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The Development of Food Finder Mobile Application

Soo Sin Yee[1], Noryusliza Abdullah[1]*

[1]Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400, MALAYSIA

*Corresponding Author Designation

Abstract: Food finder mobile application is developed to solve the indecisive problem of the foodies when they want to make a decision for daily meals. The proposed application provides the information and reviews of the foods to assist the users to make a better decision for their daily meals. Methodology used to develop this application is agile methodology. Food finder mobile application can reduce purchasing doubts, improve decision-making and increase the probability of selecting satisfactory foods. This application is expected to provide guidance for the users to choose and decide for daily meals.

Keywords: Food, Finder, Mobile Application

1. Introduction

Food is the fundamental need for every kind of living to provide the energy for survival [1]. Therefore, a balance diet is needed in daily life. Furthermore, with the benefits of the mobile technologies, mobile applications have gained rising popularity [2]. Next, users had installed and downloaded abundant mobile applications to assist their daily activities with the advances of the mobile devices [3]. Mobile application is increasingly significance for computing and communication purpose in daily life.

A food finder mobile application is proposed for this project. This project aims to provide a platform for the foodies to find and get the foods in the selected Johor area. This mobile application allows foodies to search for the desired food. It also provides details and information of foods such as name, restaurant's name, price, picture, description, address, and location. The goal of this project is to develop a mobile application that can provide convenient functionalities for the users. The functionalities are including allowing users to search the favourite foods in selected Johor area, view the information of the foods, provide location of the foods and display in Google Maps, enable users to give and view the comments and ratings of the foods.

Nowadays, most of the people have indecisive decision-making problem when they need to decide which dish to eat for their daily meals. This will waste a lot of time for thinking about what to eat for

each meal. A food finder mobile application is really required for recommend and suggest the meals. Users can view the comments and ratings in the application before making a decision. The comment and rating function is not only used for reviews the foods, but also provides personal experience and opinions of the users for giving the suggestions to other users. Therefore, all users can review the comments and ratings of the foods to decide what to eat. This project will benefit the users who like to use a mobile application to search and find the foods.

2.   Related Work

This section discusses and highlights the technologies used for developing a mobile application with Android platform and the existing mobile applications that have the similar concept and idea with this proposed application.

2.1   Technology used

The technologies used for developing food finder mobile application are Android Studio, Firebase Realtime Database, Google Maps, and Java language.

2.1.1   Android Studio

Android Studio is an official Android Integrated Development Environment (IDE) for the development of Android system [4]. It allows users to develop and build a mobile application with an Android platform that can run on various Android devices. In addition to IntelliJ's powerful code editor and developer tools, Android Studio also provides features that can improve the efficiency of Android applications such as provides Gradle-based build system which allows flexible compilation when developing Android applications. Android Studio can assist developers to accelerate the development and enhance the productivity when developing Android applications.

2.1.2   Firebase Realtime Database

Firebase Realtime Database is a database that uses cloud-hosted NoSQL databases to store data. The data is stored in JSON format and synchronized to each client connected in real time. All clients share a real-time database instance and automatically receive updates with the latest data when building cross-platform applications using Android, iOS, and JavaScript SDKs.

2.1.3   Google Maps

Google Maps is a free and online map service around the world that provided by Google [5]. This service can be accessed through a web browser or mobile application. It is an official map application of Google on the Android platform. Users are able to search for places or get directions from one place to another place by using Google Maps. Users also can view and browse panoramic street images of cities in the world. It can help users find the best route to reach the destination by tracking real-time traffic information. Google Maps provides an Application Program Interface (API) for the developers. API is a protocol and tool used for improve system. It allows developers to embed Google Maps data into the mobile application without having to build their own map server. Therefore, this enables developers to use Google Maps data to provide users the location services.

2.1.4   Java language

Sun Microsystems officially introduced Java language in 1995. Java language has outstanding characteristics such as simple, cross-platform and object-oriented. The syntax of the Java language is very similar to the C language and C++ language which makes it easy for programmers to learn and utilize in developing mobile application. It is a pure object-oriented language. Java language inherits the core of the object-oriented language and avoids uncommon features in C++ such as structure concept and pointer concept [6]. It helps programmers to solve the problem of managing memory and make programming easier and reliable.

