Presentation Characteristics Analysis of Online Educational Videos

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INTRODUCTION
With the advancement in multimedia industry, educational delivery has been rapidly shifting towards video form available on content-based communities such as Massive Open Online Courses and TED. In this context, what has intrigued educational providers is effective presentation skills that enhance learning outcomes. This project focuses on educational videos and presenters' behaviors to identify positive and negative presenting characteristics. Initially a survey is conducted in related to educational videos on TED talk forums. The popularity of such videos is measured based on metadata of videos’ webpage. The presenters' behavior is then extracted from the video, followed by a clustering procedure which states the positive and negative characteristics.

IMPLEMENTATION

Popularity Measurement

Extract the following metadata from videos’ webpage: upload time, category, the number of views, rates, top comments. Sentiment analysis is conducted to identify positive and negative comments. Define as popularity \( P \) of a video \( i \) as follow:

\[ P_i = \frac{\text{top_counts} + \text{comments}}{n} \]

The normalization intends to remove the bias caused by upload time and category. Method of median is used to designate the popularity as positive and negative.

Gesture Measurement

We deploy a framework that concurrently segments video according to shot changes, recognizes and tracks object within each segment.

1. Start the computing of color histograms on the first frame. Let the variable \( \text{cur_hist} \) denotes the value of obtained color histograms.
2. Calculate the color histogram of the next frame. Let the variable \( \text{cur_hist} \) denote the obtained value. Detect the objects including body, head, hands, and limbs.
3. Calculate the correlation(\( \text{cur_hist} \), \( \text{prev_hist} \))
4. If \( \text{diff} < \text{TH} \), Not shot change; Track those object and calculate the motion; \( \text{prev_hist} = \text{cur_hist} \); go to step 2.

Text Linguistics Analysis

As a whole, we statistically evaluate the transcripts of educational including the number of words, sentences and vocabulary, key words/n-grams, inter-words correlation. We design an interactive tool to help convey this information.

RESULTS

After conducting our experiment on the dataset, we obtain the following results:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value1</th>
<th>Value2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NumOfViews</td>
<td>1,713,820</td>
<td>908,456</td>
</tr>
<tr>
<td>NumOfComments</td>
<td>304</td>
<td>132</td>
</tr>
<tr>
<td>NumOfWords</td>
<td>1084</td>
<td>793</td>
</tr>
<tr>
<td>NumOfSentences</td>
<td>153.6</td>
<td>139.9</td>
</tr>
<tr>
<td>AvgLengthSentences</td>
<td>14.17</td>
<td>12.61</td>
</tr>
<tr>
<td>NumOfWords/Views</td>
<td>675.6</td>
<td>564.3</td>
</tr>
<tr>
<td>BodyMovement</td>
<td>0.61</td>
<td>0.75</td>
</tr>
<tr>
<td>HeadMovement</td>
<td>0.04</td>
<td>0.07</td>
</tr>
<tr>
<td>LimbMovement</td>
<td>0.28</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Based on the qualitative characteristics as described above, we can describe the presentation styles of speakers. More specifically, the speakers of the more popular videos (cluster a) presents the following characteristics compared to those of the less popular videos.

- Delivery more information (NumOfWords, NumOfSentences)
- Complex sentences (AvgLengthSentences)
- Wide range of vocabulary (NumOfWords/Views)
- Rich hand gesture (LimbMovement)
- Avoid shaking heads (HeadMovement)