

iLuto: A Filipino Recipe App for Android

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Abstract: “iLuto: A Filipino Recipe App for Android” is an Android application developed to help users with varying cooking skills learn how to easily prepare popular Filipino native recipes and unique dishes that are rarely found on a typical Filipino cookbook. The application help develop users’ skills as they progress thru different app features such as the “Fridge” to Search/ View recipe, Add/Remove Favorite Recipes, Daily Meal Planner, and the Grocery/ Shopping List. The application was created using Android Studio with SQLite Manager as its database. The researchers used the prototyping technique as a method to develop the application. The study was subjected to compatibility, conformance and functionality tests used to improve the performance of the application. It was further subjected to evaluation based on the Android core app quality standards (developer.android.com) with the criteria of functionality, performance and stability, and Google Play. Ten (10) IT experts and thirty (30) mobile users evaluated the app. Evaluation results revealed an overall mean of “3.62” with a Standard Deviation of “0.84”, interpreted as “Highly Acceptable”. Results proved that the mobile application is an effective tool to learn and enhance the skills of the users in cooking native Filipino cuisine.

Keywords: Interactive System, Android Application, Filipino Recipes, Filipino Cuisine, Cooking App.

I. INTRODUCTION

For most people, cooking is a task that needs to be done on a daily basis. It has been part of human activities since fire was invented and when people developed an interest in taste and health preservation. However, cooking also plays a big role in the culture and tradition of a nation. It directly represents the lavish and intricate nature of a group of people in a particular place, country or region. The Philippines has been considered as one of the countries known for its rich culture and traditions particularly when it comes to food. Filipino cuisine is one of the popular dishes known worldwide because of its unique ingredients, aroma, and tastes. Every region in the Philippines has its own distinct cuisine that represents the culture and tradition of that particular place served during fiestas or feast of saints, family gatherings, holidays and parties. These recipes have been handed down from generations to generations, some are even centuries ago.

Unfortunately, some of the traditional Filipino dishes, particularly the old ones, are now being forgotten. With the presence of technology and the influence of other countries, most Filipino is now trying to learn other international cuisines rather than enriching and preserving their own recipes. The problem can be attributed due to the lavish and intricate preparation of old cuisines and the time and effort it takes to prepare these recipes. It was further aggravated due to the fact that most of these traditional dishes are not properly documented. Looking at the available mobile app found in the Google Play Store, there are insufficient Filipino Recipe applications and some have limitations. For example, the application only runs provided that the user has an active internet connection.

The study aimed to alleviate the different problems mentioned by developing an Android-based mobile application that provides and document native Filipino recipes that can be used even without an active internet connection. The target users of this app are cook enthusiasts interested in native Filipino cuisine. English language was used in order to cater to users interested in Filipino cuisine but are not able to understand Tagalog. It can somehow document traditional Filipino recipe that is gradually disappearing and make it easily accessible to the public. The app provided interesting features that track progress and keep the interest of users.

A. Objectives of the Study

The general objective of the study is to develop iLuto: A Filipino Recipe App for Android. Specifically, the project intends to:

1. design an Android application that has the following features:
 - a. Search to view recipe by category, by location, by ingredient, random recipe, by region (Luzon, Visayas, Mindanao) or view all recipes.
 - b. Add/ Remove Favorite Recipe.
 - c. Share Favorite Recipe on social media.
 - d. Daily Meal Planner to the user to make determine what to cook for the whole day or in a week.
 - e. Grocery/ Shopping List for the user to make the list handy and interactive in the mobile device.
2. create the project using Android Studio as frontend and SQLite as its backend. It runs on Android mobile devices or on Android tablets.
3. test and improve the application using the following test cases: Functionality test, Conformance test, and the Compatibility test.
4. evaluate the acceptability of the application software based on the Android Core App Quality with the following areas to consider:
 - a. Visual Design;
 - b. User Interaction, Functionality;
 - c. Performance and Stability;
 - d. Google Play

B. Scope and Limitation of the Study

The end-users of the application is the general public—Smartphone users (Android platform) with varying age groups. Its target users are people who aspire to cook. The application implemented a user-friendly GUI which appeals to all age groups for ease of use. Lastly, the content of the app (Filipino recipes) ranges from modern to traditional/ native recipes. The app is compatible with Android versions 4.0-5.0 with 4"-6" screen sizes. The user can use the app with its features (except for the share a recipe feature and voice search and action) when his/her device does not have an active Internet connection.