2.2   Study of the existing applications

There are three existing applications in Google Play Store that are chosen to compare with the proposed application. They are Foodpanda, OpenRice and Restaurant Finder. These existing applications are mobile application that have a similar concept with the proposed application. The comparison of the application is shown from different aspects which are search function, location, view foods information, real-time comment function, rating function, authentication, high quality of photos, user friendly, updated information, restaurants details, and requirement Internet connection.

Each application shown in Table 1 has a common feature which is allow users to find the foods. However, these existing applications are focus on the ordering and delivery and has some limitation on the suggest foods for the users. For example, some of the existing application lack of the search function, real-time comment function, rating function, authentication, updated information, and restaurant details. There is no a specific application focus on the suggest foods for the users. Therefore, the proposed application has improved these limitations and integrate all of these function in a new application which is food finder mobile application. The features of these three existing mobile applications and the proposed application are reviewed and analyzed in Table 1.

Table 1: Comparison between existing application and proposed application

No	Features	Foodpanda	OpenRice	Restaurant Finder	Proposed Application
1	Search function	Yes	Yes	No	Yes
2	Location	Yes	Yes	Yes	Yes
3	View foods information	Yes	Yes	Yes	Yes
4	Real-time comment function	No	Yes	No	Yes
5	Rating function	No	Yes	No	Yes
6	Authentication	Yes	Yes	No	Yes
7	High quality of photos	Yes	Yes	Yes	Yes
8	User friendly	Yes	Yes	Yes	Yes
9	Updated information	Yes	No	Yes	Yes
10	Restaurants details	No	Yes	Yes	Yes
11	Requirement Internet connection	Yes	Yes	Yes	Yes

3.   Methodology and Framework

This section discusses the software development methodology used to develop the food finder mobile application. The methodology selected to develop the proposed application is agile methodology. Agile methodology is an iterative software development that has capability to get user feedback constantly and adapt to the changes in demand in the shortest time [7]. Agile process flow has six phases. These phases are concept, inception, iteration, release, production, and retirement. The details and activities of each phase will be discussed in this section.

3.1   Concept phase

Concept phase involves identifying the opportunities of the project and estimate the work and time that needed to complete the project [8]. This phase required to analyze and select the best strategy for developing the project. The problem of indecisive decision-making when need to decide which dish to eat for daily meals is identify in concept phase. After that, the functionality of the existing application in the current market is reviewed and analyzed. Next, an improvement solution from the existing application is draft and plan. A proposal is written to propose a food finder mobile application in concept phase. Gantt chart is created for visualizing the implementation of each process.

3.2 Inception phase

Inception phase includes identifies modules of the project and understands the initial requirements of the proposed application [8]. The user requirements and system requirements of the food finder mobile application are identified in the inception phase. Furthermore, Unified Modelling Language (UML) such as use case diagram, sequence diagram, class diagram and activity diagram are created to illustrate the whole design of the food finder mobile application. The proposed application is divided into various modules. The suitable work duration for each module is scheduled and arranged. Database is also designed in this phase. Moreover, wireframe is drawn to visualize the user interface of the whole mobile application.

- Use case diagram

Use case diagram illustrates the interaction between the user and the system. The use case diagram for user of the food finder mobile application consists of eight main use cases. These use cases include Register, Login, Search, View foods information, View comments and ratings of the foods, Give comments and ratings to the foods, Location, and Logout. Figure 1 shows the use case diagram of the proposed application for user.
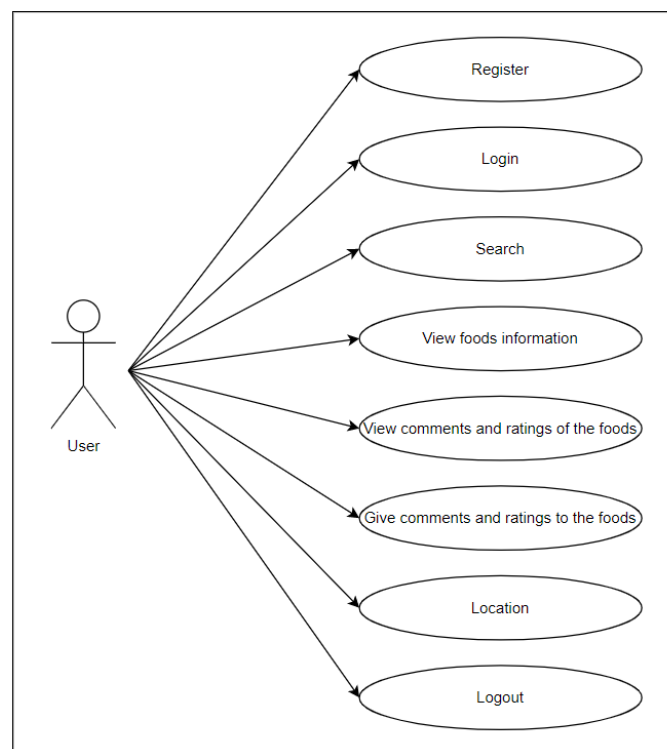

