

A Proposed Movie Recommendation Method Using Emotional Word Selection

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Abstract. Many online movie sites or music sites offering recommendation services employ a collaborative filtering technique archived by analyzing customers' satisfaction rating, evaluation, search history, download records etc. This approach, however, has difficulty with reflecting individuals' personalities and their own taste for the recommendation. Exploiting such emotional data to a film recommendation remains a challenge in the present. To solve this, we propose an emotion words selection method usable for the collaborative filtering. Through the proposed emotion-based collaborative filtering method, a recommendation system can exploit individuals' emotional differences on the movie items for the recommendation process. This approach was proven by gathering users' emotion words selection and satisfaction rating data on several films, and comparing them with MBTI (Myers-Briggs Type Indicator) that is a representative psychometric test for measuring psychological preferences and personalities. This study assumes that individual's movie taste is much related to the personalities classifiable by MBTI types, because movie taste and evaluation on a movie is influenced by individual's subjective matters. The results of this study show that emotion words based collaborative filtering method is appropriate for extracting users' MBTI types. Thus, if a recommendation service offers users films based on their MBTI types, the users can be recommended more customized films.

Keywords: Emotion-Words, Emotion, MBTI, Collaborative Filtering, Movie, Recommendation Service.

1 Introduction

Collaborative filtering is an important method of search service or recommendation service. As a data analysis technique, it helps users to find the items they would like to find or purchase [1]. Amazon.com is the one of the best model applying collaborative filtering to a recommendation service. Amazon.com analyzes numerous customers' purchase records and search history, satisfaction rating of items for collaborative filtering method [2]. MovieFinder, MovieLens, Drugstore, HP Shopping

and Wal-Mart are other examples of the sites which applied collaborative filtering techniques to their recommendation services [3].

Currently, however, collaborative filtering techniques mainly rely on simply unified values like satisfaction rating, like-dislike selection, and purchase records or frequency, search history. Therefore, in the case of movie or music, this collaborative filtering has difficulty with reflecting subjective individual personality or movie taste or music taste. It needs a different approach that can extract users' subjective information for movie or music, because, those art forms rely on users' subjective personalities or preference, tastes. Thus, we present an emotion-word selection method for emotion-based collaborative filtering. This method can help to reflect individuals' personalities or users' movie tastes for the recommendation process. So, if applied to movie sites or music sites, the emotion-based collaborative filtering can help to offer users customized recommendation. This approach was proven by gathering users' emotion-word selection and satisfaction for the given films, and comparing them with MBTI (Myers-Briggs Type Indicator) that is a representative psychometric test to measure psychological preferences.

2 Related Work

2.1 Recommendation Service and Collaborative Filtering

Recommendation service offers users items of interest or need. Two methods of recommendation systems are first, calculating the similarity between 'items' related to users' expressed needs, interests or responses, and second, calculating the similarity between 'users' related to other users who have similar interests, needs or responses. The second method is well known as collaborative filtering [4].

Collaborative filtering helps user make choices or find items or information based on the opinion, ratings, or evaluation of other users. Many sites which offers recommendation services apply collaborative filtering technique based on item ratings by users [5]. MovieLens, Recommendz, FilmConseil, VideoRecommender, and MovieFinder.com offers recommendation services for the context of films applying collaborative filtering theqnique [4].

2.2 Emotion-Based Research

Emotion can be defined as a subjective response on a variety of stimulus, like feelings, thoughts, behavior, and so on. It is reflected by personality, disposition, character, and temperament. [7]. There are researches applying human emotion to the recommendation services. Fang-Fei suggests emotion-based search and recommendation system for music items which have specific emotions [8]. They extracted characterized melodies from film music, and analyzed that how human feels the melodies. From the analyzed data, users can retrieve a specific type of music, using specific feeling, emotion that he / she wants to listen or find.

Young-Gie et al. studied for matching sound-emotion information with image-emotion information by abstracting sound-emotion data from human sound.

Young-Gie et al. developed a DB for emotion and matched and classified emotion-color with emotion-word. From this study, they developed more appropriate image recommendation system for users' emotion [10].

Another emotion-based recommendation service is developed by Chiwhan-Im for online shopping mall. The system matches customer's emotion and item style for recommending items supposed suitable to the user from these results [9].

