EmotionMap: Visual Analysis of Video Emotional Content on a Map

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Research Objectives

While there is much research confirming that emotion plays a crucial role in gratifying users' needs during their experience of movies and TV series, there is little implementation of analytical systems to allow users to understand emotional content.

In this work, we want to present an interactive visual analysis system to express video emotional content for better help users to browse, navigate and query the video content.

Research Objectives
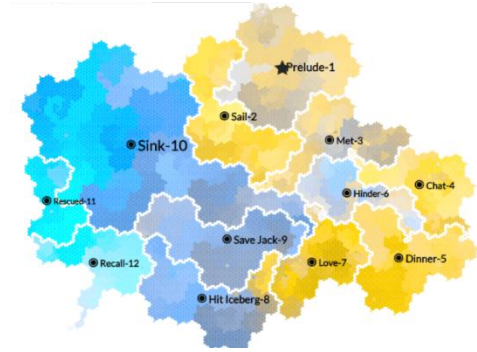
- **Emotional content extraction and modeling.**

  We collect the subjective and objective emotion data of several movies through users' assessments and automatic recognition algorithms. Then we model the emotional content of these movies based on emotion representation models.

- **Using the metaphor of a map for video content analysis.**

  We create a novel form for video analysis by means of a map. It provides an efficient way for exploring video content, especially emotion. In particular it allows understanding of the overall emotions at a glance while also giving a rapid understanding of the details.

- **Interaction system with multi-views and natural sketches.**

  We integrate natural sketch interaction in our system and construct an interactive visual analysis system with views that are interconnected, mainly including a map view, a character view, a video view, and a timeline view.

Research Method

EmotionDisc

Firstly, we developed EmotionDisc which is an effective tool for collecting audience's emotion based on emotion representation models.

We collected audience and character emotional data, then integrated the metaphor of a map to visualize video content and emotion in a hierarchical structure.
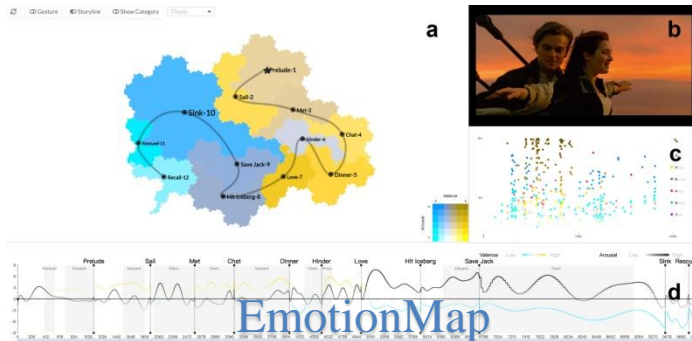
EmotionMap combines sketch interaction, providing a natural approach for users' active exploration. The novelty and effectiveness of EmotionMap have been demonstrated by the user studies and experts' feedback.
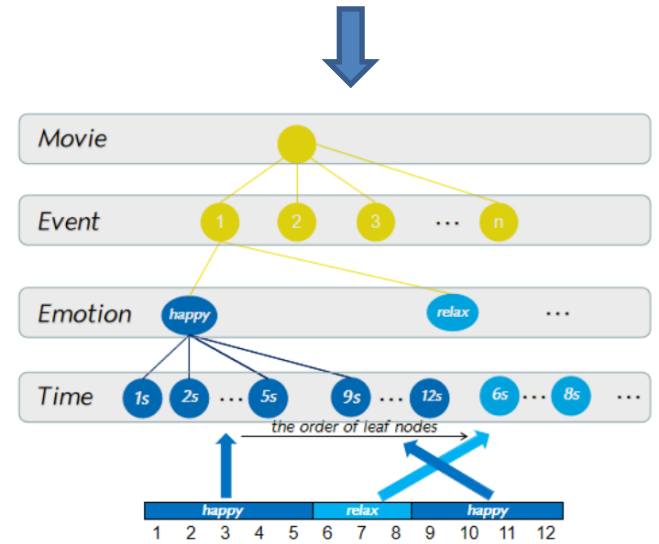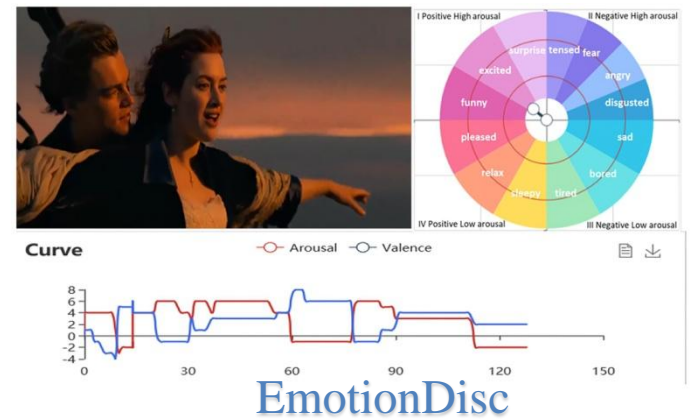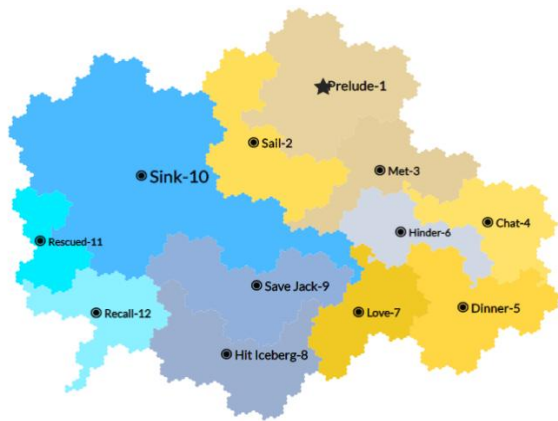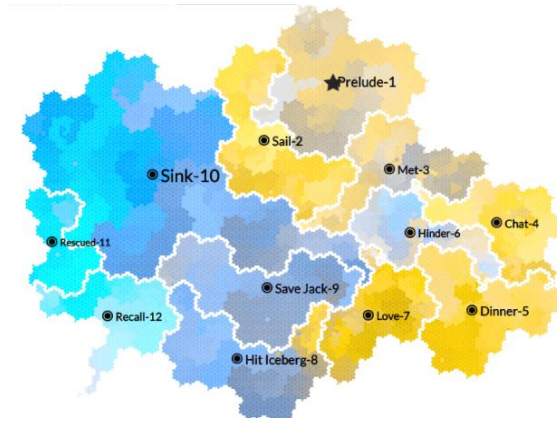

