



A Personal Emotion-Based Recipe Recommendation Mobile Social Platform: Mood Canteen

Tsai-Hsuan Tsai¹(✉), Hsien-Tsung Chang², Chia-Yu Hsu¹,
Shu-Yu Lin², Wei-Cheng Yan³, and Yi-Cheng Chen³

¹ Digital Media Lab, Chang Gung University, Tao-Yuan, Taiwan
ttsai@mail.cgu.edu.tw

² Department of Computer Science and Information Engineering, Chang Gung University, Tao-Yuan, Taiwan

³ Metal Industries Research and Development Centre, Kaohsiung, Taiwan

Abstract. This study resulted in the development of a mobile social platform, called Mood Canteen, which has the purpose of meal cuisine and recipe sharing. Mood Canteen has two important characteristics: (1) to establish the relationship between food and emotion: To construct an interaction between food and personal emotions, Mood Canteen applies an emotion analysis mechanism on SNS to analyze emotions based on semantics, emoticons/emoji, and images of food- and cuisine-related posts, and it matches those emotions with food to create a user's personal emotional state database and emotional food database according to the study's results. (2) To establish an emotion-complementing healing system: To make emotion cuisine recommendations for users that meet their emotional state and help users alleviate negative emotions and promote positive emotions by sharing recipes and meals, Mood Canteen incorporates a newly created personalized meal recommendation mechanism that provides users with the appropriate comfort food selection based on a personal emotional state database and emotional food database. In addition, based on the characteristics and requirements of the mobile user interface, this study applied the SMASH usability heuristics to initiate the usability measurements of the developed Mood Canteen system.

Keywords: Mood-boosting receipts · Emotion analysis
Emotion cuisine database · Recipe sharing community · Mobile application
Usability heuristics for smartphones

1 Introduction

Food is the source of nutrients that we depend on to live and plays a role in both reducing tension and producing mood regulation. Many studies have revealed that certain foods can indeed promote positive emotions and ease the impact of negative emotions. For example, the emotional factor for people who choose sweets during social occasions could lie in the sharing of joy and happiness from friendship. The motive in choosing comfort food is usually to ensure a good emotional state or to

reduce anxiety, sadness, and other negative emotions [1–4]. Based on the influence of food on emotion, Professor Charles Spence partnered with Just Eat to develop the “Just Eat” mobile app, which uses mood mapping to analyze people’s emotional states. In other words, it detects a user’s facial expression by scanning it to evaluate whether they feel angry, disgusted, fearful, surprising, sad, or joyful, and it then provides appropriate food recommendations according to their emotional state. For example, an angry expression could appear when a person is stressed, in which case, the app suggests foods that have a calming effect, such as dark chocolate and nuts rich in magnesium. In the case of excitement, foods such as whole grains and beans, which are beneficial to blood sugar regulation, are recommended [5, 6]. Studies have also found that food plays a vital role in relaxing and soothing emotion, which encourages people to read food or recipe-related articles and to search for food-related images and videos through social media to maintain or enhance their own positive emotions. In addition, the users prefer to share these food-related messages on social media to induce similar emotional changes in viewers [7, 8]. Thus, many social media forums are based on recipe sharing, such as Tasty [9], Tastemade [10], Kitchen Stories [11], and iCook [12], all of which have become very popular. Unfortunately, the mechanism of current recipe sharing and recommending platforms neither connects to the personal emotional states of the users nor recommends appropriate foods or recipes that are suitable for people in different emotional states. For this reason, this study designs a mobile social platform, Mood Canteen [13], for cuisine and recipe sharing. In addition to the original function of providing a social media community, Mood Canteen emphasizes the interaction between food and human emotions, and it recognizes and analyzes the emotional states of the users through images, texts, and Emoji/Emoticons. In addition, Mood Canteen can suggest menus that meet both the users’ emotional needs and their preferences and customs, in the hope of alleviating negative emotions through food and assisting in the generation of positive emotions. In so doing, it allows food to not only provide necessary nutrition and energy but also assist in promoting positive emotions.