Figure 1: Use case diagram of food finder mobile application for user

- Sequence diagram

Sequence diagram is used to illustrate the order of the method calls and their response [9]. It shows the dynamic collaboration between multiple objects by describing the time sequence of sending messages between objects.

- Class diagram

Class diagram is a static structure diagram that used to display a static structure of system by showing the classes of the system, attributes, methods, and the relationship between various classes. There are eight classes involved in this system. These classes include User, Login, Register, Admin, Search, CommentRating, Information, and Location.

- Activity diagram

Activity diagram represents the flowchart to illustrate the choice, sequence, and parallel implementation of the activities [10]. It is a common tool used by UML to represent the dynamic behavior of the system. Activity diagram describes a series of the activity taken by the users and shows the flow control from one activity to another activity. Figure 2 displays the activity diagram of the food finder mobile application for user.
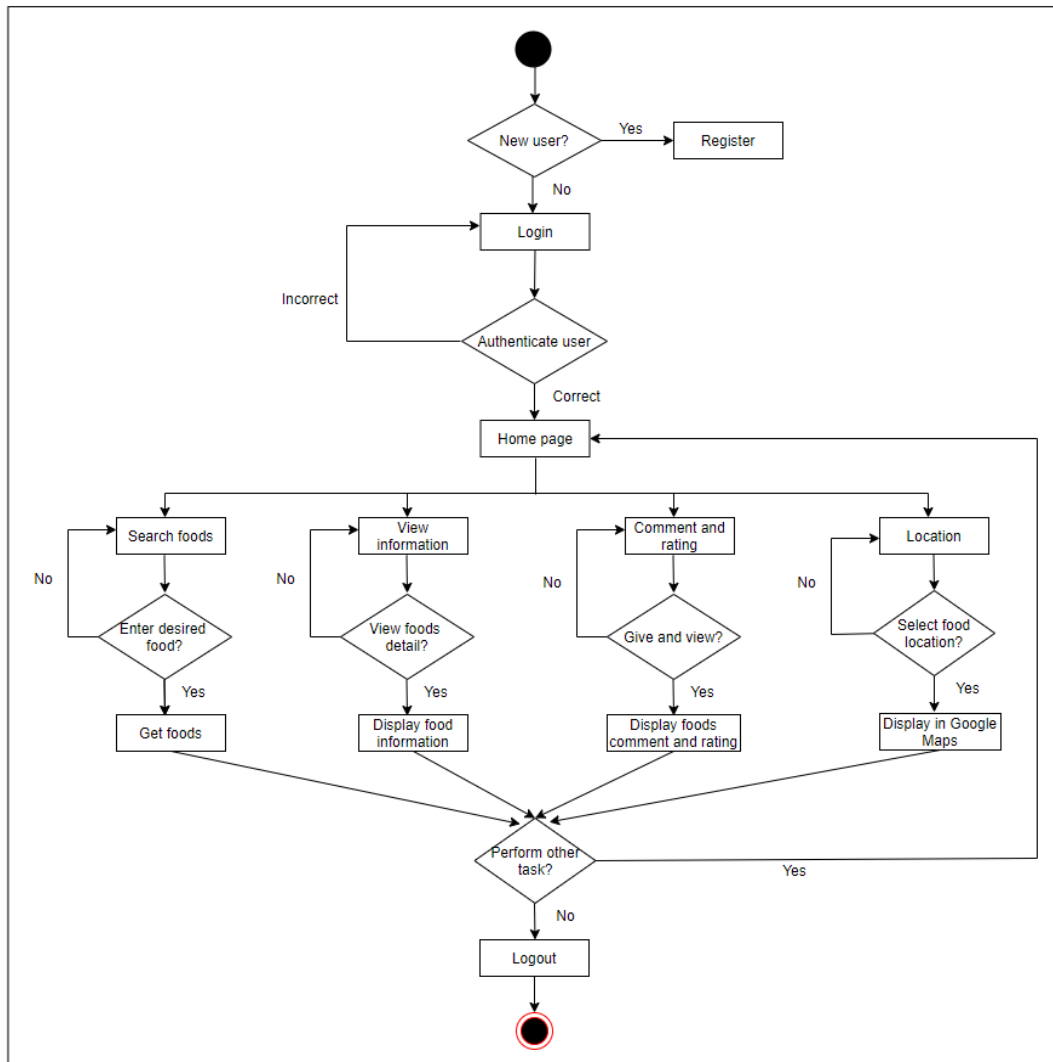