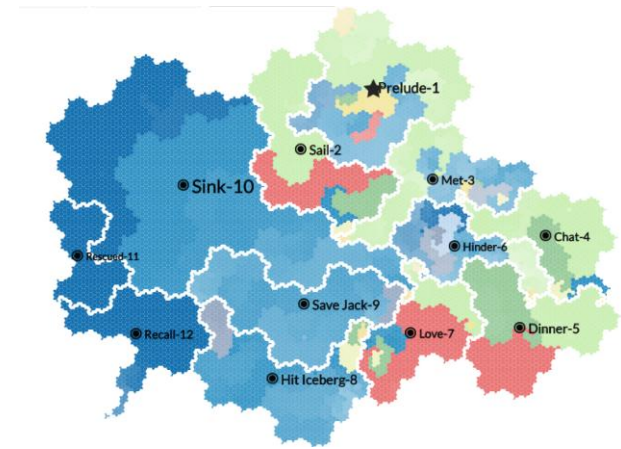(a)
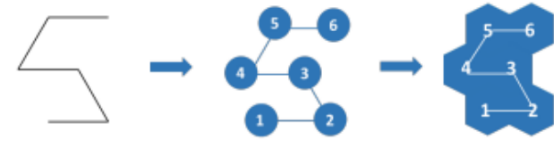
(b)

Process for constructing movie metaphor map

EmotionMap

Research Results


(a) event   (b) arousal and valence   (c) type and intensity

The map in (a) is the first level that divides video into events while (b) is the detailed level shows valence and arousal in each event. The maps in (c) show the type and intensity of emotion distribution.

Research Results

Map view is the main view that visualizes movie content using a map as a metaphor.

Video view is for video playback.
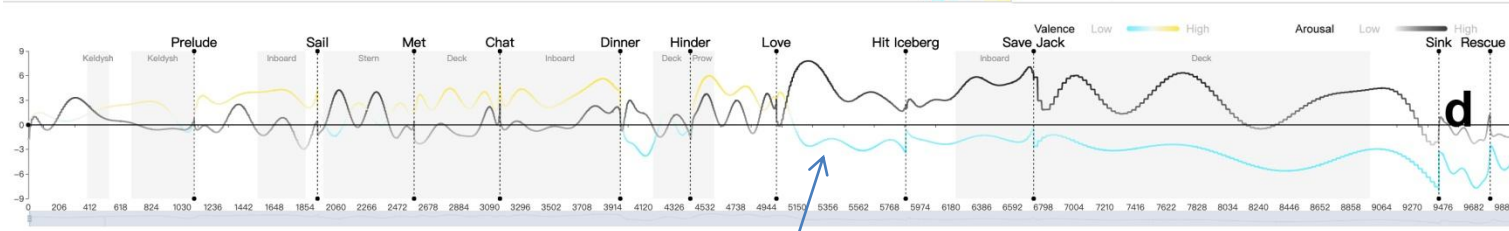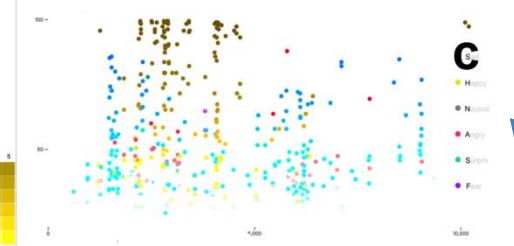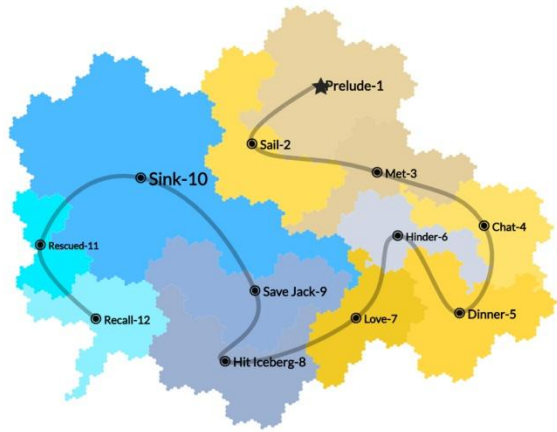
Character view shows the emotion of selected characters.

