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# Visualization of affect in movie scripts

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## ABSTRACT

This paper presents a preliminary approach to visualize the affect carried by movies through the affective analysis of their scripts.

## Keywords

Emotion detection, Sentiment Analysis, Movie visualization

## 1. INTRODUCTION

Affective based movie search is relatively recent. One of the most prominent works is the iFelt system [5] that proposes to search for movies according both to the emotions embedded in the movie (or *objective* emotions in the authors' terminology) and to the emotions elicited in the viewer (or *subjective* emotions). The iFelt system classifies subjective Ekman emotions [3] thanks to physiological inputs (ECG, blood pressure, etc.) and considers audio/video/subtitles analysis. Once classified the system enables to search for a movie using a visual representation of all movies according to their emotions. Another system is the BBC classification system [2] which targets objective emotions using TV specific dimensions such as happy/sad, light-hearted/dark, serious/humorous or fast-paced/slow-paced. They observed that the serious/humorous and the fast/slow pace were the two most important dimensions. Their classifier obtains very good accuracy for these two dimensions using audio/video signal processing, including genre information.

It is noteworthy to remark that none of these works consider movie *scripts*. However movie scripts are a rich source of information: they are split by scenes, attribute dialogues to characters, provide scene descriptions and stage directions. All these aspects which are not present in subtitles could be used to discover the affect contained in a movie.

This paper presents a preliminary approach to the visualization of objective affect in movie scripts. We first describe the retrieval and formatting of movie scripts in section 2.1, then

explain the affective analysis in section 2.2 and eventually show the possible visualization in section 2.3.

## 2. OUR PROPOSAL

### 2.1 Movie scripts retrieval

We first downloaded around 1150 movie scripts in flat text from IMSDB.com, the *Internet Movie Scripts Database*. We then filtered out all scripts that prevented to extract scenic information (because of non machine readable format, scripts with erroneous characters, etc.). We kept then around 750 movie scripts to work with. These scripts were then parsed and better formatted. Most of these scripts were very close to the *Fountain* format, a plain text format for screen writers that clearly delineates the dialogue lines from the scene descriptions. For the rest of the scripts, regular expressions were used. Eventually four types of information are annotated: the *scene headings* (interior/exterior, time of day, location); the *scene descriptions*, the description of the locations, actions and behaviours of the characters; the *dialogue lines*, that is what the characters say; and the *stage directions* which provides additional information regarding the attitudes or actions of characters while they speak. We will refer to these elements as *script elements*. The appendix shows an example of formatted script.

### 2.2 Affect analysis

The affect analysis of the movie script content has been performed thanks to *SATI API*<sup>1</sup> [1] which enables to retrieve the sentiment (a continuous value in [0,1]) and the emotion (Ekman emotions) that is conveyed by a text. Both analyses use symbolic approach since classical supervised learning tends to be domain dependent. Both approaches are based on lexicons (Liu's lexicon for polarity [4] and Wordnet-Affect for emotions [7]). In order to deal with negation or valence shifts caused by adjectives (see for instance the expression "it is a missed opportunity"), the sentiment analyzer makes use of parsing techniques: it first parses the sentence using Stanford parser, associates each word with its polarity from the lexicon and applies valence modification rules iteratively until no more rule can be applied. Each of the four elements (scene headings, descriptions, dialogue and directions) were annotated both with the valence and an Ekman emotion. The final result has been formatted in the EmotionML format [6] as a standalone EmotionML document whose emotions are referred to thanks to an emoId (see appendix).

<sup>1</sup><http://talca2.loria.fr/empathic>

## 2.3 Affect visualization

We are interested here in visualizing the affect of the 750 annotated movie scripts and propose something similar to iFelt with its *movie space*. Valence information is the easiest to display. Figure 1 shows an example on how to display movies by valence: all movies are represented as dots, the distance from the center and the color giving information on the average valence of the movie including all script elements (red meaning negative, green positive). The user can hover a particular dot and see information about the movie. The figure shows both the poster of the movie that the user hovered and the timeline information, showing average valence for each scene. Hovering the timeline enables to see the actual content of the scene in terms of descriptions or dialogue elements along with their corresponding valence.