2.3 MBTI

MBTI (Myers-Briggs Type Indicator) is a representative psychometric test to measure psychological preferences. MBTI classifies and expresses people's disposition [12][14]. The MBTI is based on psychologist Jung's theory about perception and judgment, and the attitudes in which perception and judgment are used by different types of people. The MBTI measures preferences of people with four dimensions: E (Extroversion) & I (Introversion), S (Sensing) & N (iNtuition), T (Thinking) & F (Feeling), and J (Judging) & P (Perceiving). In combination, 16 personality types (ISFJ, ISFP, ISTJ, ISTP, INFJ, INFP, INTJ, INTP, ESFJ, ESFP, ESTJ, ESTP, ENFJ, ENFP, ENTJ, ENTP) are possible [11].

Jamie & Bryan analyzed the learning styles, teaching agriculture course, and MBTI types of agriculture pre-service teachers. They found that teachers with different MBTI types have different learning styles and teaching methods. For example, ESTJ type is practical, realistic, matter-of-fact, and with a natural head for business or mechanics, while ISTJ type is seriousness, quiet, and earn success by concentration and thoroughness [11]. Hyun-ho compared MBTI type with leisure preference type and utilized the results for marketing for leisure. This study found that different MBTI type has different leisure preference type, for example, 'with- family type', 'sports type', 'rest type', and 'with-mass media type' [13].

In this paper, MBTI is used for comparison with users' personalities to prove how the proposed approach in this paper is appropriate for reflecting users' movie taste according to users' personalities.

3 Design of the Study

3.1 Research Overview

Current recommendation systems have a limitation to exploit information with regard to user's emotion on the film, an individual preference, or movie taste. Users can have different reasons why they think, feel or evaluate like that about the film, according to users' different preferences or backgrounds (e.g. touching feeling, well-formed plot, funny story...). We assume that exploiting the emotional information for movie items will be an example of a recommendation system taking advantage of users' personal differences.

To show the possibility of our idea, we present a study for deriving information of users' emotion on each film from emotion-based collaborative filtering. The study was progressed with 4 steps. In step 1 and 2, we selected several films for the experiment and extracted emotional words for subjective evaluation on the films. In

step 3, questionnaire respondents were encouraged to select 2 emotional words on each film and to evaluate the satisfaction rating for each film, and to check their MBTI type. In step 4, we analyzed data with 3 methods: *step 4-1* General Satisfaction rating vs. MBTI-based Satisfaction rating, *step 4-2* MBTI-based Satisfaction rating vs. MBTI-based Emotion words selection, and *step 4-3* Emotional word selection of I type vs. E type.

3.2 Research Experiment and Results






Step 1. Movie Selection. For the questionnaire, 5 films were selected from ‘Korean Film Council’ database [18]. Korean Film Council offers movies ranking based on cinema audiences from 2000 to 2007. The movies were selected with following two criteria.

1. Can the movie represent the various genres?
2. Did the movie release within 3 years?

The reasons of these criteria are to support the varied users’ movie tastes, and to help user answer more accurately about the movies. The movies to meet these criteria are like Table 1.

The reason why foreign films couldn’t be selected for this research is because the genres of the foreign films are limited to SF, adventure, action, fantasy etc. In other words, films like ‘Transformers(SF & action & adventure)’, ‘The Lord Of The Rings series (fantasy & adventure & action)’, ‘The Matrix(SF & action)’, ‘Harry Potter series(fantasy & adventure)’, and ‘Mission: Impossible(adventure & action & mystery)’ can’t represent the various genres.

Table 1. Selected Movies

Movie Title	Genre	Opening Day	Ranking	Total audience
King And The Clown 	Drama	2005.12.29	1	12,302,831
Welcome To Dongmakgol 	War & Drama	2005.08.04	7	8,008,622
Transformers 	SF	2007.10.11	8	7,440,531
The War Of Flower 	Thriller	2006.09.27	10	6,847,777
Pounds Beauty 	Romance Comedy	2006.12.14	12	6,619,498

Step 2. Emotion Words Selection. We extracted 39 groups of emotional words from Younhee’s research [14]. Younhee studied and arranged Korean emotional words in her study. After this process, 10 emotional words were re-abstracted for movie evaluation from extracted 39 groups of emotional words by a questionnaire. The questionnaire survey was conducted to 13 people in their early 20s.

The selected 10 emotional words were located following the dimension of pleasant and aroused defined by Ekman’s ‘Basic Emotion Dimension’(Fig. 1) as shown Fig. 2 [15] [16].

