EMOFOOD: WEB-BASED RECOMMENDER SYSTEM OF FOOD INTAKE

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LAPORAN PROJEK TAHUN AKHIR DIKEMUKAKAN BAGI MEMENUHI SYARAT UNTUK MEMPEROLEH IJAZAH SARJANA MUDA KEJURUTERAAN PERISIAN (PERISIAN PENDIDIKAN) DENGAN KEPUJIAN

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ABSTRAK

Kini ramai orang tidak menyedari tabiat pemakanan emosi menjejaskan kesihatan mental mereka. Bagi membantu keadaan orang ramai khususnya golongan belia, penulis mencadangkan satu kaedah yang membangunkan sistem pengesyoran berasaskan web untuk pengambilan makanan yang berkaitan dengan emosi. Emofood ialah sistem yang membantu orang ramai meningkatkan kesihatan mental melalui pemakanan yang betul. Pengambilan makanan yang baik bukan sahaja dapat menyihatkan tubuh badan malah dapat meningkatkan kesihatan mental. Objektif pertama kajian ini adalah untuk mengenal pasti kriteria sistem pengesyor berasaskan web pengambilan makanan untuk emosi. Objektif kedua adalah untuk membangunkan sistem pengesyoran berasaskan web pengambilan makanan untuk emosi. Objektif ketiga adalah untuk melakukan penilaian heuristik ke atas sistem pengesyoran berasaskan web pengambilan makanan untuk emosi yang dibangunkan. Metodologi untuk objektif satu ialah tinjauan literatur dan temu bual. Metodologi menggunakan Prototaip Evolusi untuk model pembangunan. Selain itu, kajian ini menilai menggunakan penilaian heuristik untuk mengetahui kepuasan pengguna sebelum pengeluaran produk. Output yang dijangkakan daripada penyelidikan ini mendapat keperluan pengguna dan ciri untuk membangunkan sistem pengesyoran berasaskan web pengambilan makanan untuk emosi. Output kedua yang dijangkakan ialah produk prototaip aplikasi. Output ketiga yang dijangkakan adalah hasil sejauh mana pengguna berpuas hati menggunakan produk. Fokus kajian adalah kepada Universiti Pendidikan Sultan Idris untuk pelajar tahun 4 Kejuruteraan Perisian..

EMOFOOD WEB-BASED RECOMMENDER SYSTEM OF FOOD INTAKE

ABSTRACT

The problem is many people are unaware of emotional eating habits affect their mental health. In order to help people's situation, especially youth, an author proposes a method that develops a web-based recommender system for food intake that is related to emotion. Emofood is a system that helps people increase mental strength through proper nutrition. Good food intake can not only keep the body healthy but can also improve mental health. The first objective of this study is to identify the criteria for the web-based recommender system of food intake for emotion. The second objective is to develop a web-based recommender system of food intake for emotion. The third objective is to do a heuristic evaluation on the web-based recommender system of food intake for emotion developed. The methodology for objective one is a literature review and interview. The methodology is using Evolutionary Prototype for the development model. Moreover, this research evaluates using heuristic evaluation to find out user satisfaction before product production. The expected output of this research gets user and features requirements to develop a web-based recommender system of food intake for emotion. The second expected output is the prototype product of the application. The third expected output is the result of the extent users are satisfied using the mobile product. The focus of the study is on Sultan Idris Education University for year 4 Software Engineering students.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, emotions are often considered something negative such as those who experience anger and sadness. However, as stated by Salovey and Mayer (1990), emotions are organized responses that traverse various psychological subsystem borders, such as the physiological, cognitive, motivational, and experience systems. Humans have six types of emotional responses, namely surprise, fear, anger, happiness, disgust, and sadness. Since humans have six types of emotional responses, emotions also have a positive or negative valence meaning for individuals. Emotions can be distinguished from the concept of mood because they are closely related.

According to them also, emotions will be related to intelligence through a person's social behavior which is emotional intelligence. They state that emotional intelligence is defined as a subset of social intelligence that entails the capacity to track one's own and others' moods and emotions, distinguish between them, and apply this information to influence one's ideas and actions. In addition, in the view of Goleman in Salovey et al. (1995), emotional intelligence is the ability that individuals have to motivate themselves and to be resilient when faced with the failure to manage emotions and moderate their state of happiness or mental pressure.

