# MFU FOOD AROUND: Web Application for Searching the Most Favorite Restaurant in case study of Mae Fah Luang University

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## ABSTRACT

Restaurant search application has been widely used by most internet-users around the world. Normally, the web search for restaurant application allows user to find a restaurant based on a keyword or a narrow search filtered by some restaurant category. The web search probably generates a list of restaurants which are probably overwhelming information to be compared and make a decision. Moreover, the existing search application mostly find only the popular but not the interesting local restaurants which are somehow owned by non-internet users. Therefore, this paper proposes a web-based application called "MFU Food Around" to search the best choice of restaurant based on user's most favorite. Our application provides the useful information for making decision. The proposed application presents some candidate restaurants and also give the solution to select best one according to our search algorithm. For simple implementation, we initially focus the restaurant search in the area of Mae Fah Luang University (MFU). The information of well-known restaurants and the local restaurants were collected and stored in our system. Many real locations are saved as pinning them in Google map. The user satisfaction evaluation shows that our application has good performance in user interface design and functionally.

*Index Terms*-- *Restaurants search application; Searching method; Restaurants; Local restaurant, Restaurant selection*

## 1. INTRODUCTION

Web searching is a software developed to search information on the World Wide Web[1]. When searching for the required information, a user overwhelmingly receive a large number of results retrieved by a search engine, however only few of these results are the user needed information. The problem of web search is not just finding the relevant results, but the results should be the user's information need. Typical search engines give the user only entering a keyword query which does not satisfy the user preference. For more user satisfaction of searching, a metasearch engine [2] allows users to provide their preferences in which the users can obtain more valuable results than considering only the keyword query. Since the index of website comprise over billions of document [1], the keyword related to the website is crucial for improving the web searching performance [3]. The web search with information retrieval method [4][5] is also an effective tools to build a website more popular and get high rank of searching results.

In some specific scenarios, restaurant search is commonly used in searching for a restaurant to make a decision. Some efficient restaurant searching applications can generate the list of restaurants sorted by distance and located around the originated device [6]. They provide the basic search allowing the user to search for a restaurant based on a keyword and advance search where the user can specify category and give rating [7]. Some world popular restaurant web searches such as tripadivor.com and zomato.com offer travel choices and trip planning which link booking hotel, flight, and restaurant.

In Thailand, the web search i.e. wongnai.com and edtguide.com are widely used for Thai people to find the well-known restaurants around the country. They helps users to find restaurants by food category, menu, location, and annual users choice and allow users to give their opinions and rating about their visited restaurants. However, some interesting local restaurants which are popular for only local people cannot be found in any web sites. Word of mouth among these non-internet users is also an important source to recommend the local food and restaurants. This is a limitation to people or the tourist who would like to try delicious and good quality food with lower price.

As motivated by above, the web search to find the most favorite food and restaurant including the well-known local restaurants is still challenge. How to select the best choice of the restaurant list need some effective methods which become our main focus. For simpler implementation of our application, we initially develop the web search application for finding the best choice of restaurant located around Mae Fah Luang University (MFU) in Chiengrai, Thailand. There are hundreds of restaurants such as café, cafeteria, diner, and canteen around the university, but most of them do not appear on the web site. Some interesting restaurants are located in small valley far away from the main road. Thus, the application should contain the map direction routing users to access these restaurants. Based our initial survey of the user requirement collected by a set of people living near

the MFU, the application helping them to make decision of the best choice of restaurant to go come to their much attention.

## 2. METHODOLOGY

Hence the contribution of this paper consists of the following. A restaurant web search is developed to satisfy the users who ask for information of the restaurant surrounding the MFU. The application called "MFU Food Around" can generate the list of recommended restaurants and select the best choice for users based on our proposed selection method. The normal Search function of the application can produce the list of restaurants retrieved by user's entering keyword whereas function of Advance Search allows user to find the restaurants by category i.e. food menu, location, rating, and other facilities. Although, the 51% of local restaurants information is coming to the web search [8], our application can present the restaurant information from non-internet owner. We collected many real locations of these local restaurant by pinning them in Google map. Then the function called "Around Me" can be used to route the desired destination for users. Finally, user satisfaction survey is also used to evaluate our proposed application performance.