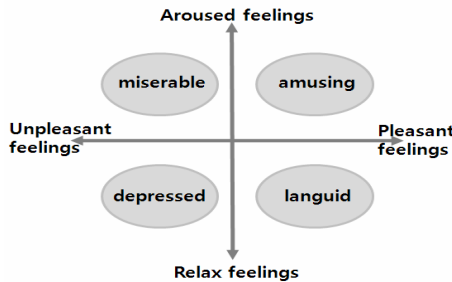


Fig. 1. Basic Emotion Dimension

The reason why arranged according to Ekman’s ‘Basic Emotion Dimension’ is to help user can choose suitable emotion word for his/her emotion on movie by providing the similar emotion-word groups.

tense <input type="checkbox"/>	interesting <input type="checkbox"/>
morbid <input type="checkbox"/>	exciting <input type="checkbox"/>
sad <input type="checkbox"/>	annoyed <input type="checkbox"/>
touching <input type="checkbox"/>	empty <input type="checkbox"/>
tantalizing <input type="checkbox"/>	uninteresting <input type="checkbox"/>

Fig. 2. Emotion Words Arrangement for Movie

Step 3. Questionnaire. The questionnaire made up of 5-point scale for satisfaction, of 10 emotional words for user’s emotion on movies, and of a checklist for MBTI type.

Transformers

Story
A long time ago, far away on the planet of Cybertron, a war was being waged between the noble Autobots (led by the wise Optimus Prime) and the devious Decepticons (commanded by the dreaded Megatron) for control over the Allspark, a mystical talisman that would grant unlimited power to whoever possessed it. The Autobots managed to smuggle the Allspark off the planet, but Megatron blasted off in search of it. He eventually tracked it to the planet of Earth (circa 1850), but ...

Cast
Shia LaBeouf (Sam Witwicky), Megan Fox (Mikaela Banes), Josh Duhamel...

tense <input type="checkbox"/>	interesting <input type="checkbox"/>
morbid <input type="checkbox"/>	exciting <input type="checkbox"/>
sad <input type="checkbox"/>	annoyed <input type="checkbox"/>
touching <input type="checkbox"/>	empty <input type="checkbox"/>
tantalizing <input type="checkbox"/>	uninteresting <input type="checkbox"/>

Transformers

0

1

2

3

4

5

Fig. 3. Part of the Questionnaire

Fig. 3 is a part of the questionnaire. Respondents were encouraged to check a score for satisfaction rating and to select 2 emotional words on each film. We added a short storyline, cast, and poster of the film in the questionnaire to make user remind more easily and accurately. The questionnaire was conducted on 101 people in their early 20s who were waiting for a screen time in front of the theater.

Step 4. Data analyzing. In this step, we analyzed gathered data in three perspectives to derive meaningful co-relation among satisfaction rating, selected emotional words and MBTI.

- Step 4-1. General Satisfaction rating vs. MBTI-based Satisfaction rating
- Step 4-2. MBTI-based Satisfaction rating vs. MBTI-based Emotion words selection
- Step 4-3. Emotional word selection of I-typed vs. E-typed users.

Step 4-1. General Satisfaction rating vs. MBTI-based Satisfaction rating.

Since movie taste can be influenced by subjective and emotional aspects of users, the response or rating for same film can be different according to different subjective personalities of users. So, we assumed there will be a difference between general satisfaction rating and subdivided satisfaction rating following user’s personality (MBTI-based satisfaction rating). This study follows the theory that MBTI type could indicate the individual personality. To prove this assumption, the satisfaction rating data obtained from questionnaire was divided to general satisfaction rating and MBTI-based satisfaction rating. And the divided satisfaction ratings were compared to them.

There was, however, no statistical significance difference between general satisfaction rating and MBTI-based satisfaction rating. The reason why we couldn’t find statistical significance between them is extremely popular films selected to get high response rate from questionnaire respondents. Since these selected films were very popular (ranked 12th in Korea), the satisfaction ratings were also very high. Thus, it needs to experiment with controversial films.

Though we couldn’t find statistical significance of this test, we found some features of MBTI-based satisfaction rating (Fig. 4.).

In case of ‘King and the Clown’ film, satisfaction ratings of all MBTI types are similar, on the other hand, satisfaction rating of other four films are quite different with regard to MBTI type.

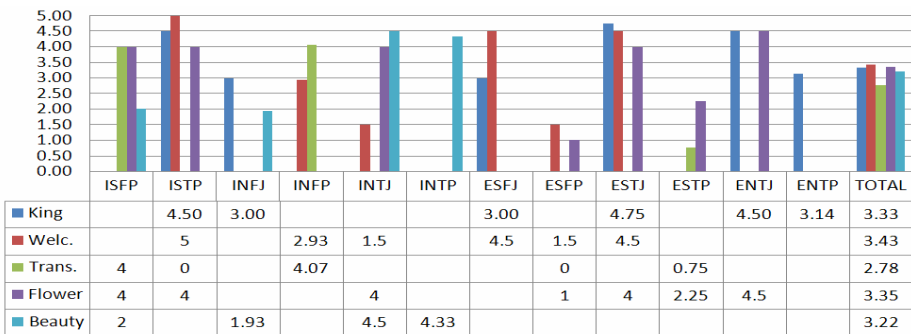


Fig. 4. The highest average & the lowest average of MBTI-based satisfaction rating and general satisfaction rating

