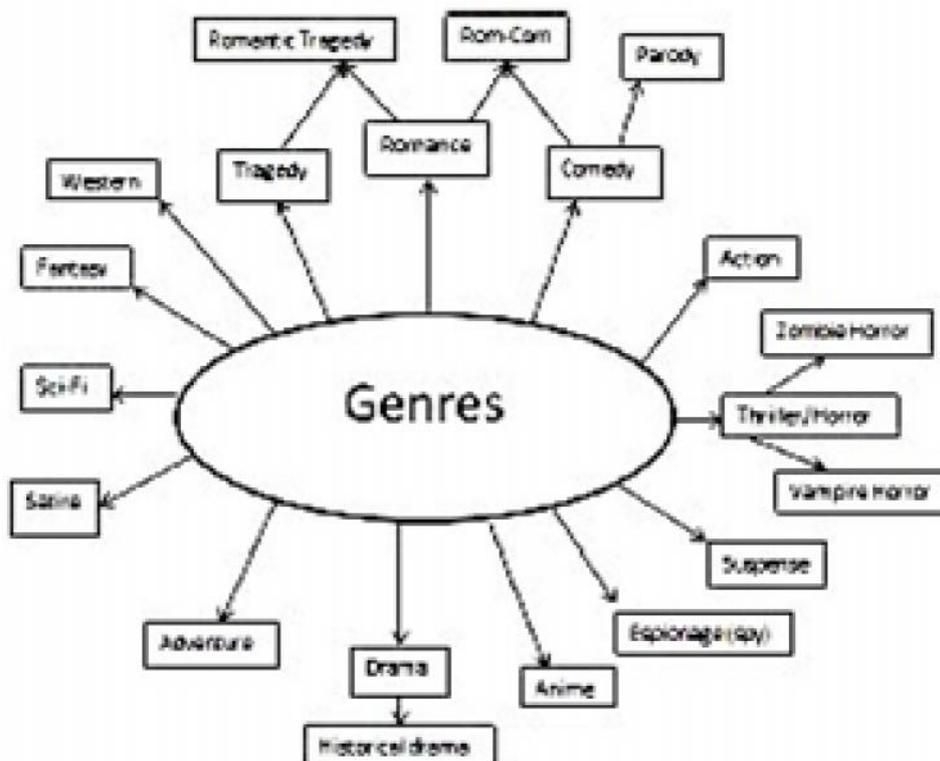


Figure 1: Different genre of Video

YouTube provide a feature of posting comments which are used in sentiment analysis [5][8][9][10] whose aims is to find the attitude of a viewer for some topic or inclination towards contextual polarity of a video. Most of the comments are related to each other but sometimes few comments are useless not familiar to the category in order to analyze. We have done cleaning of the comments so that only the relevant and informatics data remains, rest is removed in order to decrease the complexity of the data. Once data is cleaned it is ready to be analyzed by using association rules [11],[12]to generate the appropriate category. More the number of comments in the video more is the accuracy of the result. Many of the comments are useless as they do not have that much of information from which we can categorize the video. Various keywords/ tags are used to form association rules [13],[14] for defining the category/genre of the video as shown in the fig3. For example, videos containing comments related to music must be put in a separate music genre from others as they are not related to them.

**Related Work**

Mehmet et. Al.[15] used four relevant video group as well as related cross-video signals: co-uploaded (pu), co-browsed (pb), co-queried (pq), co-commented (pc) . A test video can be classified using pf by combining the cross-video signals (pu, pb, pq and pc) with the native test video value po. This combination is taken by the weighted sum with the weight vector is shown by w. The optimum weight vector can be identified by minimizing the final classification error on given training data set. Given the test video set and the training video set, the classifier C is applied on those videos separately to get the classification scores.

The classification score for the test set represented by po. Following classification score median is calculated for every set of co-related videos. The median scores for co-uploaded, co-browsed, co-queried and co-commented videos are represented by pu, pb, pq and pc, respectively. The final classification score, pf can be obtained by doing weighted sum of the scores. To easily represent, the score vector is given[15]  $p = [p_o, p_b, p_u, p_c, p_q]^T$  . The weight vector is represented with the help of [15]  $w = [w_o, w_b, w_u, w_c, w_q]^T$ .