In this section, the proposed web application has been developed by using Software Development Life Cycle (SDLC) method and then evaluated with Expectancy Disconfirmation model as described below

### A. Software Development Life Cycle (SDLC)

SDLC is one of the popular software development method to present the process of how an application is developed. In this paper the SDLC is used to implement the proposed web application namely, MFU Food Around. It consists of seven steps: *planning, analysis, development, testing, implementation*, and *maintenances* described as follows.

*1. Planning phase*
The development of the proposed application have been performed within 4 months, the purpose of the web application is to support MFU people to find the restaurants located around MFU, thus we gather the application's requirement of the MFU people including student, staff, and restaurant owners using the Expectancy Disconfirmation model. Survey of MFU people was established in form of questionnaire as shown in Table I and its result was concluded in Table III.

TABLE I. QUESTIONNAIRE OF USER SATISFACTION TO START THE PROJECT

| No | Questions |
|----|-----------|
| 1 | Are you interested in this project? |
| 2 | Do you need the advance search function? |
| 3 | Do you use the social medial to access food or restaurants information? |
| 4 | Is it better if the restaurants can be found from the Google map? |
| 5 | Do you need the proposed web application to support your decision of choosing the best place to go? |
| 6 | Do you prefer to use the proposed application after the project has been done? |

For the system evaluation, our survey consists of five levels of agreement as follows.

- ☐ level 5 = strongly agree
- ☐ level 4 = agree
- ☐ level 3 = uncertain
- ☐ level 2 = disagree
- ☐ level 1 = strongly disagree

The survey of questions that consisting of Six questions.

1) Are you interested with this project? To determine how much is the people interested in our project being the proposed web application.
2) Do you need the advance search function? This is the important function to search in multiple keywords.
3) Do you use the social medial to access food or restaurants information? To know that people mostly use the social media as the tool to search for their favorite restaurant.
4) Is it better if the restaurants can be found from the Google map? To determine that should the application contain the feature of map direction to route users for their exact location.
5) Do you need the proposed web application to support your decision of choosing the best place to go? The application should help the users' decision among various types of food and restaurant.
6) Do you prefer to use the proposed application after the project has been done? To confirm that a number of target users will use our application after the project is completed.

*2. Analysis phase*
At this phase, our system requirements are defined from the user requirement of the previous phase. The main process of the application consists of normal and advance search, entering the restaurant information i.e. food and coupon, and giving review and rating. There are 3 participants in the system as follows. Firstly, a user who can only search for the restaurant. Secondly, a member who can give rating and review, and receive the coupon. And lastly, a staff who can manage the restaurant information.
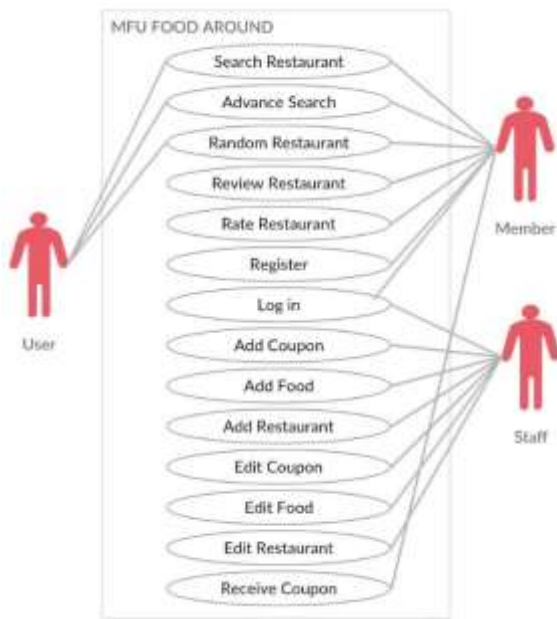
Fig 1. Use Case Diagram of The Proposed Application