INFP type gave the lowest satisfaction rating of ‘Welcome to Dongmakgol’, while the type gave the highest satisfaction rating of ‘Transformers’. In contrast, although ISTP type gave the highest satisfaction ratings of ‘King And The Clown’, ‘Welcome to Dongmakgol’, ‘Pounds Beauty’, while all respondents in ISTP type didn’t even see ‘Transformers’. From this we can predict that INFP type is in favor of ‘Transformers’, but ISTP type is not in favor of it. ISFP type gave the lowest satisfaction rating of ‘Pounds Beauty’, while INTJ type gave the highest satisfaction rating of this. In other words, ISFP type is not in favor of ‘Pounds Beauty’, but INTJ type is favor of it.

From these results of MBTI-based satisfaction rating test, we can interpret ENTJ, ESTJ, ESFJ, ISTP types have similar movie taste. ISFP, INFP types and INTJ, INTP types are also interpreted as having similar movie tastes.

Step 4-2. MBTI-based Satisfaction rating vs. MBTI-based Emotion words selection.

To prove the necessity of the movie evaluation based on emotion words selection, MBTI-based emotion words selection method compared with MBTI-based satisfaction rating.

For this test, the answers of respondents were grouped according to ‘answer correspondence’. Answer correspondence means numbers with same evaluation of same film in this study. Emotion words selection was classified into 11 groups of answer correspondence degree from 0 to 10, and satisfaction rating were classified into 6 groups of answer correspondence degree from 0 to 5. The group of answer correspondence level 0 means that the answers of a group people are entirely different, and the group of answer correspondence degree 10 (emotion words selection) and answer correspondence degree 5 (satisfaction rating) means the answers of group members are perfectly the same. After this process, we calculated the correspondence degree of MBTI type of group members as shown in the Fig. 5.

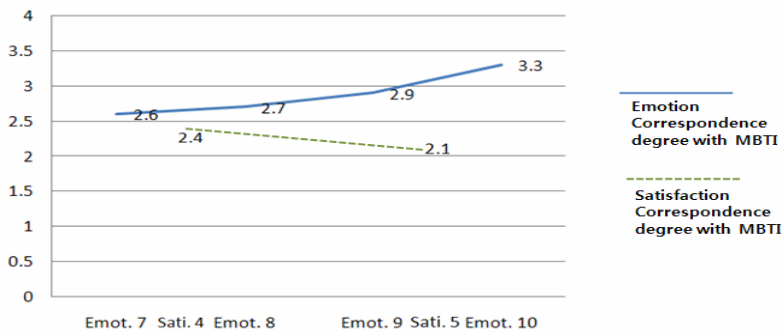


Fig. 5. Correspondence degree of MBTI Type
 * correspondence degree: maximum 4, minimum 0

Correspondence degree of group members’ MBTI type of emotion words selection is generally higher than satisfaction rating. And in case of emotion words selection, the higher answer correspondence, the higher correspondence degree of MBTI type, but satisfaction rating is not. This result shows that the method of emotion words

selection can reflect group members' MBTI type. In other words, emotion words-based collaborative filtering can reflect network members' personalities or movie tastes.

Step 4-3. Emotion word selection of I type vs. E type

Besides, we could be noticed two distinguishing features during analyzing process of the emotion word selection data.

Feature 1. There are differences between I type and E type selecting emotion words.

This feature can be displayed by the emotion words selected by more than 50% people of each MBTI type. We classified the abstracted data into I type and E type. The reason why MBTI type was divided into I and E type is that respondents answered intuitively for this I & E question compared to other questions (S & N, F & T, P & J). From this response, we assumed the questions inquiring about I & E type are the definite indicator. I type is consist of 8 subtypes (ISFJ, ISFP, ISTJ, ISTP, INFJ, INFP, INTJ, INTP) and E type is also consist of 8 subtypes (ESFJ, ESFP, ESTJ, ESTP, ENFJ, ENFP, ENTJ, ENTP).

Fig. 6 is a frequency graph of emotion words selection of I & E types on a movie 'King And The Clown'. As Fig. 6 shows, there are noticeable differences in emotional responses to the words 'interesting' and 'tantalizing' between I and E type. All types of E type felt 'interesting' emotion, while 3 types of I type felt 'interesting' on the 'King And The Clown' film. And 4 types of E type felt 'tantalizing' emotion, while all types of I type felt 'tantalizing'.