On the other hand, the application does not have features other than those that are stated in the program specifications. Its sole topic is how to cook Filipino food and its contents are only select modern or traditional/native Filipino recipes (not all Filipino recipes will be featured). Foreign cuisine is not part of the project. The application runs only on Android mobile devices and tablets.

C. Significance of the Study

The main purpose of this study is to develop a Filipino recipe app that uses available mobile-technology for Android mobile devices or tablets. The following are the beneficiaries or the project and their benefits.

Society. By using the application, users gain additional knowledge on cooking native Filipino dishes by having fast & portable access to an array of recipes with various categories. It allows preservation of Filipino food culture and traditions.

Cook enthusiasts. It is beneficial for those people who are business-minded or those who want to start a business in the food industry but lacks an idea of what food to cook. The proposed application provides an avenue to learn to cook unique Filipino food most especially those who have not taken any culinary courses.

Future researchers. Another beneficiary would be the future researchers who would be interested to conduct a project similar to this study.

II. METHODOLOGY

A. Design

Flowcharts are used in designing and documenting simple processes or programs. The following figures present the different program flowcharts of iLuto.

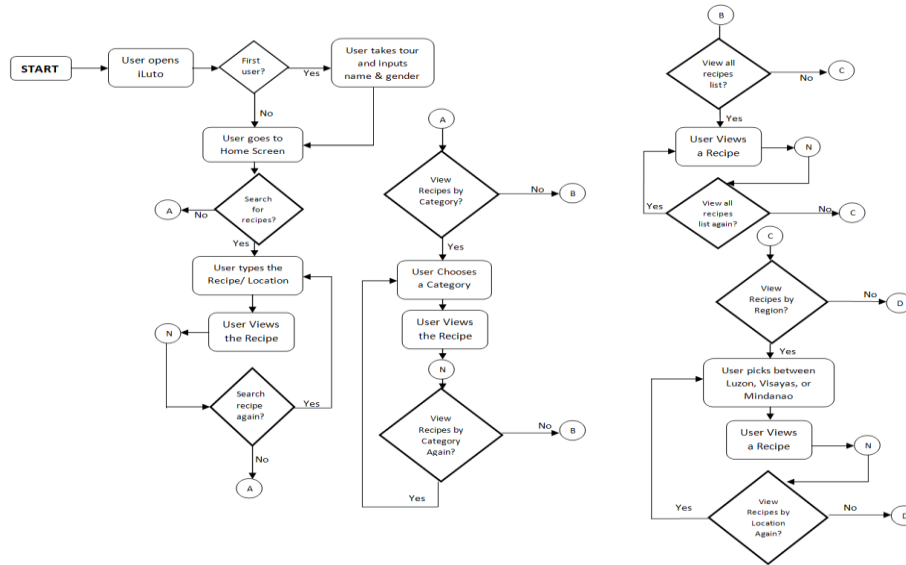


Fig. 1: Program Flowchart of iLuto – Main Menu

Figure 1 presents the main part of the program flowchart that provides the different activities paths a user takes when they initially use the application. On its initial use, the user takes a tour, part of the app tutorial and is required to enter a name and select a gender. After the tutorial, the user is redirected to the home screen. The user is free to explore the features of the app and can review how the app and its features are used thru the “help” page of the app.