$$pf = wTp \tag{1}$$

$$\min_w \sum \log(1 + \exp(-y_i w^T p_i)) + \frac{1}{2} \|w\|^2 \tag{2}$$

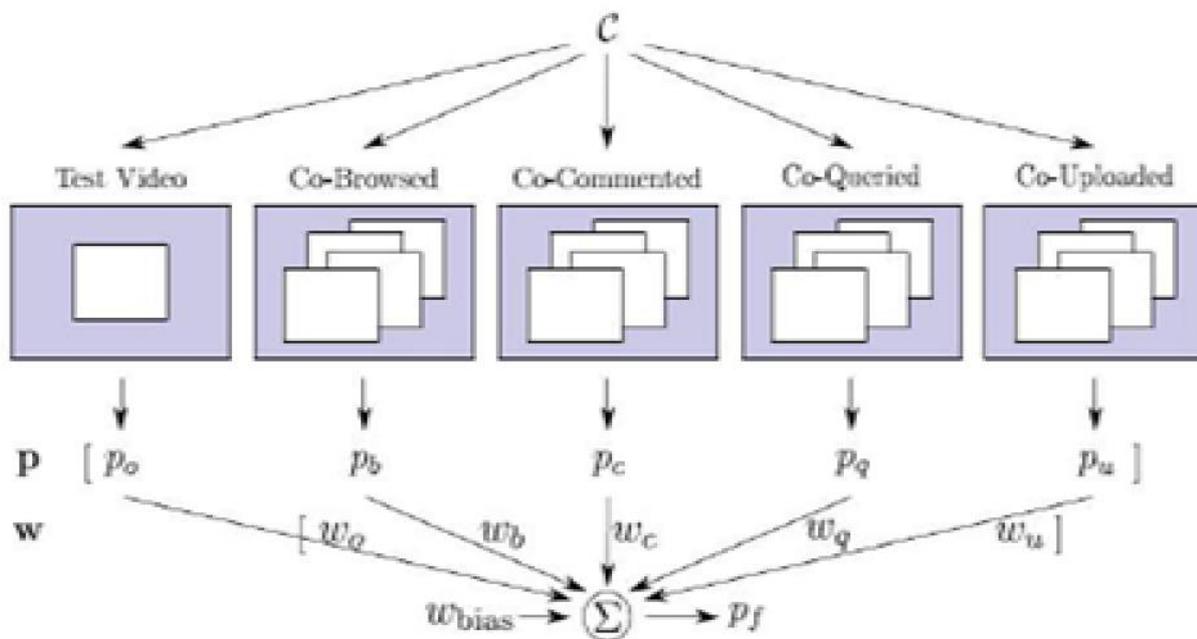


Figure 2. Video Classification System [15]

Given training samples having labels  $\{y_i\}$  and related classification score vectors  $\{p_i\}$ , the job is to learn the weight vector which can minimize the error in classification. The minimization is done using trust region Newton method. While doing the optimization, the bias term  $w_{bias}$  and 1 is added to  $w$  and  $p$ , respectively. Zheeshan et.al.[1] initially classified

movies into action and non-action genre by estimating the visual disturbance as well as average shot length with the help of a simple but robust technique. They also used audio and color data and combined it with the Cinematic Principles to classify movies. They formed three subclasses; comedy, drama and horror/other under non-action group. Further they classified action movies into explosion/fire genre and other-action genre. Zhou et.al.[16] introduced a method for movie trailers genreclassification, based on scene categorization. Their way decomposes each trailer to a group of keyframes by shot boundary analysis. From these keyframes, they use state-of-the art scene detectors and descriptors to extract features, which are then used for shot categorization via unsupervised learning. This allows them to represent trailers using a bag-of-visual-words (bovw) model with shot classes as vocabularies.

## OUR APPROACH

In this research we have tried to take the advantage of user viewpoint or we can say, user perspective towards the video i.e., what user actually thinks about the video. Sometimes a video is categorized into different categories although the video content may differ from the defined category. So, only the user who watches the video is aware of the actual category of that video according to the content of the video. YouTube is one of the video sharing websites that allows a user to comment their responses, opinions [17] about the content of the video. These comments can be used to know the actual category of the video. Each video on the YouTube has a unique Video ID of 11 characters which is present at the end of the YouTube video URL. The unique video id of any video can be obtained by using pattern matching technique in URL by using RegEx[18]. A regular expression (RegEx) is a special sequence of characters that helps you match sets of strings, using a predefined syntax held in a pattern. Once we have obtained the unique video id then, we can fetch the complete web page content. This obtained web page content is loaded into JSON. Once the content is loaded into JSON, we apply several data cleaning techniques to clean the data so that desired and meaningful information can be obtained from that data like removing special characters and non-ASCII values. These special characters are of no use to us so in order to remove complexity and look data more cleaned we have removed them. Once data