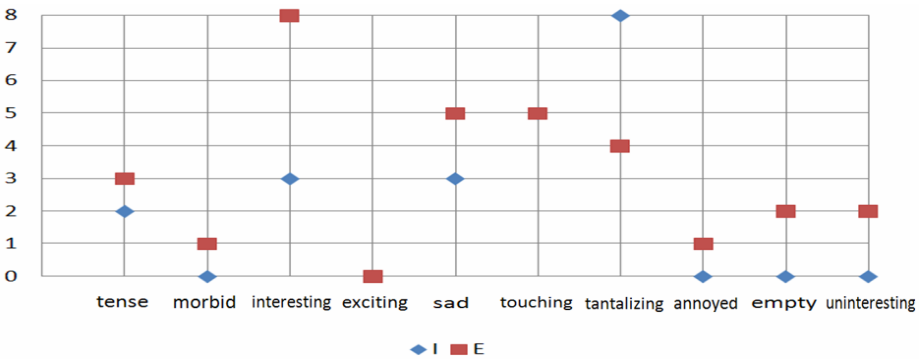


Fig. 6. A frequency graph of emotion words selection of I & E types on 'King And The Clown'
 * exciting: E=0 & I=0, touching: E=5 & I=5

And E type selected more various emotions (tense, morbid, interesting, sad, annoyed, empty, uninteresting) in comparison with I type (tantalizing), while, E type selected more negative emotions (annoyed, empty, uninteresting) than I type. Therefore, we could assume a tendency that E type receives more various emotional feeling than I type.

Feature 2. There are some relations between responses of I & E type and Ekman’s ‘Basic Emotion Dimension’

First, we arranged the emotional word most frequently selected by each MBTI types for all presented films and then the words were divided into I type and E type (Fig. 7).

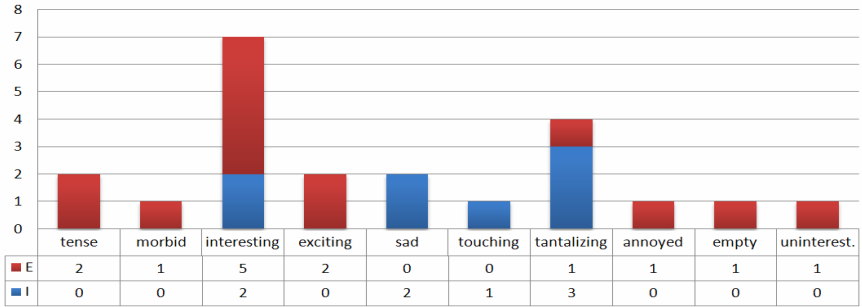


Fig. 7. Emotional Words most often selected by each MBTI type on all presented films
 * A number means each MBTI type (for example, the bar graph of ‘tense’ means there are 2 MBTI types in E type. And that means the respondents of 2MBTI types in E type most felt and selected ‘tense’ emotion word in comparison with other emotion words.)

Fig. 7 shows that I type more often selected ‘sad’, ‘touching’, ‘tantalizing’ emotion words in comparison with E type for all presented films, on the other hand, E type felt ‘tense’, ‘interesting’, ‘exciting’ emotions. Also, E type answered negative emotions such like ‘annoyed’, ‘empty’, ‘uninteresting’.

In comparison these results with Ekman’s ‘Basic Emotion Dimension (Fig. 1)’, for all presented films, I type more felt ‘depressed’ emotions close to ‘unpleasant feeling & relax feelings’ (sad, touching, tantalizing) compared with E type, on the other hand, E type more felt ‘languid’ emotion related to ‘pleasant feelings & relax feelings’ (annoyed, empty, uninteresting).

4 Future Work and Conclusion

In this paper we proposed movie recommendation method using emotion words selection. The assumptions of this experiment are first, movie taste or evaluation on a movie are influenced by individual’s subjective personalities or preferences, and second, MBTI (Myers-Briggs Type Indicator) is a representative psychometric test to measure psychological preferences.

The results of this experiment show the evaluation method with emotion words selection is appropriate to reflect users’ individual personalities and preferences, and movie tastes. And we found each MBTI type responded differently to the same film. Thus, if a recommendation service applies this presented method, it can provide users more customized recommendation results.

However, to prove the quality or satisfaction for recommendation results using emotion word selection, we should develop a practical application to get feedback for users' responses on the service. That will be future work of this research.

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