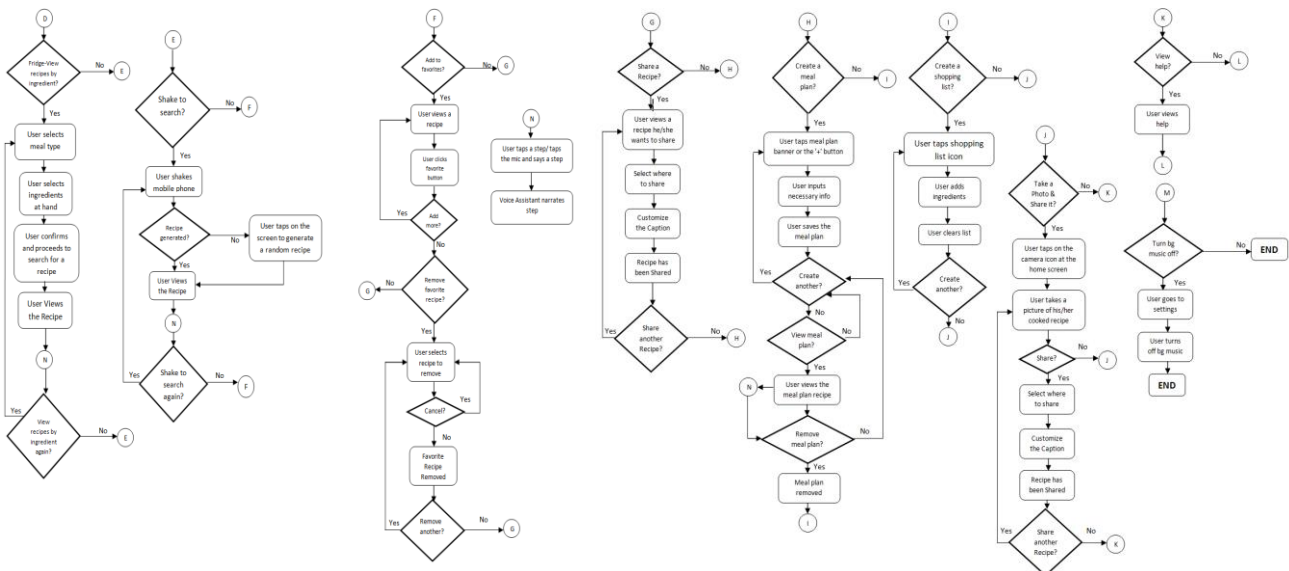


Fig. 2: Program Flowchart of iLuto – Activities

Figure 2 provides the different program flowchart for the different activities that iLuto app offers to its users. There are eight different activities provided by the app in order to track progress and capture the interest of its users. Users can view recipes by ingredient via the "Fridge" feature (D). User can also view random recipes thru the app's "Shake to Search" feature (E). They can add the recipe to their favorites lists using the app's "Add to Favorite" function (F). In addition, they

can also share a recipe to the "Share a Recipe" feature (G). In order to manage their meal, users can create a meal plan using the "Create a Meal Plan" function (H). A shopping list can also be created thru the create a shopping list activity menu (I). Added to this, they can also take photos of their Filipino cooked recipes and share it on a social networking site such as Facebook thru the "Take a Photo and Share It" function (J). Finally, if ever users find it difficult to use the app they can easily access the "Help" feature (K) of the iLuto application.

B. Development

Prototyping is a methodology adopted by the researchers. It is a methodology that performs the planning, analysis, design, and implementation phases concurrently and is repetitively performed until such time that the system is completed. Using this method, the researcher was able to arrange ideas and apply changes easily.

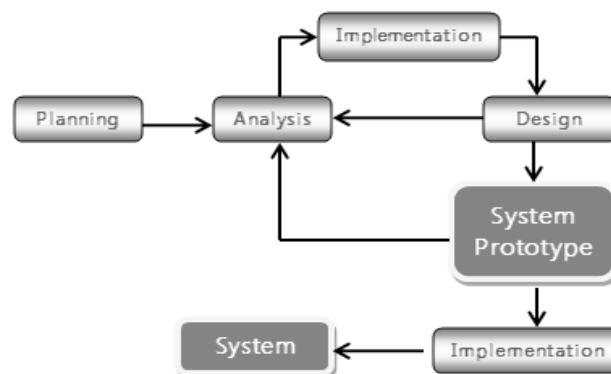


Fig. 3: Prototyping – System Development Methodology

Figure 3 presents the methodology used by the researchers in developing iLuto. As compared to other methodologies in which changes are applied through the working model directly which might result in certain errors, prototyping allows the researcher to implement alterations to improve the next prototype release. First, sketches were created that demonstrate what the working model would look like. These were part of the Planning phase done thru meeting and brainstorming sessions. The researcher established a high-level view of the intended project and determined its goals. This includes gathering different Filipino cuisines from reliable sources such as Filipino Recipe books, online sources and conducting interviews on different Filipino Chefs of selected regions. During the Analysis phase, the researcher refined project goals into defined functions and operation of the intended application. The researcher also analyzed end-user information needs. In the Design phase, the researcher was able to describe desired features and operations in detail including the documentation. The prototype was created and developed which meets all system goals for performance and still has all of the application functionality needed. The design was continually modified according to the hardware environment, operating system, user interface capabilities of the system, and interface design goals. The Implementation phase is where the system was built. All codes were written, debugged, and tested to make sure that it performs as designed. Then, the app was tested and evaluated. After this, it was uploaded on Google Play store wherein user feedback revealed more bugs that need to be fixed. This phase was the longest and most expensive part of the process.