Timeline view show the emotional data in linear time.

Research Results

We invited three professional practitioners of video creation and video editing:

✓ *"I think spatial representations are good because it's easier to see relations"*

✓ *"The map-based video expression method provides an overview for video directors.It helps directors consider how to combine the plot content of the story besides chronological order, such as the importance of characters and emotions."*

✓ *"People are more likely to focus on the blocks that are darker in color or larger on the map. EmotionMap represents valence and arousal data in an efficient way for emotion concentration"*
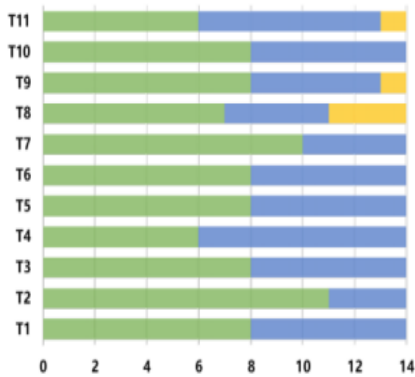
We created a user study that evaluates the effectiveness of the system and the user experience:

✓ *11 tasks that allow participants to experience all the functions of our system.*

✓ *14 volunteers from different study were involved in our system experience task.*

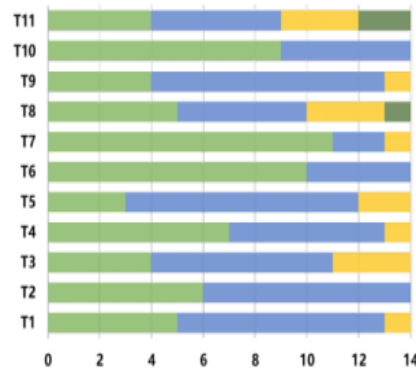✓ *2 questions according to thecontent of the task and usage experience and 3 questions about subjective feedback.*

Research Results

HELP TO FIND ANSWER?

Extremely Helpful · Helpful · Normal · Not Helpful · Helpless

HOW DO YOU FEEL OVER THE PROCESS?

Very Good · Good · Normal · Not Good · Bad

POST QUESTIONNAIRE

Extremely Agree · Agree · Neutral · Disagree · Extremely Disagree

• EmotionMap has gained all participants approval ("helpful" or "extremely helpful" to find the answer) for 8 out of 11 tasks. The three remaining tasks that recieved partial approval were tasks T8, T9, T11.
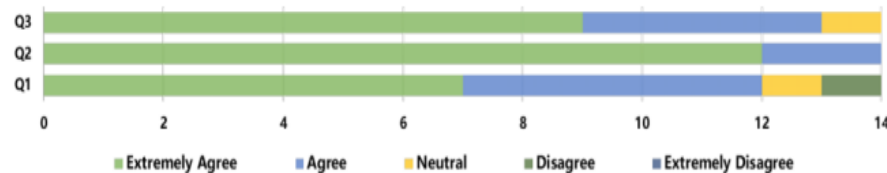
• According to the results of the participants' experience in completing the tasks, for every task, there are at least 64% (9 of 14 at least) of participants think EmotionMap is user friendly.

• About 85% (12 of 14) of participants would like to use our system to explore video content in their life.

• All the participants (100%) of this task agreed that EmotionMap is effective for exploring emotional video content.

• More than 90% (13 of 14) of participants think EmotionMap is helpful to analyse video content such as events, characters and the relationship between characters.

Research Conclusions

In this paper, we proposed EmotionMap, an efficient interactive system for video emotional content analysis. EmotionMap allows users to query, navigate and explore the content of video.

In our future work：

- ➢ We will take the user's psychological signals into account for emotion visualization and analysis, such as pulse and EGG.
- ➢ We will collect more kinds of video and generate additional maps for comparison.
- ➢ We plan to incorporate multi-modal information contained in video into automatic algorithms to assist in the analysis of video emotional content.
- ➢ Video visualization is a burgeoning field of study and we are developing new ways of interaction as well as emotion analysis for further exploration of video content.