Figure 2: Activity diagram of food finder mobile application for user

- Database design

Database design refers to the construction of the optimal database model for an application. The establishment of the database enables the application to store data effectively. Entity Relationship Diagram (ERD) is created for the database design. It is an effective way to express the conceptual relationship model of a system. ERD describing the entities in the system and the relationships between entities.

- User interface design

User interface design is a process to design the layout of the application. A good user interface design is required for a popular and high-quality system [11]. The wireframe of the proposed application is created to visualize the interface design of whole mobile application.

3.3   Iteration phase

Iteration phase is the phase that starts to develop the application based on the requirements of the project [8]. This phase will include communication between developers and users. Each module of the proposed application is assigned based on module priority. The modules of the proposed application include register, login, search function, view foods information, comment and rating, location, and logout. All the requirements, function and database designed in the previous phase were implemented in the iteration phase. Iteration phase includes users to do testing and collect the feedback and requirements for improving the development of the proposed application. Android Studio and Firebase is used to develop the food finder mobile application. Implementation of modules will be described and the code segment of each module will be provided for visualizing the development of the proposed application.

- View foods information activity

This module allows users to view the information of the foods such as name, restaurant's name, price, picture, description, address and location. Figure 3 shows the code segment of the view foods information activity.

```java
private void displayInfo(FoodModel foodModel) {
    Glide.with(getContext()).load(foodModel.getImage()).into(img_food);
    food_name.setText(new StringBuilder(foodModel.getName()));
    food_description.setText(new StringBuilder(foodModel.getDescription()));
    food_restaurant.setText(new StringBuilder(foodModel.getRestaurant()));
    food_address.setText(new StringBuilder(foodModel.getAddress()));
    food_location.setText(new StringBuilder(foodModel.getLocation()));
    food_price.setText(new StringBuilder(foodModel.getPrice().toString()));
```

Figure 3: Code segment of the view foods information activity

- Comment activity

In comment activity, users are able to view and give the comment for the foods in the food finder mobile application. This module provides a reference for the users to view the feedback of the foods that given from other users. Therefore, users can get more information about the foods. Figure 4 shows the code segment of activity for adding comments and Figure 5 shows the code segment of the view comments activity of the food finder mobile application.

```java
EditText edt_comment = (EditText)itemView.findViewById(R.id.edt_comment);

builder.setView(itemView);

builder.setNegativeButton( text: "CANCEL", (dialogInterface, i) -> {
    dialogInterface.dismiss();
});
builder.setPositiveButton( text: "OK", (dialogInterface, i) -> {
    CommentModel commentModel = new CommentModel();
    commentModel.setName(Common.currentUser.getName());
    commentModel.setUid(Common.currentUser.getUid());
    commentModel.setComment(edt_comment.getText().toString());
    commentModel.setRatingValue(ratingBar.getRating());
    Map<String,Object> serverTimeStamp = new HashMap<>();
    serverTimeStamp.put( k: "timeStamp", ServerValue.TIMESTAMP);
    commentModel.setCommentTimeStamp(serverTimeStamp);

    foodDetailViewModel.setCommentModel(commentModel);
});
```