Java programming language was used by the researcher for the system's code and interface through the use of Android Studio as the Android Developer Tool (ADT), with SQLite as its database. SQLite Manager for Firefox was used to manage the database. Of course, different errors will appear on different user Android mobile devices, in which the researchers endured and persevered to correct until such time that no more bugs were found.

C. Test

iLuto: A Filipino Recipe App for Android were subjected to three different types of tests, these are Functionality, Conformance, and Compatibility Tests. In this case, it assures that the developed application can adjust to devices with varying screen sizes. It also helped the team on maintaining the developed application and making sure that the app is working on an Android Operating System platform version 4.0 (Ice Cream Sandwich) to Android M (Marshmallow). It also ensures conformance of the application to the standards of Google Play pertaining to Visual Design and User Interaction, Functionality, Performance and Stability and the adherence of the application through Google Play Developers Content Policy. The developers made sure of the maintenance and the functionality of the developed

application. To conduct the test, test cases were printed, the team arranged where and when the testing was conducted and videotaped the testers as they test the iLuto app. Five tests respondents participated during the categorized as one (1) Technical Critic, one (1) App Developers or IT experts, and three (3) IT students.

Test case objectives for functionality test are to check the application's functionalities, check if it responds correctly to all user's inputs, check if it performs its functions within an acceptable time and to check if it's efficiently usable. Conformance test case objectives are to check if it conforms to the core quality of the Android standard. Ensure the visual design and interaction patterns of the application adhere to the Android standards and appropriate to the users. Make sure that the application provides expected functional behavior for the user's convenience, guarantee that the system provides the performance, stability, and responsiveness expected by users. Lastly, is to ensure that the application is ready to be published on Google Play. For the compatibility test, the test case objectives are to check the compatibility of the application in various mobile devices with different screen sizes. To check the compatibility of the application from different Android versions. Finally, to check the compatibility of the application in terms of the size of the memory or RAM.

D. Evaluation

To further assess the acceptability of the developed application, the system was subjected to evaluation participated by forty (40) evaluator respondents comprised of ten (10) IT experts consists of Android developers and designers and thirty (30) mobile end users. The evaluation instrument used was based on the Android core app quality (developer.android.com) with the criteria of functionality, performance and stability, and Google Play.

In conducting the evaluation, a specific procedure was observed. First, the developers conducted a manual evaluation using the evaluation form given by the research adviser based on the Android developers. Second, the developers looked for specific evaluators like IT Experts and common end-users to evaluate the mobile application. The developers then distributed the evaluation form provided with a pen together with the Android device where the application was installed. After distributing the android device and the evaluation form, the developers let the evaluators explore and feel the application to know the different features of it so that they can evaluate the application correctly. After giving the time to explore the application, the evaluators evaluated the application using the evaluation instrument to check if the developers met all the specified requirements. Accomplished evaluation forms were collected and analyzed.

The gathered data were calculated and tabulated. Standard Deviation (SD) and the weighted mean were computed for the results. For the evaluation criterion, the evaluation form had a scale of 1 to 4; 1 is the lowest and 4 is the highest. Table 1 presents the scoring system of the evaluation made. Likert Scale was used to analyzed and interpret results shown in Table 2.0.

TABLE I: SCORING SYSTEM

Numerical Rating	Equivalent
4	Highly Acceptable
3	Acceptable
2	Fairly Acceptable
1	Unacceptable

TABLE II: LIKERT SCALE

Range	Equivalent
3.51 – 4.00	Highly Acceptable
2.51 – 3.50	Moderately Acceptable
1.51 – 2.50	Fairly Acceptable
1.00 – 1.50	Unacceptable

III. RESULTS AND DISCUSSIONS

A. User Interface Design

The following figures present some of the screenshots of the different features or function found on iLuto: A Filipino Recipe App for Android.