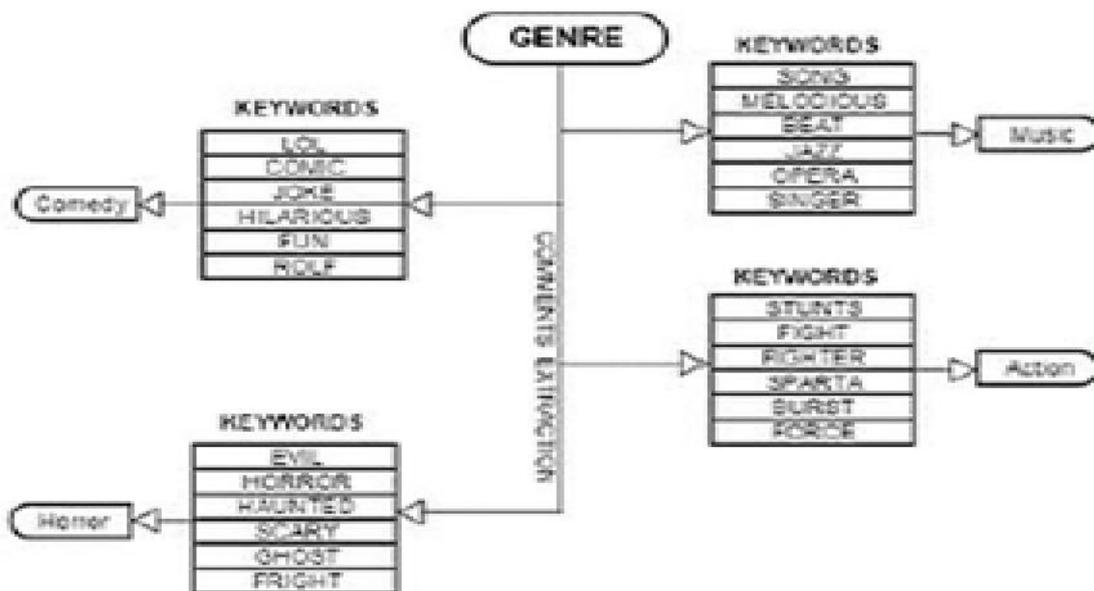


Figure 3: Block diagram of process

is cleaned we apply association rules according to the genre. Our motivation to mine association rules comes from the following thing: “90% of users who like article A and article B also like article C, 30% of all users like all of them” and “90% of articles liked by user A and user B are also liked by user C, 30% of all articles are liked by all of them”. Several keywords may not be appropriate words but these words make some sense related to them /tags which give a similar meaning to it or used in place of them.

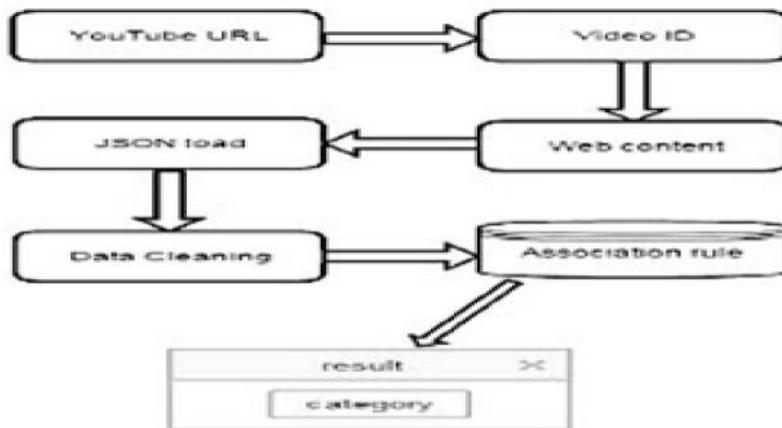
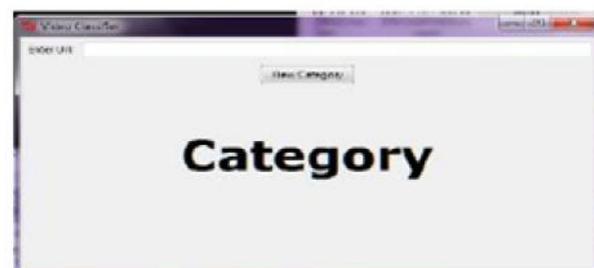


Figure 4: Keywords/Tags Structure

like any video which is related to a song. Different users will have a different set of words to give similar meaning like ‘melodious’ this word might have a different meaning as compared to word ‘opera’ but these both are related to one category i.e. music. In the same way, several words with same meaning like synonyms of words and related words are grouped together to form association rule and the comments of videos matching maximum of particular group will be of that category. In this research we have taken 4 main genres i.e. ‘ACTION’, ‘MUSIC’, ‘COMEDY’, ‘HORROR’ and if there is no match to these categories rules then the video will be classified in ‘OTHERS’ category.