Figure 4: Code segment of give comments activity

```java
private void loadCommentsFromFirebase() {
    dialog.show();
    List<CommentModel> commentModels = new ArrayList<>();
    FirebaseDatabase.getInstance().getReference(Common.COMMENT_REF) DatabaseReference
            .child(Common.selectedFood.getId())
            .orderByChild("serverTimeStamp") Query
            .limitToLast(100)
            .addListenerForSingleValueEvent(new ValueEventListener() {
                @Override
                public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
                    for (DataSnapshot commentSnapShot:dataSnapshot.getChildren())
                    {
                        CommentModel commentModel = commentSnapShot.getValue(CommentModel.class);
                        commentModels.add(commentModel);
                    }
                    listener.onCommentLoadSuccess(commentModels);
                }

                @Override
                public void onCancelled(@NonNull DatabaseError databaseError) {
                    listener.onCommentLoadFailed(databaseError.getMessage());
                }
            });
}
```

Figure 5: Code segment of view comments activity

3.4 Release phase

Release phase includes testing and fixing of the software [8]. In release phase, all modules of the proposed application are integrated and conduct final testing for each module. Functional testing and user acceptance testing are performed in this phase. Release phase must ensure the application is reliable and without any error. Users are involved while conduct testing of the proposed application.

3.5 Production phase

Production phase is to perform the maintenance of the software [8]. This phase can ensure the stability of the proposed application. All modules of the proposed application must maintain in good operating condition. Furthermore, a demonstration for the proposed application is conducted in the production phase.

3.6 Retirement phase

Retirement phase is the final phase in agile methodology. All activities that involve in developing the proposed application must performed completely. In retirement phase, the application release must be removed from the production process [8].

4. Result and Discussion

This section discusses the result of the development of food finder mobile application. The user interface of the food finder is display to show the design of the application. The results of the functional testing and the result of the user acceptance testing will discuss and illustrate in table and graph.

4.1 Results

The proposed application has successfully developed and provided a simple user interface design for the users. The user interface of the food finder mobile application is display in Figure 6. Functional testing and user acceptance testing are conducted to examine the proposed application and ensure it fulfil the requirements. Table 2 shows the result of function testing for the food finder mobile application. Next, Figure 7 shows the result of user interface evaluation and Figure 8 displays the result of functionalities evaluation.
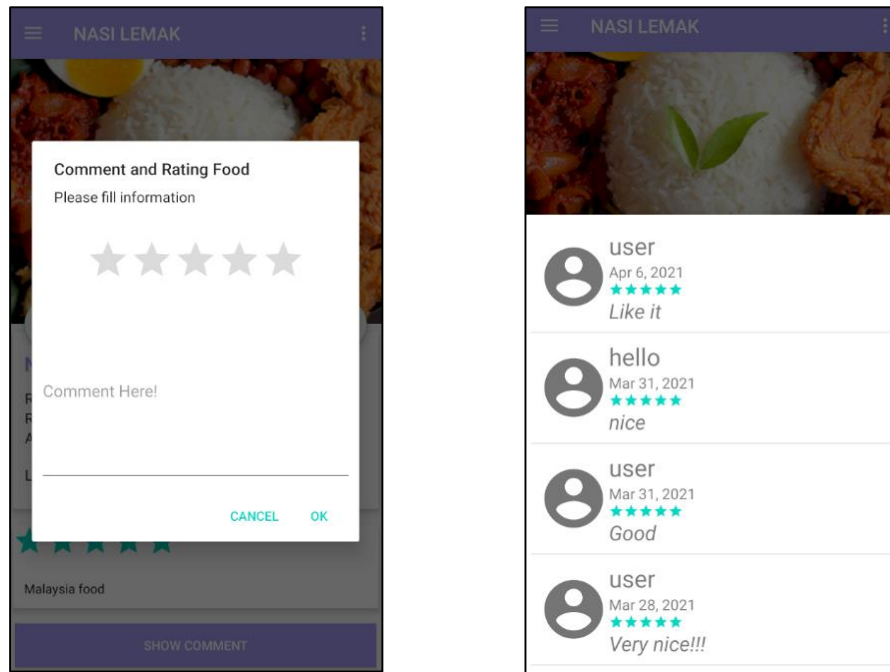
Figure 6: Give and view comments and ratings page interface design

