Implementation of A Dietary System from Information Technology Outlook

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Abstract- ***Information system is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Dietitian system helps people to evaluate their nutrition status and conditions and accordingly provides them with diet and nutrition advises. It will help people to save time as they will not need to visit the doctor to evaluate their nutrition conditions. Accordingly, the developed system improves people awareness about the importance of nutrition, reduces consultation time and makes people care more about their health. It becomes paramount that a system is created to help act as Informative dietitians which would give food advice (diet plan) to registered users only which in turn would lead to a healthy lifestyle. Waterfall model was used to design hardware and system requirements and helps in defining the overall system architecture. The researchers would be using HTML, JavaScript, Bootstrap, CSS and CMS for the implementation of the Information dietitian system. HTML and Bootstrap would also be used to implement the interface, accepting data or information from the Admin with JavaScript for Styling the webpage to give more functionality. While PHP framework would be used to write the server-side scripts that will add, Generate and collect form data. The data collected would be stored in a database, which is the database (a Relational Database). It would also be used to Store each user details after registering and for login purpose and also users' information. This developed system provides advice only for healthy people, not for unhealthy or exercise individuals and pregnant and lactating women.***

I. INTRODUCTION

The introduction of computers in food analysis and in menu planning had opened a new hope for efficiently and effectively planning appropriate menus. Numerous software packages have been developed during the 1980's in the area of nutrition and food analysis (Salam & Hoffmann, 2017).Nutrition is getting food into the body for growth and energy, and for keeping the body healthy and alive. It also includes the environmental, psychological and behavioral aspects of food and eating. Nutrition focuses on how to protect the body from diseases by healthy dieting. There are seven major classes of nutrients, they include: carbohydrates, fats, minerals, protein, vitamins, fiber and water(Nordqvist, 2020). These nutrient classes can be classified as either macronutrients which are needed in relatively large amounts, or micronutrients which are needed in smaller quantities. The macronutrients include carbohydrates, fats, protein, fiber, and water, whereas the micronutrients include minerals and vitamins. Carbohydrates and proteins supply 17 kJ approximately (4 kcal) of energy per gram, while fats provide 37 kJ (9 kcal) per gram. Vitamins, minerals, fiber, and water do no provide energy, but are vital for other reasons. Most food contains a mixture of all or some of the seven nutrient classes. However, not having enough or too much of a nutrient, or some nutrients may result in poor health (Nordqvist, 2020).

A dietitian system helps people to evaluate their nutritional status and conditions, and accordingly provides them with nutrition and diet advises. Moreover, it will help people to save their time as they will not need to visit the doctor to evaluate their nutritional conditions. The general idea of the nutritional Informationsystem is asking users many questions related to age, weight, height, gender, and exercise time and type, and accordingly advise them. Knowledge acquisition in any domain including nutrition is not an easy process. The process requires expertise and experience, and may contain inherent calculation errors (Horn, Popow, Miksch, & Seyfang, 2017).

Also, experts are often unable to express explicitly their reasoning process (Becerra-Fernandez,

Gonzalez, & Sabherwal, 2016; Salam & Hoffmann, 2017; Duan, Edwards, & Xu, 2017). This difficulty is considered a major challenge in developing a dietitian system capable of providing accurate and timely diagnosis (Duan, Edwards, & Xu, 2017). Another difficulty that the system developers may face is the need to continuously update the knowledge base of the system. Nevertheless, in domains where knowledge is well established, the development of an Informationsystem offers many benefits to people such as increased timeliness, increased productivity of experts, improved consistency in decisions, improved understanding, and improved management of uncertainty and formalization of knowledge. In nutrition support, the main benefits of Informationsystem are substantial time savings for people and clinicians and an improved quality of care; an Informationsystem's ease of use, robustness, integration, and the maintainability by the clinical experts are the main factors for its success (Horn, Popow, Miksch, & Seyfang, 2017)**.**

Also, according to Bunn, in (2017), he said this kind of system is required particularly in view of large rural population with no access to medical help. There are a number of nutritional systems reported in the literature; the first one is called The Nutrition Diet Program (NDP) which is developed to help the rural population who cannot find dietician or the medical doctor near them. This system provides a customized diet plan for patients; the system prepares this plan based on the many details provided by the user. Another system is for "Nutrition Counseling and Menu Management; this program makes menu planning and manages the eating habit (Hong & Kim, 2017). The third one is a Nutrition Diagnosis Expert System that utilizes Nutritional Care Process and Model (NCPM), which is defined by American Dietetic Association (ADA) in 2008 and integrate the nutrition diagnosis knowledge from dietetics professionals to establish the basics of building the rule based expert system with its knowledge base.