Related to the covid -19 pandemic, students were introduced to e-learning which has led to disrupted education systems globally. The Covid-19 pandemic has also disturbed the learning process of more than one billion schoolchildren in 129 nations around the

world, according to the United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2020). Therefore, it becomes a crucial component in the reduction in students' motivation and learning effectiveness as a result of dramatic learning changes (Ganasan & Azman, 2021). This makes them deal with various internal problems such as struggle with their own emotions. Lack of knowledge in controlling emotions will cause students to tend towards stress.

In addition to the epidemic stress faced by teenagers, binge eating behavior is also common among teenagers and has become a public health concern with serious physical and mental health consequences. In discussing binge eating behavior among Malaysians, Gan et al. (2018), state that binge eating behavior among teenagers needs to be understood because it can identify those who are at risk of having psychiatric disorders such as depression and anxiety disorders. According to them, those who experience binge eating behavior are identified by eating quickly, eating until they are uncomfortably full, eating when they are not hungry, eating alone because of shame, and feeling disgusted or guilty with themselves.

According to World Health Organization, a person is in good mental health when they are aware of their own potential, able to handle daily stressors, productive at work, and involved in their community (WHO, 2018). Thus, the mental health of university students is a critical problem since it is linked to both their academic achievement and their overall well-being (Samsudin & Hong, 2016). Academic performance is a sign of a student's productivity and it is an important asset to the development of the country.

Therefore, solving emotional problems also meets Sustainable Development Goals 3 which is related to good health and well-being.

1.2 Research Background

Nutritional intake is an important factor in improving health. Emotional instability can trigger overconsumption. In the study of Evers et al. (2013), positive emotion is a commonly overlooked trigger for food intake, but it is a meaningful and crucial trigger for unhealthy food consumption. So, it is clear that a person's food intake depends a lot on their emotions. Furthermore, unhealthy food intake will not only affect health but also contribute to the problem of emotional instability.

Varela and Ares (2015), claimed that meal selection is a complex act governed by a number of interrelated elements, two of which are mood and emotions. Many argue that consuming food according to mood and emotions will relieve their mood and emotional anxiety such as sadness or anxiety of eating unhealthy foods, when there is excessive eating stress, while some foods may be taken to fight depression, consciously and unconsciously. This unknowingly not only affected their health but they have further aggravated their emotional state. As mentioned by Leow et al. (2018), stress may contribute to ill health indirectly through its effects on people's health-related behaviour, such as encouraging them to eat unhealthy appetising foods high in fat and sugar.

This effort is one that contributes towards Sustainable Development Goal (SDG) 3 which has been said, good health and well-being. Sustainable Development Goal 3 of the 2030 agenda for Sustainable Development is to “ensure healthy lives and promoting well-being for all at all ages” (United Nations). Targets related to the SDG3 project aim to reduce non-communicable disease fatalities; enable universal access to sexual and reproductive health care; and achieve universal health protection. As a result, this research will help to some extent to accomplish SDG 3 of the 2030 Agenda.

According to the Ministry of Health, half of the adults in Malaysia is overweight or obese (Iskandar, 2021). It shows how widespread and serious this disease is in our country. Obesity is the level at which a person has a high body mass index (BMI) value. When a person is obese, it can have a severe impact on their health and increase their chances of complications major illnesses, such as diabetes and heart disease. Therefore, the Malaysian Ministry of Health (KKM) is taking steps to combat obesity and non-communicable diseases like diabetes and hypertension. Therefore, the Malaysian Ministry of Health (KKM, 2020) has taken action to reduce the disease by introducing the Malaysia Food Pyramid 2020 with the slogan "Educate the People to Take Food Properly". The Malaysian Food Pyramid 2020 is a big change from the Malaysian Food Pyramid 2010, which is very significant in the vegetable group at the bottom part. The Malaysian Food Pyramid 2020 helps us determine the types and quantities of food we should eat on a daily basis based on food groupings. It helps Malaysians in practicing good eating habits on a regular basis to ensure that our health remains stable and disease-free.