2 Mood Canteen Design and Development

2.1 Design Rationale of Mood Canteen

Mood Canteen is a mobile application that was designed to recommend emotion foods based on the user’s current mood. To suggest foods that are suitable for the user’s emotional state, we applied mechanisms from Scherer’s Geneva emotion wheel [14], Machajdik and Hanbury’s affective image classification [15], and MoodLens, an emoticon-based sentiment analysis system based on emotion analysis theory created by Zhao et al. for Chinese tweets [16], to create a personal emotion database and an emotion cuisine database. For the emotion cuisine database, the app first searches for food- and cuisine-related posts on the web and social media, followed by food pairing with emotion analysis such as semantics, Emoticons/Emoji, and images to establish an emotion cuisine database [14–17]. For the personal emotional state database, we first have a user obtain authorization from Facebook, and we then conduct an emotion analysis of the Facebook data that uses text, emoticons and emoji, and images on SNS

[14–17]; with these, we create the user’s personal emotional state database. Next, the Mood Canteen system recommends an appropriate mood cuisine that is suitable for the users according to the information in the emotional food database and the personal emotional state database. Mood Canteen even provides features such as emotional cuisine classification and searching, which allows users to customize meals in accordance with their emotional attributes and send the feedback to the Mood Canteen emotional cuisine database. Moreover, Mood Canteen provides users with a meal video recording and recipe editing, which enables the users to create personalized recipes and share them on social media. Figure 1 shows the Mood Canteen system architecture.

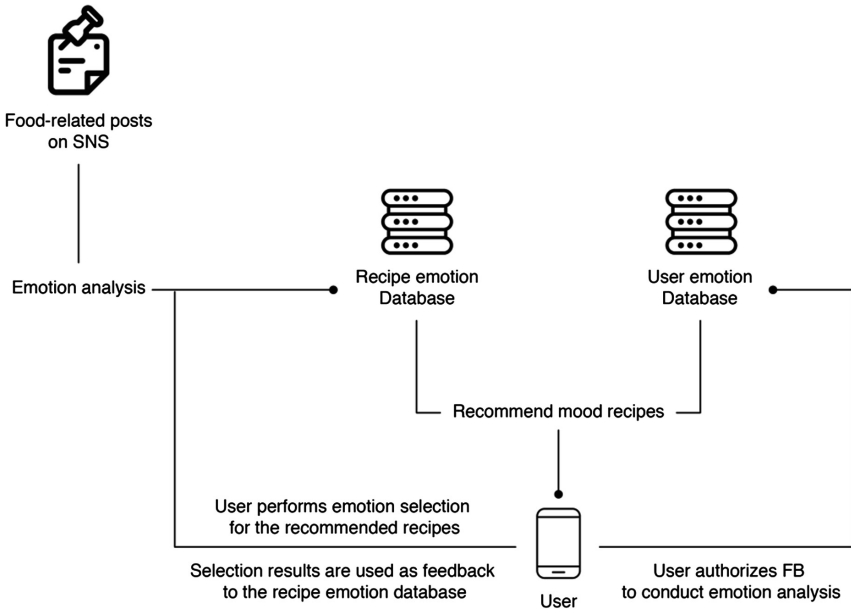


Fig. 1. Mood canteen system architecture.

2.2 Features of Mood Canteen

Mood Canteen offers system features such as daily mood-boosting recipes, recipe editing, video recording, my collection, and search. The main features of Mood Canteen are the following:

- (1) **Daily mood-boosting receipts function:** Daily mood-boosting recipes is the homepage of the Mood Canteen system; it analyzes and recommends the appropriate emotional cuisine for users based on the personal emotion analysis mechanism. Mood Canteen will recommend recipes that are displayed on the daily mood-boosting recipes interface and present the emotional category of each meal. Users can browse the cuisine videos, read over the detailed picture-text sections of the recipes, and create an emotional category for each meal.