Fourteen processes of the proposed application are summarized in the use case diagram as shown in Figure 1. User and member can search a restaurant by entering a keyword i.e. name and food type then the application shows the results as the list of relevant restaurants. Advanced search allows a user or a member to search query by specifying the category of the restaurant information. Based on the advanced search function, user can receive more specific information such as the list of restaurants which are steak house having a car parking, air condition, and low-price menu. Unlike the advance search, Random search shows only one result randomized from the list of inquired restaurants. Members can submit their personal review and rate the restaurant being the useful information for the next query. A user who wants to search, review, rate, and receive a coupon must register to be a member so that the member can login the system. To manage the information of restaurant in the application, only staffs can login to add, delete, and update the restaurant information such as food type, facilities, and promotions. The application also provide a functionality of restaurant promotion in form of a coupon which can be obtained by only members of the system.

Since we mainly focus on search method in the proposed application, there are two types of searching. The first is Normal Search where the system generate a list of related restaurant based on a keyword. Figure 2 show the flowchart of how the normal search find the particular restaurant. The second is Advanced Search where a user can specify the food type, price, location, rating, and facilities. If there exists more than one result, the best choice is selected from the list of candidate restaurants by proposed searching algorithm as shown in Figure 3.
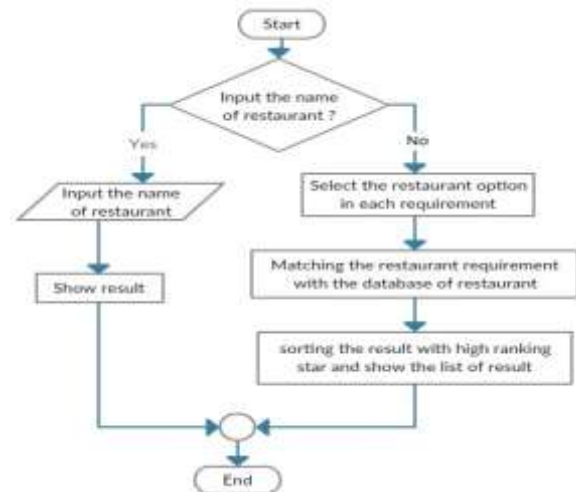


Fig 2. Flowchart of searching algorithm

Unlike other web search applications, we propose an algorithm to find the best solution among the list of multiple restaurants embedded in the Advanced Search function. The program displays the search filters which allow a user to narrow down according to Restaurant type, Food type, Open time, Close time, Price rate, Restaurant rate, and Restaurant popularity rate respectively. Finally, if there exists more than one restaurant, the one having greater 5-star rate is chosen as the best result. The algorithm of searching to obtain the best restaurant is shown in Figure 3.



Fig 3. Algorithm of Advance Search for the best restaurant

Fig 4. The interface when using Advance Search.

*3. Design Phase*

In the design phase, the desired system features are described in the user interface design, database design, and application architecture. The user interface of an application should make the user's interaction as simple and efficient as possible and accomplish the user requirement [10]. The proposed application contains 4 pages as shown in Figure 5 and 6 below.



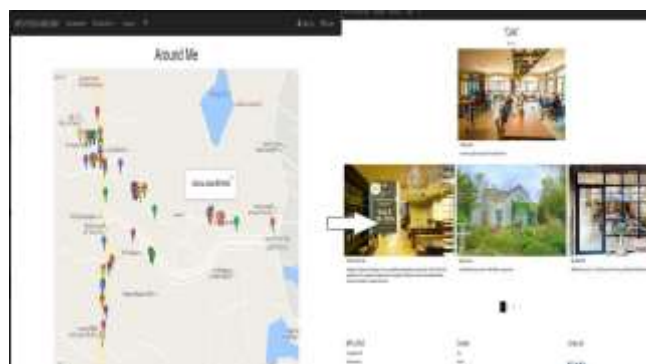Fig 5. User Interface Design of the Application



Fig 6. User Interface Design of the Application

*Home page*: This page displays "Recommended Restaurants", "news", Review", and "Advertising" links. However the main menu representing our main functionality includes "Around Me", "Recommended Restaurants", "Advance Search", and "Coupon".