1.3 Problem Statement

The world is now increasingly worried due to the increase in mental health cases among teenagers and students. In addition to the drastic change in the way of learning which is totally online and binge eating behavior, further increases mental health problems. For too long education or learning on a computer screen has a negative impact on mental, physical, emotional, and even social health (Aida, 2020). The problem of students not being able to control their emotions is actually a serious enrichment and needs to be emphasized. They often think of the emotions they bring with them as attitudes that cannot be changed. Moreover, there is no software that can help overcome this problem by combining mental health elements with food intake.

Not all students suffer the same fate due to surrounding factors that can motivate them such as parental encouragement. There are also students who have family problems and various things that make them feel down. In fact, most parents do not understand their child's emotional problems because they are unable to apply empathy to their child. Students also take short decisions when following the word of the heart while experiencing emotional problems such as eating whatever they like. Cheng & Kamil (2020) processed meals, meat substitutes, and alcohol consumption increased among stressed people, but vegetable and fruit consumption decreased. This is very bad for health and can also affect in increasing the problem of emotional instability of students. So, it will cause students to be more emotional. If students' emotional instability continues, they are more likely to develop an anxiety condition (Saari, 2001).

Apart from impacting mental health, diseases such as high blood pressure, high cholesterol levels in the blood, high blood sugar levels, stomach pain and obesity, are among the diseases that are often associated when failing to control diet. Eating habits such as eating fast food, snacks and processed foods become a lifestyle practised by students. Also, they are very fond of trying new things like eating trendy foods even though those foods are expensive. These foods are foods high in sugar and salt which are not good to consume. Therefore, if eating habits are not prevented then more students are disturbed due to disease.

To overcome these problems, this study proposes to identify the requirement of food intake for emotions based on the recommendation system. Then, develop a web-based system patterned recommendation system and make an assessment based on heuristic evaluation related to user-centered design. The Emofood web-based system gives a solution to students by giving suggestions for appropriate food according to their emotions along with the correct food intake. Awareness of food quality and diet also have an impact on a student's mental and physical health. Indirectly when students have good mental health, students will be more productive and competitive when spared from emotional instability. Thus, will be able to save and stop diseases that involve heredity such as diabetes.

1.4 Research Objective

The purpose for this research:

i. **To identify the criteria for the web-based recommender system of food intake for emotion.**

Several objectives had identified in order to achieve the aim of the project. Emotions play a very important role in the process of interaction and self-development. It will be a problem for someone who tends to have a negative nature towards emotions. This is because they do not know what emotions he is feeling, this is due to a lack of understanding of this aspect of emotions. The wrong food intake also to some extent affects a person's emotions. The food and sustenance we eat will affect our attitude, temperament, countenance, heart, and whole life (Ismail, 2014). The criteria and standards required for this system were discovered via studies in past research and literature reviews. Finding the need might also be assisted by interviews with experts. This approach can accomplish objective one.

ii. **To develop a web-based recommender system of food intake for emotion.**

This project was developed with a web-based system. A web-based system is software that is designed to operate on the web that is accessed over a network connection using HTTP. The user-centered design will be applied in this project. User-centered design is a user-focused process in which the developer must consider the needs, goals, and input of users when creating a digital product. The development of the prototype using the gathered criteria. The prototype produced is

through appropriate processes and tools. The architecture of the system is the nature of the interaction of its main components the recommender engine.

iii. **To do a heuristic evaluation on the web-based recommender system of food intake for emotion developed.**

This project uses a heuristic evaluation technique to evaluate the system. Heuristic Evaluation is a method of assessing the usability of a digital product that aims to improve the user experience. Heuristic Evaluation is a way to identify whether the product has met the common user behaviour that is critical for users. It is necessary to conduct an interview and survey to identify the extent of user satisfaction.

1.5 Research Question

The research question is as follows:

i. **What are the criteria of the user requirement for the web-based recommender system of food intake for emotion?**

The criteria of the user requirement are very important as the content of this study. Identifying the criteria of the user requirements will help the developer to achieve the objective one which is to identify the criteria for the web-based recommender system of food intake for emotion. Besides identifying criteria, determining and understanding the objectives to find quality criteria. Criteria of the user requirement in this study are about user mental health such as emotional balance. Next, the developer must know about the development needs.

ii. **How to develop a web-based recommender system of food intake for emotion?**

For product development, the developer needs to design the product first by using the appropriate method. Developers need to make some research to find a suitable model method and tools for the development of this product. This is very important to avoid any unwanted problems that can lead to a waste of time, energy and cost. In addition, it is to achieve objective two which is to develop a web-based recommender system of food intake for emotion.

iii. **What extent that the user satisfies with the web-based recommender system of food intake for emotion?**

After the product is developed, the developer needs to make an evaluation of the product. Product evaluation as stated is heuristic evaluation. An evaluation is important to conduct to see the extent of user satisfaction. Moreover, the assessment is done to achieve objective three which is to do a heuristic evaluation on the web-based recommender system of food intake for emotion developed.