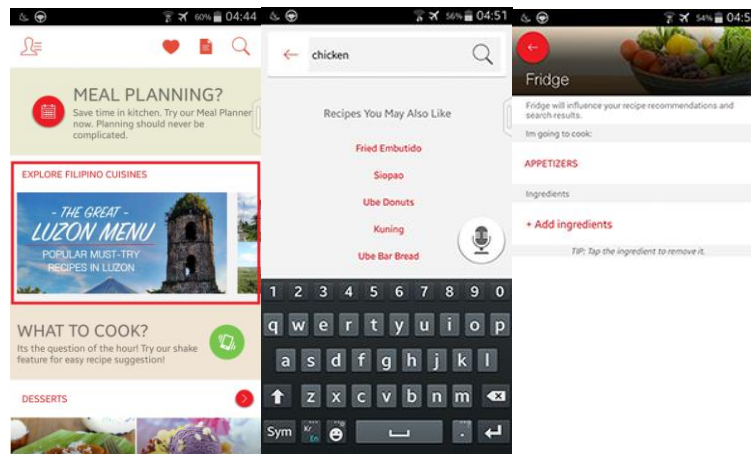


Fig. 4: Browse by region, Search a recipe/ search by location, Fridge

In the Browse by region, the user can view recipes by region (Luzon, Visayas, Mindanao). When searching for a specific recipe/ searching by location, the user can search for a recipe or recipes of a specific location. In the Fridge, the user may search for recipes using his/her ingredients at hand.

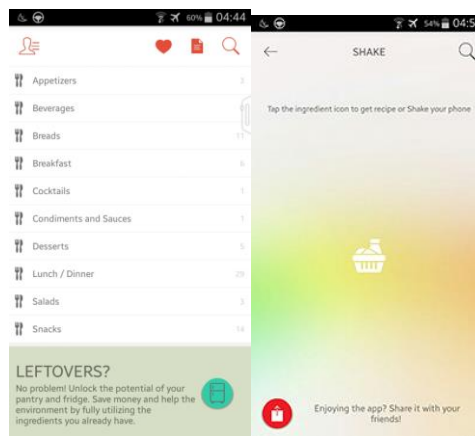


Fig. 5: View recipes by category, Shake to search

When viewing recipes by category, the user may view the recipes by Appetizers, Beverages, Breads, Breakfast, Cocktails, Condiments & Sauces, Desserts, Lunch/Dinner, Salads, or Snacks. The user may search for a random recipe through the Shake to the Search feature. The "leftovers?" is a banner for the fridge feature. After clicking this, the user is able to access the Fridge. In the Fridge, the user first selects a meal type (e.g. Main Dish, Snacks, Desserts, etc.). Then, the user can add their ingredients at hand and will tap 'Search' to view the recipes he/she can cook with his/her available ingredients.

B. Test Results

TABLE III: TEST RESULTS FOR FUNCTIONALITY AND CONFORMANCE TESTING

Test Type	Pass	Fail	Total No. of Test Cases	Percentage
Functionality	17	0	17	100%
Conformance	19	10	29	66%
Compatibility	8	5	13	62%

Functionality test passes all the test cases provided in the test instrument, this means that the desired functionalities and features of the application were achieved. On the other hand, The second test was compatibility testing where the application was tested in different kinds of android devices with different screen sizes. Five (5) test cases failed because the researchers were not able to provide Android mobile devices with versions 4.0, 4.1, and M. In addition, the researchers also were not able to provide Android mobile devices with 7 & 8 screen sizes which is why some test cases failed. Finally, the Last test was the conformance testing, which tests every element of the application included the Standard Design, Navigation, Notification, Audio, Permissions, Install location, UI and Graphics, etc. The failed test cases in conformance test were the notification area and permissions area. Some functions failed too like the background music button because it did not display the appropriate design when it was toggled on/off by the tester. The notifications area failed because no notifications were being displayed or showed when using the application. Prior to the evaluation, the team improved the background music button which now displays the appropriate design when toggled on/off. Notifications now display when a meal plan, which is set by the user, now provides alarms.

C. Evaluation Results

TABLE IV: IT EXPERTS EVALUATION SHEET

Level of System Acceptability	Mean	Standard Deviation	Interpretation	Rank
Visual Design and User Interaction	3.58	1.04	Highly Acceptable	4
Functionality	3.8	1.13	Highly Acceptable	2
Performance and Stability	3.73	1.11	Highly Acceptable	3
Google Play	3.84	1.16	Highly Acceptable	1
AVERAGE MEAN AND SD	3.74	1.11	Highly Acceptable	

The Evaluation Result for IT experts revealed that “Google play” got the highest rank, followed by “Functionality”, the third one is the “Performance and Stability”, and lastly, the “Visual Design and User Interaction”. This shows that the IT experts agreed that the developed app conformed with the standard set by “Google Play”. On the other hand, “Visual Design and User Interaction” got the lowest rank but still highly acceptable. This means that designs and graphics can be further improved to satisfy the user's needs. To further interpret the result, “Visual Design and User Interaction” got a mean of “3.58” and an interpretation of “Highly Acceptable”. For the second criteria, the “Functionality” got a mean of “3.8” with an interpretation of “Highly Acceptable.” For the third criteria, “Performance and Stability” got a mean of “3.73” with an interpretation of “Highly Acceptable”, and for the last criteria, which is the “Google Play”, got a mean of “3.84” with an interpretation of “Highly Acceptable”.