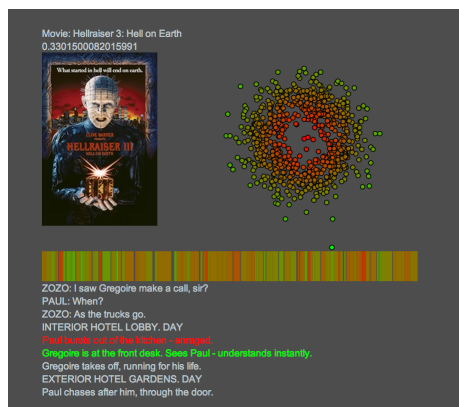


Figure 1: Valence visualization for all movies and by timeline

Emotions visualization is a bit trickier. The figure 2 shows emotions laid out following Plutchik wheel style of visualization. Given a movie, its emotional profile is simply computed by counting all occurrences of Ekman emotions in script elements and calculating the ratio of each emotion, for instance (joy=0.5, fear=0.1, sadness=0.2, disgust=0.0, surprise=0.1, anger=0.1). The movies are then displayed as dots such that, the higher each emotion, the closer they are to the corresponding corners. Like for valence, the user can hover each dot and have information about the movie. Here the information is the emotional distribution of all characters of the movie. We consider in this figure the emotional analysis of the *dialogue lines* of the characters. Another visualization could consider the scene descriptions involving the characters as well.

While the emotion visualization seems pleasant and readable, it is also inherently ambiguous since it is a two dimensional projection of the six dimensions emotional vector. The solution of iFelt is to be less informative and only display the most dominant emotion of the movie. Another solution, as used by the BBC system would be to perform a Principal Component Analysis to retrieve only relevant dimensions at the possible cost of readability.

## 3. CONCLUSIONS

We presented a preliminary analysis of movie script affective content and a visualization that both enables to see the

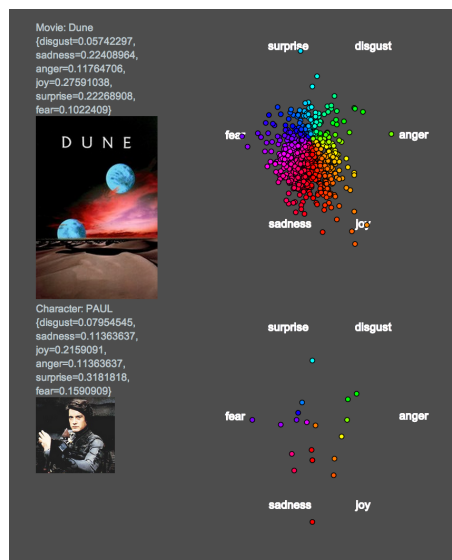


Figure 2: Emotion visualization for all movies and by characters

whole movie space at a glance and to examine each movie individually. Since this work is preliminary no evaluation has been conducted yet. The next steps would be to request test subjects to perform some movie research queries and evaluate both their success and satisfaction.

## 4. REFERENCES

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## APPENDIX

### Movie script example

```
<scene time="DAY" type="INTERIOR">
  <location emoId="e335">LOW RENT APARTMENT</location>
</scene>
<descr>
  <text emoId="e336">
    Four little KIDS SCREAM and SQUABBLE while the phone CHIRPS
    insistently in the tiny, cluttered apartment and a harried
    MOTHER lunges for the phone, answers sharply...
  </text>
</descr>
<dial speaker="MOTHER">
  <text emoId="e337">Yes?</text>
</dial>
<dial speaker="MOTHER">
  <mood emoId="e339">listens, frowns, then</mood>
  <text emoId="e338">
    Whaaaaaat? "Voice mail"! I don't know what you're talkin' about.
    ... Is this a joke? I don't know any scientists. James who? Never
    heard of you!
  </text>
</dial>
```

### Corresponding EmotionML fragment

```
<emotion id="e335">
  <dimension name="valence" value="0.0"/>
  <category name="sadness"/>
</emotion>
<emotion id="e336">
  <dimension name="valence" value="0.0"/>
  <category name="disgust"/>
</emotion>
<emotion id="e337">
  <dimension name="valence" value="0.5"/>
  <category name="neutral"/>
</emotion>
<emotion id="e338">
  <dimension name="valence" value="0.0"/>
  <category name="surprise"/>
</emotion>
<emotion id="e339">
  <dimension name="valence" value="0.5"/>
  <category name="neutral"/>
</emotion>
```