## RESULTS

The following snapshots are showing the implementation and given table shows results. First we have to copy the link from the YouTube and then paste the link in our software to find out the more relevant category of movie. Both the Category by YouTube and by our software are displayed as shown by the snapshots. The keywords are identified and the relevant category for the movie trailer is shown.



Video URL from You Tube	You Tube	New Genre	Max No. of keywords	Accurate
<a href="https://www.youtube.com/watch?v=poLjq0u4_5A">https://www.youtube.com/watch?v=poLjq0u4_5A</a>	Film & Animation	Action	3	Video classifier
<a href="https://www.youtube.com/watch?v=Cnfj6QCGLyA">https://www.youtube.com/watch?v=Cnfj6QCGLyA</a>	Entertainment	Music	1	Video classifier
<a href="https://www.youtube.com/watch?v=caoGNx1LF2Q">https://www.youtube.com/watch?v=caoGNx1LF2Q</a>	Music	Music	9	Both
<a href="https://www.youtube.com/watch?v=y0VvViKjjM">https://www.youtube.com/watch?v=y0VvViKjjM</a>	Entertainment	Music	20	Video classifier
<a href="https://www.youtube.com/watch?v=WiuJ_GHlb64">https://www.youtube.com/watch?v=WiuJ_GHlb64</a>	Entertainment	Music	4	Video classifier
<a href="https://www.youtube.com/watch?v=riHQZJtLWY">https://www.youtube.com/watch?v=riHQZJtLWY</a>	People & Blog	Horror	8	Video classifier
<a href="https://www.youtube.com/watch?v=6L6XqWoS8tw">https://www.youtube.com/watch?v=6L6XqWoS8tw</a>	Film & Animation	Action	4	Video classifier
<a href="https://www.youtube.com/watch?v=GdNKsW-E_po">https://www.youtube.com/watch?v=GdNKsW-E_po</a>	Film & Animation	Music	5	Video classifier
<a href="https://www.youtube.com/watch?v=36uutyEKt4o">https://www.youtube.com/watch?v=36uutyEKt4o</a>	Comedy	Horror	10	Video classifier
<a href="https://www.youtube.com/watch?v=V496LGfxr38">https://www.youtube.com/watch?v=V496LGfxr38</a>	Music	Music	5	Both
<a href="https://www.youtube.com/watch?v=A4kdGqVarYM">https://www.youtube.com/watch?v=A4kdGqVarYM</a>	People & Blog	Music	0	None
<a href="https://www.youtube.com/watch?v=Bzt6h5uFWOU">https://www.youtube.com/watch?v=Bzt6h5uFWOU</a>	Sports	Other	2	You Tube
<a href="https://www.youtube.com/watch?v=4YM9wBIgY-Y">https://www.youtube.com/watch?v=4YM9wBIgY-Y</a>	Film & Animation	Horror	7	Video classifier
<a href="https://www.youtube.com/watch?v=fNVmyDeZy28">https://www.youtube.com/watch?v=fNVmyDeZy28</a>	Entertainment	Comedy	4	Video Classifier
<a href="https://www.youtube.com/watch?v=QsCkty3mpg0">https://www.youtube.com/watch?v=QsCkty3mpg0</a>	Entertainment	Action	11	Video classifier
<a href="https://www.youtube.com/watch?v=X1U21VBSbSs">https://www.youtube.com/watch?v=X1U21VBSbSs</a>	Film & Animation	Horror	4	Video classifier
<a href="https://www.youtube.com/watch?v=29m2livchll">https://www.youtube.com/watch?v=29m2livchll</a>	Entertainment	Music	2	Video classifier

Table: Genre classification comparison

### CONCLUSION AND FUTURE SCOPE

We have taken samples containing a number of videos from all categories to classify them and after applying our proposed association rules on them we found that the videos with more number of comments generate more accurate result as compared to videos having less number of comments. Some comments are found, which are

commented in different languages and have words which have no dictionary meaning but in most of the cases, our classification is accurate. One major problem of using this filter is if there are few comments and there are no keywords in them then it does not provide us an accurate result. This analysis can be further used in future as we have comments in the cleaned from which we can use

them to tell the sentimental behavior of the user, what type of videos user mostly watches and what type of reaction it gives to videos like negative/positive feedback or opinion. Also, in addition, to make the filter more accurate we can analyze videos by low-level and high-level feature extraction using image processing and then matches both results and produces a better filtration to the videos for a user.

#### ACKNOWLEDGMENT

We are thankful to JamiaMilliaIslamia, New Delhi, DTU, New Delhi for their support to provide infrastructure and other facilities. We especially thankful to Pulkit Agrawal, PulkitMaheshwari, Ekansh Agrawal and HarshitaSaxenakeen insightful comments on work.

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