- Furthermore, the emotional meal attributes defined by the users will be sent to the recipe emotion database as feedback and become the basis of a database update.
- (2) **Personal recipe editing function:** To create personalized recipes, Mood Canteen provides recipe editing and meal recording so users can customize their own recipes. Recipe editing includes video editing and graphic editing. Users can click on the meal video to initiate film editing, select an animation, and add or delete text descriptions. After completing the video editing, a user can enter text editing mode and select the emotional attributes of a meal.
 - (3) **Meal video recording function:** While recording a meal video, users can add a node as a recipe step for subsequent editing. At the completion of the recording, the users will enter the editing procedure directly. During this process, users can add different seasonings or cooking movement animations to increase the thoroughness of a recipe video and its personal characteristics.
 - (4) **My collection function:** This function allows users to save their own favorite recipes. In addition to displaying the users' personal information and chef level, users can view their fans, track their number of followers, and view their personal pages.
 - (5) **Search function:** The search function allows the users to select the emotional categories and food ingredients or search for their favorite meals by a keyword (Figs. 2, 3 and 4).



Fig. 2. Mood canteen homepage and daily mood-boosting recipes function.

2.3 System Validation

A mobile user interface usability measurement was performed after the construction of the Mood Canteen system was complete. Evaluating and improving the user interface



Fig. 3. Mood canteen meal video recording function.

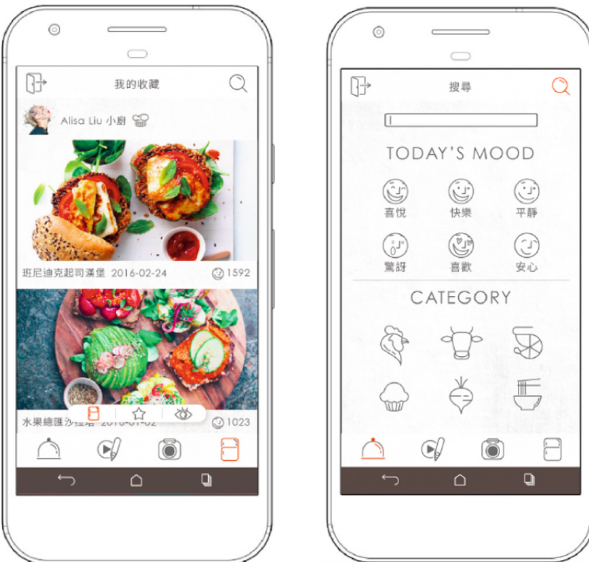


Fig. 4. Mood canteen my collection function (pictures on the left); search g function (pictures on the right).

design have very important associations with the system development. The heuristic evaluation is based on the design specifications of 10 usability heuristics for user interface designs presented by Nielsen to provide an interface design with references by observing the interface and making positive and negative comments. The implementation modality is to find the problems in the user interface design during its usage based on the experience of 3–5 specialists. Its advantages are that it is easy to operate, fast, and low cost; its disadvantage is that the evaluator's own experience will affect the problems that are found. Analysts with experience in Usability assessment can identify more problems than amateurs can, and suggestions that are made with a focus on improving the problems will be more specific than those made by amateurs [18, 19]. For this reason, Wong et al. [20] presented user-involved usability measurements that can recognize problems from different aspects. In the heuristic evaluation, it is suggested to have the user search and document the ideas and difficulties encountered in the operation of the user interfaces. In addition, based on the characteristics and requirements of the mobile user interface, Inostroza et al. [21] developed SMASH, which is a set of usability heuristics for smartphones that is built on the heuristic evaluation of Nielsen's 10 usability heuristics. Thus, this study applied the 12 SMASH usability heuristics of Inostroza et al., as designed for smartphones, to initiate the usability measurements of the developed Mood Canteen system. First, 5 experts were invited; 2 had a background in information engineering, and 3 had a digital media background. In addition to having extensive experience in mobile applications development, these experts had performed systematic usability assessment tests to participate in a SMASH assessment of the Mood Canteen. The experts tested the system's usability through the heuristics values of one item in an offered series, found interface design bugs, and defined usage problems over opinion exchanges and discussions. In addition, 13 users were invited to participate in the SMASH evaluation in this study. The purpose of this SMASH assessment was to test the main features of the Mood Canteen, such as daily mood-boosting recipes, recipe editing, video recording, my collection, and search. The participants were asked to download Mood Canteen and its operating system and to complete the SMASH questionnaire at the end of the operation. The usability assessment results, which were based on the 12 SMASH heuristic evaluation criteria, are shown as follows:

SMASH 1: Visibility of the system status. The Mood Canteen interface design can easily identify the location of the function, and the information display is clear and easy to understand.

SMASH 2: Match between the system and the real world. Mood Canteen can genuinely respond to the user's operations; in other words, when using different features, Mood Canteen allows users to detect changes in the interface immediately.

SMASH 3: User control and freedom. The Mood Canteen system is simple, which facilitates its application. In addition, the performance of the features has clear distinctions.

SMASH 4: Consistency and standards. The color, text, and graphics presented by the Mood Canteen user interface design have high uniformity and are all in conformity with the design principles.

SMASH 5: Error prevention. The participants consider this system to be easy and simple to operate, which can decrease the possibility of making an error.

SMASH 6: Minimize the user's memory load. The operation of the Mood Canteen system is simple, and the performance of the features has clear distinctions, which decreases the chance of an unnecessary overload from the memory and reduces the users' cognitive burden during operation.

SMASH 7: Customization and shortcuts. The system function is presented clearly, and no special memory or search is needed.

SMASH 8: Efficiency of use and performance. The Mood Canteen interface design is simple and neat. The positions of the buttons to press correspond to the user's hand gestures, and the application's system can be used smoothly without causing any major issue. Additionally, users do not need to memorize much of the operating procedure.

SMASH 9: Esthetic and minimalist design. The Mood Canteen interface design is exquisite, sharp, neat, and simple. The design of the fine details shows a selective and well-planned style.

SMASH 10: Help users recognize, diagnose, and recover from errors. The technical operation is kept in line with the operating capability scope of general users.

SMASH 11: Help and documentation. The Mood Canteen system does not provide question assistance. In a situation when users encounter an operating or system error, it is recommended that the system can provide helpful hints to reduce user frustration. It is also recommended that an operating guide or demo pages be added to allow beginners to learn the system's functions more quickly.

SMASH 12: Physical interaction and ergonomics. The privacy protection level is low, which is suitable for a personal mobile device. If Mood Canteen is operated on a public device, it is recommended that other device login reminders be added.

3 Conclusions

This research resulted in the development of a mobile social platform, called Mood Canteen, which has the purpose of meal cuisine and recipe sharing. Mood Canteen can be used on Android smartphones. In July 2017, Mood Canteen was launched on Google Play and was made available for interested users to download and use [13]. Mood Canteen has two important characteristics: (1) to establish the relationship between food and emotion: To construct an interaction between food and personal emotions, Mood Canteen applies an emotion analysis mechanism on SNS to analyze emotions based on semantics, emoticons/emoji, and images of food- and cuisine-related posts, and it matches those emotions with food to create a user's personal emotional state database and emotional food database according to the study's results. (2) To establish an emotion-complementing healing system: To make emotion cuisine recommendations for users that meet their emotional state and help users alleviate negative emotions and promote positive emotions by sharing recipes and meals, Mood Canteen incorporates a newly created personalized meal recommendation mechanism that

provides users with the appropriate comfort food selection based on a personal emotional state database and emotional food database. The Mood Canteen system links personal emotion healing with food, with a focus on providing personal emotional appeasement and healing with food. Our future studies will continue to explore the interactions between food and specific emotions. Furthermore, the current Mood Canteen provides only the Chinese version of emotional vocabulary analysis; it is recommended that emotional semantic analysis in other languages be added to strengthen the emotion analysis mechanism.

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