Table 2: Result of function testing for the food finder mobile application

| No	Modules	Test Cases	Expected Output	Actual Output
1	Search function	Input a valid data	The application shows the related foods	As expected
		Input invalid data	Error message is shown in the bottom and prompts users this food does not exists in the application	As expected
2	View foods information function	Display the foods information	The application shows the name, restaurant's name, price, picture, description, address, and location of the foods	As expected
3	Comment function	Give comments	A message of thank you is shown and comment is given successfully	As expected
		View comments	The application will shows all the comments that given by other users	As expected
4	Rating function	Give ratings	A message of thank you is shown and rating is given successfully	As expected
		View ratings	The application will shows all the ratings that given by other users	As expected
5	Location function	Click on the URL	The application will show the location of the foods in Google Maps and direct users to the destination	As expected
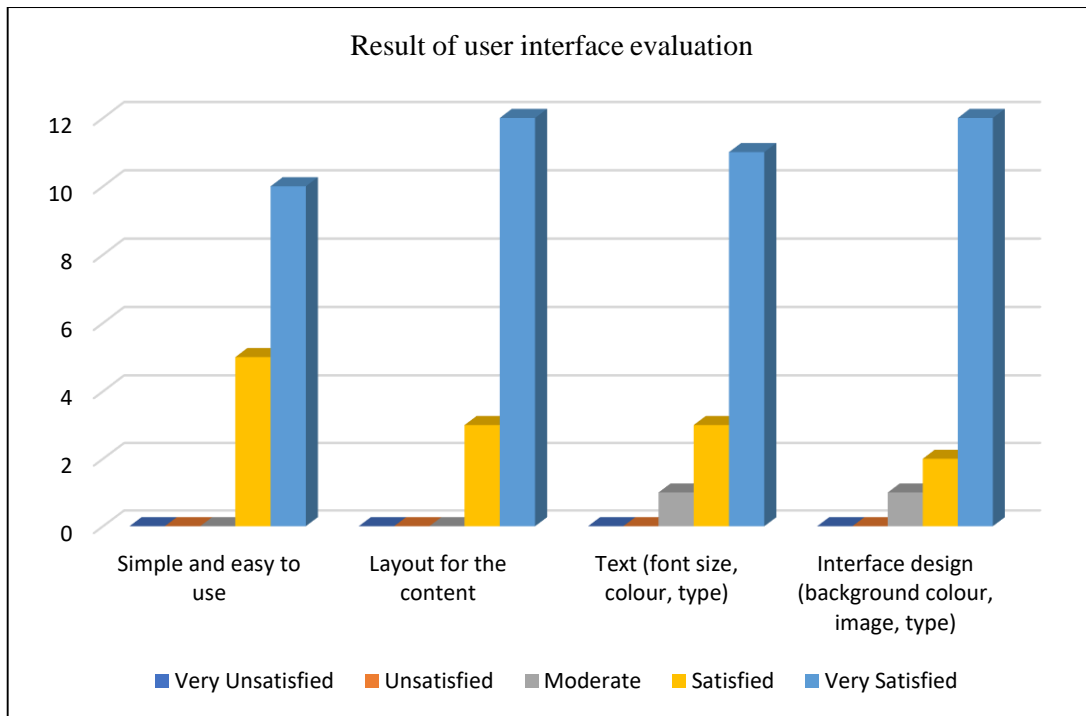
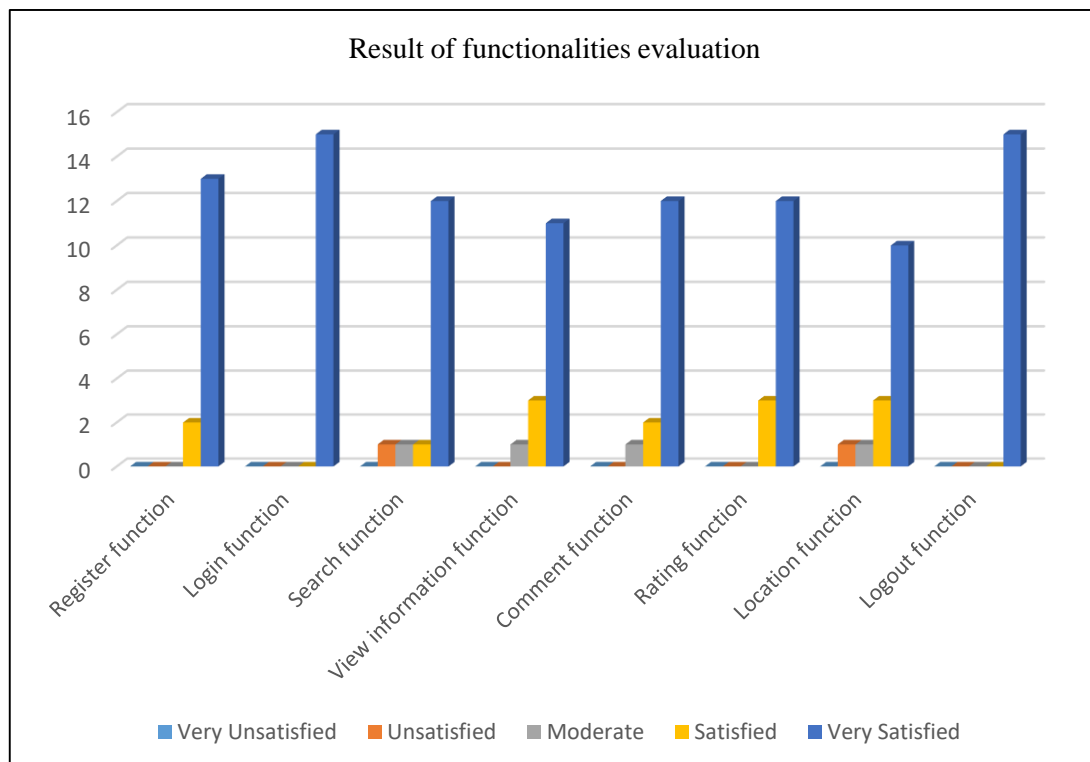**Figure 7: Result of user interface evaluation**