*Recommended page*: In this page, the application shows the list of recommended restaurants which are categorized by rating star, restaurant type, food type, and price.

*Around me page*: This page shows Google map location of all nearby restaurants which located around MFU.

*Advance search page*: This page presents searching function which classify the restaurants and display only the list of restaurants queried by a user.

*4. Development phase*

After the design phase, the application has been created the system, features, and functions to achieve the functional requirements based on the specific design solutions in the previous phase [11]. In this phase, the system is build, distribute, install, configure, test, and find defects and error.

*5. Testing phase*

When the proposed application has been completed, we implement and test the application to satisfy the users. The Expectancy Disconfirmation model is used to assess the user satisfaction. The model was represented in the questionnaire which contains some questions as shown in Table II.

TABLE II. QUESTIONNAIRE OF USER SATISFACTION AFTER USEING MFU FOOD AROUND WEB APPLICATION

| No | Questions |
|---|---|
| **User Interface** | |
| 1 | Is the screen display of the application user-friendly? |
| 2 | Is content of the application well-organized and accurate? |
| 3 | Does the web application have effective navigation? |
| 4 | Is the content is well-format and easy to scan reading? |
| 5 | Is the screen display of the application clear content and understandable? |
| **Function** | |
| 1 | Is the functionality of the application simple and understandable? |
| 2 | Does the Advance Search function work properly? |
| 3 | Does the individual "categorized by any types" i.e. food work properly? |
| 4 | Does "Around You" function support your travel to the restaurant location correctly? |
| 5 | Does the application perform in stable? |

To evaluate the proposed application, our questionnaire ask the target users to give their quantitative value in five levels of agreement as follows.

- ☒ level 5 = strongly agree
- ☒ level 4 = agree
- ☒ level 3 = uncertain
- ☒ level 2 = disagree
- ☒ level 1 = strongly disagree

The questionnaire contains two parts consisting of Screen display and Function as described below.

*Part 1: Screen display*

1) Is the screen display of the application user-friendly? To ensure that the application can be accessed easily on-screen readers, making the web application attractive to a larger audience.

2) Is content of the application well-organized and accurate? The content and information should be presented in the correct use of language and formatting.

3) Does the web application have effective navigation? To make sure that users can find the information quickly and easily. The web search should navigate user to next step or to go from page to page. The flow of the application can accomplish user goals.

4) Is the content is well-format and easy to scan reading? The font formatting and text content should make users to quickly scan reading throughout on the web.

5) Is the screen display of the application clear content and understandable? The content of web application should not contain any complicated text.

*Part 2: Function*

1) Is the functionality of the application simple and understandable? The program provides proper application functions to people having various characteristics. Check that the user can find instructions they know intuitively how to operate a function of the program.

2) Does the Advance Search function work properly? To ensure that the available menu to the advance search filter can be used effectively. Users should find the best restaurants to go.

3) Does the individual "categorized by any types" i.e. food work properly? The user should receive the desired restaurant information filter by the program.

4) Does "Around You" function support your travel to the restaurant location correctly? The Around You is the important function adding the Google map feature in the program. Hundreds of restaurant locations are saved as marker or pins by our survey. Therefore the map function can route the user to get directions to that place.

5) Does the application perform in stable? To determine that the application can responds fast, reliable and stable when users load any pages.

*6. Implement phase*

After the system completed, the system will be deployed to the server.

*7. Maintenances phase*

The maintenance phase is the final step of SDLC. The application remains operational after initial implementation. During the maintenance phase, programmer is usually asked for any changes in the needs of user and correcting the bugs and errors.

*B. Expectancy Disconfirmation model*

The word Expectancy is the user expectation about the system performance whereas Disconfirmation refers to the evaluation of a user toward the application [12]. The expectancy was used to estimate the user satisfaction from a survey [13].

## 3. RESULT AND ANALYSIS

In this section, we explain how to collect the restaurant information and other related data and to evaluate the result.