1.6 Research Scope

For this study, the target users are those who have a mental health problem and do not know the best way to treat it apart from meeting a counselor. So, the target users are year 4 students of Sultan Idris Education University (UPSI). The selection for year 4 Software Engineering students at this Higher Education Institution is because emotional disorders

and anxiety often occur to them in the process of completing their Final Year Project. Hence, this app will help them in terms of suggesting suitable food for them because the right food intake can stabilize emotions, thus increasing the productivity of students. Furthermore, the scope of the study area is located at the Sultan Idris University of Education in Tanjung Malim, Perak.

1.7 Significant of The Study

i. Students

The significance of this is students because this project will be able to help students find solutions to emotional problems in addition to physical health based on recommending the proper food for emotion. Students will feel motivated to change their lifestyle in terms of healthy food intake.

ii. Developer

In addition, the developer also benefits from this web-based recommender system of food intake for emotion because as a student, the developer also feels the same and thinks this will get worse if there is no solution. Due to current progress, developers do not miss the opportunity to produce such an app. Apart from helping the students, it also has a huge impact on the developer self.

1.8 Definitions, Acronyms and Abbreviations

Table 1.1 Definitions, Acronyms and Abbreviations

Glossary	Meaning
UPSI	Universiti Pendidikan Sultan Idris
SDG	As a worldwide call to action to end poverty, protect the environment, and ensure that everyone can live in peace and prosperity by the year 2030, the United Nations approved the Sustainable Development Goals (SDGs) in 2015.
SDLC	The Software Development Life Cycle (SDLC) refers approach to creating high-quality software that involves clearly defined steps like analysis, planning, design, development, testing, and deployment.
UCD	The User-Centered Design (UCD) is an iterative model focusing on user satisfaction (user-centered) in the design and development life cycle.
KKM	Malaysian Ministry of Health (KKM)
CBT	Cognitive Behavioural Therapy
HTTP	The Hypertext Transfer Protocol (HTTP). The World Wide Web was built on the HTTP protocol, which is used to load websites with hypertext links.

1.9 Gantt Chart of Progress FYP

Table 1.2 Gantt Chart

Week / Task	FYP1 Semester 2 2021/2022 (week)														FYP2 Semester 1 2022/2023 (week)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Topic discussion and determination																												
Project Title Approval																												
Introduction																												
Literature Review																												
Methodology																												
Proposal presentation																												
Design & Build Prototype																												
User Evaluation																												
Refinding Prototype																												
Implement Product																												
Product Delivery																												
Project Presentation																												
Thesis Writing																												

1.10 Conceptual Diagram

To obtain the requirement and preferences, this research uses interview experts which is thematic analysis to identify food intake that relates to students' emotions. This approach was used to get a better comprehension of the problems. According to Alhojailan (2012), Thematic analysis enables the researcher to identify the relationships between concepts and contrast them with recurring facts. The selection to utilise the Evolutionary Prototype to develop the system is dependent on several factors, for instance, it allows the user to engage with the system and meet the user requirements. It parallel with applying user-centered design in this development. Next, the use of the correct recommendation algorithm is identified in order to suggest good food intake to students. After the software development is finished, a set of heuristic evaluations of usability will be applied and sent to students. The heuristic evaluation is an evaluation method that approach the most common methods in user-centered design for identifying usability problems (Kumar et al. 2020).