TABLE V: MOBILE USER EVALUATION RESULT

Level of System Acceptability	Mean	Standard Deviation	Interpretation	Rank
Visual Design and User Interaction	3.31	0.57	Moderately Acceptable	3
Functionality	3.76	0.64	Highly Acceptable	1
Performance and Stability	3.28	0.51	Moderately Acceptable	4
Google Play	3.65	0.60	Highly Acceptable	2
AVERAGE MEAN AND SD	3.50	0.58	Moderately Acceptable	

Functionality got the highest rank when it comes to mobile users. Results show that mobile users agreed that the developed application provided the necessary functionalities or features that they need for a recipe content mobile application. On the contrary, Performance and Stability got the lowest rank, nevertheless, it is still moderately acceptable. To further interpret the results, “Visual Design and User Interaction” got a mean of “3.3” and an interpretation of “Moderately Acceptable”. “Functionality” got a mean of “3.76” with an interpretation of “Highly Acceptable”. “Performance and Stability”, got a mean of “3.28” with an interpretation of “Moderately Acceptable”. Lastly, “Google Play” with the mean of “3.65” and an interpretation of “Moderately Acceptable”.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The aim of this study is to solve a cook enthusiast's problem of finding what particular food to cook by providing him with an application which can store all of his favorite recipes and at the same time contains a range of different recipes which are readily available for viewing without the need of an internet connection. It must also provide interactive features which enhance the experience of its users as they use the application.

The application was designed with the following features: search to view recipe with five options (view recipes by category, search a specific recipe or search recipe by location, search recipes by ingredient (fridge), shake to search random recipe, and browse recipes by region), add/remove favorite recipe, view all recipes, share your favorite recipe, settings, take a photo & share it, daily meal planner, grocery/ shopping list, tap to narrate procedure, and tap the mic to narrate.

The application was created and developed using Android Studio, with SQLite as its database. SQLite Manager for Firefox was used to manage the application's database.

The application was tested and improved using Compatibility, Conformance, and Functionality test. The result of the test was to improve the notifications area of the app which was then done by the team.

The application was evaluated through Core App Quality Standards (developer.android.com) with the following criteria: Visual Design & User Interaction, Functionality, Performance & Stability, and Google Play. The evaluation respondents are composed of ten (10) IT experts and thirty (30) end-users composed of culinary students, mothers, and students. The application follows standards set by developer.android.com which is mandatory in order for the application to be published on the Google Play Store. The overall combined evaluation results of IT experts and end-users is "Highly Acceptable" with "3.62" Mean and "0.84" Standard Deviation. The result of the evaluation shows that the mobile application is an effective tool to learn and enhance the skills of the users in cooking Filipino cuisine.

B. Recommendations

Based on the findings, test results, and conclusions; the following recommendations for future enhancements of the study were proposed:

1. Adding and saving app user/s recipes for convenience. Instead of writing their recipes on paper and risk the possibility of losing/ misplacing it, the user can instead save his/her own recipe on the app for quick and easy access.
2. iOS version of the app for the availability of use to apple users. Through this, the iLuto app can be introduced in the apple market and will not be limited to Android users only.
3. Nutrition fact/ dietary information of each recipe for additional knowledge/ information on a particular recipe. For example, a mother would like to cook a viand that is low in fat and sugar but is high in vitamins and minerals. If the recipes have nutrition facts, the mother will have less hassle on choosing the viand he/she wants to cook.
4. Consolidate shopping list according to similar items to reduce redundancy. For example, the user inputs "salt", "pepper", and "spices". The shopping list will then suggest combining these three individual inputs/ingredients as one: "salt and pepper, spices".
5. The difficulty level in cooking/ preparation of menu like a beginner – the easiest; intermediate – the average; and professional– the most advance for ease of use. Through the categorization of the difficulty level of a recipe, users will know what recipe they will attempt to cook.

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