**1. How to collect the data**

To implement the proposed application, we have collected restaurant data from the real place of various kind of restaurant. Due to the initial stage of the application, we focus only the restaurant located around Mae Fah Luang University (MFU) which is limited 10 kilometer in radius. The restaurant information has been gathered consists of the restaurant name, restaurant types, food types, open and close time, parking and other facilities, and location. To provide the map direction, we save the restaurant locations by pin each of them in Google map API.

**2. Evaluation Results**

The proposed application is evaluated in two phases. Firstly, the questionnaire generated by the Expectancy Disconfirmation model is used for a survey of user requirement. Table III shows the result of user satisfaction to make the initiation of *MFU Food Around* web-based application gathered by 40 respondents. Secondly, the performance of MFU Food Around application is evaluated by the user satisfaction model. The questionnaires are collected by 30 respondents. The result of user satisfaction of the application is shown in Table IV.

TABLE III. THE RESULT OF THE USER SATISFACTION TO USE MFU FOOD AROUND WEB APPLICATION

| No | Question | Mean | Level of Agreement |
|---|---|---|---|
| 1 | Are you interested in this project? | 4.55 | Agree |
| 2 | Do you need the advance search function? | 4.80 | Agree |
| 3 | Do you use the social medial to access food or restaurants information? | 4.40 | Agree |
| 4 | Is it better if the restaurants can be found from the Google map? | 4.45 | Agree |
| 5 | Do you need the proposed web application to support your decision of choosing the best place to go? | 4.50 | Agree |
| 6 | Do you prefer to use the proposed application after the project has been done? | 4.85 | Agree |

TABLE IV. THE RESULT OF USER SATISFACTION AFTER USING MFU FOOD AROUND WEB APPLICATION

| No | Questions | Mean | Level of Agreement |
|---|---|---|---|
| **User Interface** | | | |
| 1 | Is the screen display of the application user-friendly? | 4.25 | Agree |
| 2 | Is content of the application well-organized and accurate? | 4.80 | Agree |
| 3 | Does the web application have effective navigation? | 4.15 | Agree |
| 4 | Is the content is well-format and easy to scan reading? | 4.85 | Agree |
| 5 | Is the screen display of the application clear content and understandable? | 4.45 | Agree |
| **Function** | | | |

| | | | |
|---|---|---|---|
| 1 | Is the functionality of the application simple and understandable? | 4.45 | Agree |
| 2 | Does the Advance Search function work properly? | 4.85 | Agree |
| 3 | Does the individual "categorized by any types" i.e. food work properly? | 4.85 | Agree |
| 4 | Does "Around You" function support your travel to the restaurant location correctly? | 4.85 | Agree |
| 5 | Does the application perform in stable? | 4.25 | Agree |

## 4. DISCUSSION

In this paper, we propose restaurant search web-based application, namely *MFU Food Around*. The web search is created for helping people to find the restaurants around Mae Fah Luang University (MFU). The result of evaluation after using the program shows that the proposed application satisfy the user in terms of user interface and functionality. The search feature which is the main function allows users to find candidate restaurants to be selected and get the recommendation of the best restaurants around MFU.

However for more convenience of users, the proposed web-based application should be extended to the mobile-based application. The mobile application platform i.e. Android and iOS is gradually growing [14] and it contains GPS location based service which is very important embedded feature [15].

## 5. CONCLUSION

In this paper, we propose restaurant search web-based application, namely *MFU Food Around*. The web search is created for helping people to find the restaurants around Mae Fah Luang University (MFU). The main purposed of MFU Food Around is to search for both of well-known and interesting local restaurants. Before we start the application development, the user requirement from the people around the MFU was gathered in form of the questionnaire. Then we collected the sources of related information from hundreds of restaurants consisting of variety of food and services. For effective searching, we also propose the restaurant searching algorithm. The application can recommend the best restaurants to the users based on their specific request. The performance of the application in terms of user interface and functionality shows that it has good level of user satisfaction.

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