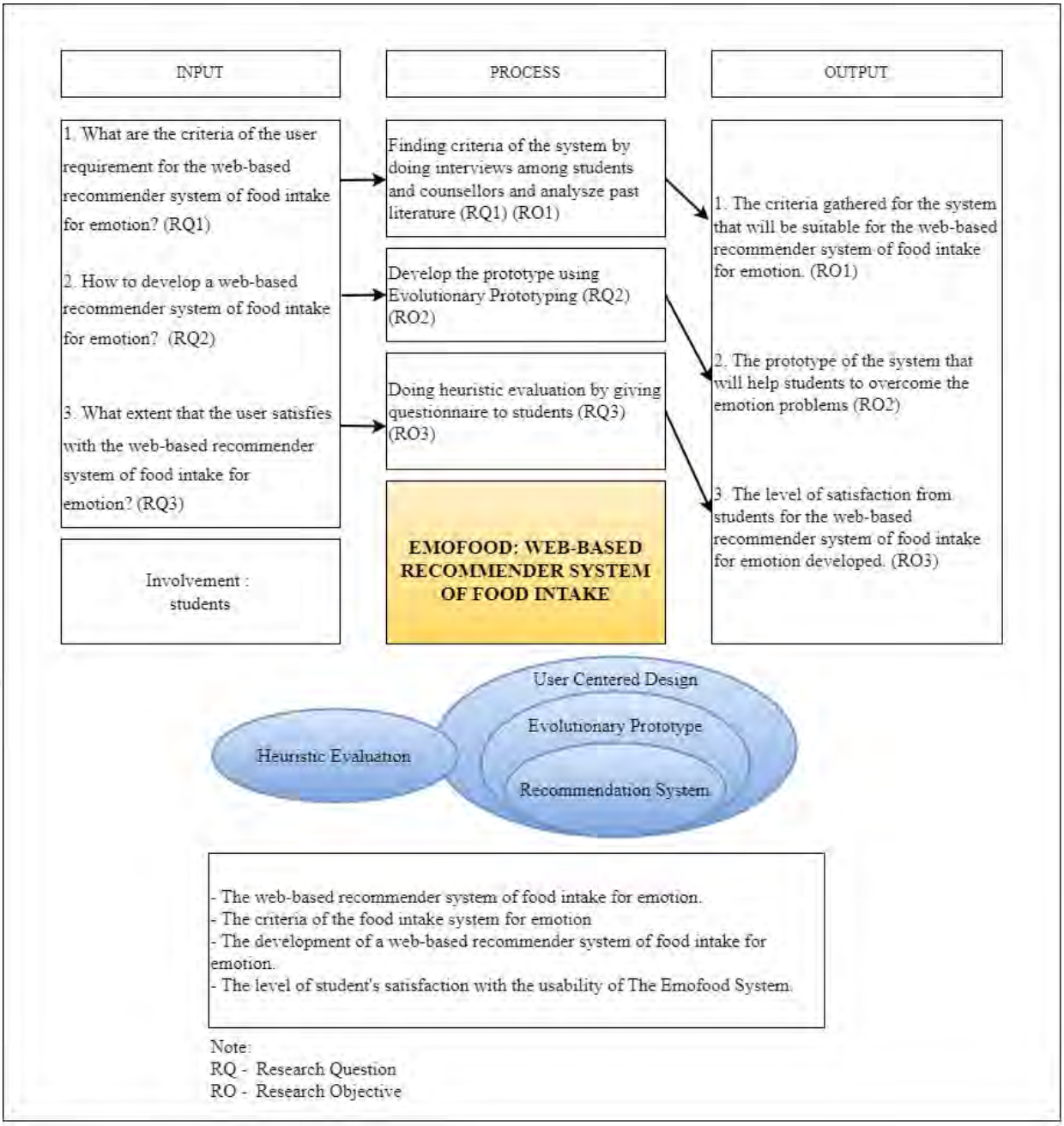

Figure 1.1 Conceptual Diagram

1.11 Conclusion

The conclusion of this research was more focused on the Recommendation System using a web-based purpose of this system was to help users solve their emotional instability by recommending the appropriate food intake. It can help users, especially students who are experiencing emotional problems or anxiety. This application is really easy to use and easy to understand for new users. This chapter also describes what will be studied based on research objectives. The first research objective is to identify the criteria for the web-based recommender system of food intake for emotion, which the researcher needs to identify user requirements. The second research objective is to develop a web-based recommender system of food intake for emotion, which the researcher needs to design the prototype of the system. The third research objective is to do a heuristic evaluation on the web-based recommender system of food intake for emotion developed. whereas the researcher needs to do an evaluation of the product. Finally, chapter 2 will discuss the literature review which is the studies that have been implemented.