Figure 8: Result of functionalities evaluation

4.2 Discussions

Functional testing is performed to test the application and ensure all the functions of the proposed application achieve the functional requirements or specification. The goal of the functional testing is to evaluate each function of the proposed application. The result of the functional testing shows in Table 2 prove the food finder mobile application can function smoothly without any error.

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Furthermore, user acceptance testing is necessary because users are the person who will use the application in daily life. There are 15 respondents participated in the user acceptance testing. This testing provided an opportunity for the users to interact with the proposed application. Users can evaluate the functions and performance of the food finder mobile application through their involvement in user acceptance testing. The result of the user acceptance testing in Figure 8 and Figure 9 show that most of the respondents are satisfied with the application in the user interface evaluation and functionalities evaluation. The majority of the respondents think the application functioning smoothly. Both the result of user interface evaluation and the result of functionalities evaluation are not at the very unsatisfactory level.

5.   Conclusion

Food finder mobile application has successfully developed and able to allows users to find the favourite foods in selected Johor area. The proposed application has accomplished the functional requirements or specifications. It also has completely meet three objectives stated in the previous chapter. Users are able to search the desired foods and view the information of the foods such as name, restaurant's name, price, picture, description, address, and location. Furthermore, users are also able to give and view the comments and ratings of the foods. This application also provides the location of the foods for the users and can navigate users to the destination for finding the foods. It will show the location of the foods in Google Maps and direct users to the destination for searching the foods. Although the proposed application has accomplished the intended goals, several limitations have been found during the process of completing this project. Therefore, certain potential future works can be implemented in the developed application to enhance the performance of the application.

Improvement can be done by enhancing the functionalities, performance, and interface of the application. There are several suggestions for the future works to improve food finder mobile application. Currently, users only can search the foods by enter the keywords of the foods, the application will not show the recommended words for the users. In future, this proposed application may provide search suggestions for the users to allows users to search their favourite foods easily. Furthermore, there is no notification to notify the users when there were new foods around user's area. Therefore, food finder mobile application may implement notification function to notify the users when there were new foods added in the application. Last but not least, the application currently not allow users to reset the password. In the future, this application may implement the reset password function and allow users to register the account using social media such as Facebook and Instagram.

In conclusion, food finder mobile application has achieved the objectives based on system requirements, scope and user requirements. Although this application has some limitations, there are several future efforts can be made to overcome these limitations and improve the functionality and performance of the application to meet users' need and better serve the users.

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