In western part of the world, as any other developing country, health and nutrition is a major challenge. People's awareness of the importance of nutrition to avoid many health-related problems is still not high; Thus, the objective of this developed prototype Information system is to improve people awareness about nutrition by consolidating knowledge from human experts and well-established websites, and accordingly advise them. This developed Information system not only captures knowledge but also apply it. According to WHO (2020), patient empowerment in healthcare is a challenging goal for medical informatics. The ubiquity of technology allows a pervasive tracking of the human behavior that produce a considerable amount of data(WHO, 2020). The basic principle of "quantified self", that has recently been adopted to indicate a field of study for the ubiquitous monitoring of human activities, is to use electronic sensors to acquire user data. Quantified self-answers the necessity to monitor, to show and sometimes suggest virtuous choices in smart systems designed for personal healthcare. In general, in the personal healthcare domain, users can track some10-personal data regarding their activities; in fact, it could be useful to exploit such data in order to elicit a virtuous behavior regarding specific goals, e.g., losing weight, following a healthy diet, exercising regularly, increasing water drinking, increasing sleeping time or correctly assuming drugs. The testing below will be used to achieve the objective.

II. MODULE OR COMPONENT TESTING

Module testing, sometimes referred to as component testing, is a form of software testing in which the various components or modules of the software are tested individually in order to verify if they perform their functions optimally. No software can be deployed unless all components are functioning as they should. This makes the process of component testing crucial to the overall life cycle of a software.

The software consists of two modules or components which are:

i. the frontend application, and
ii. the backend application.

- The Frontend Application
- User Login Interface:

This page accepts the registered email and password of the user which in turn grants said user access to the user profile linked to the earlier inputted login credentials.

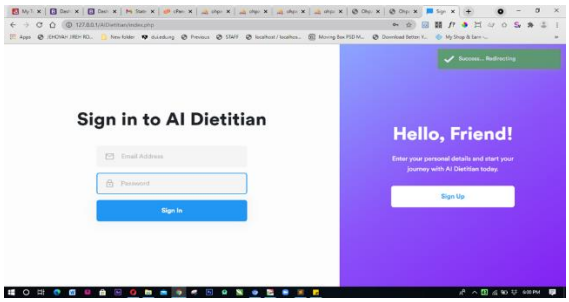

Figure 1 User Login Interface

- User Register Interface

This is where a user can register into the system database. It accepts the new email and password provided by a would-be user as login credentials which will then be used to create a new profile for the user.

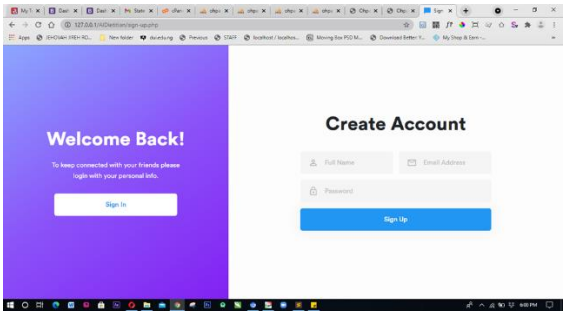

Figure 2 User Register Interface

- User Home Page

After logging in to the profile, the user will be redirected to the home page of the website which gives a brief overview of the system and actions which the user can perform.

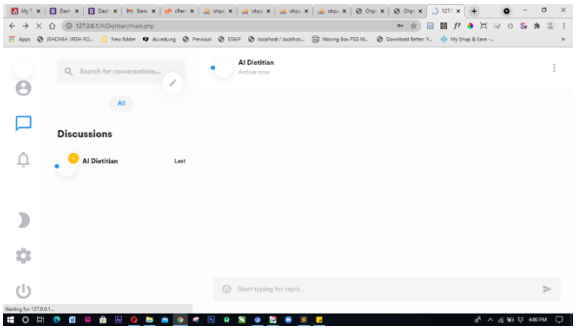

Figure 3 User Home Page

- User Chat Session with Informative dietitian

This page is where the interaction between the user and the Informative intelligent dietitian commences. The user is prompt by a dialog box which welcomes the user and asks the user to initiate the chat by typing in the word “Hello”.

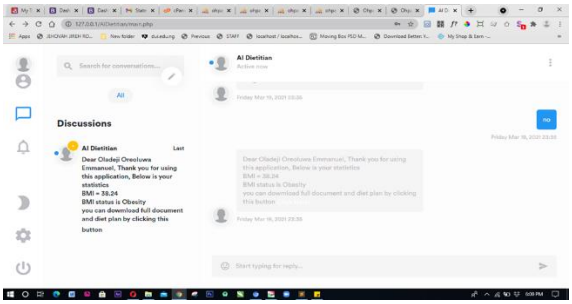

Figure 4 User Chat Session with Informative dietitian

- User Profile Page

This page will provide an overview of the user profile. It will display basic information such as the name of the user, the email and phone number of the user and the number of devices owned by the user.

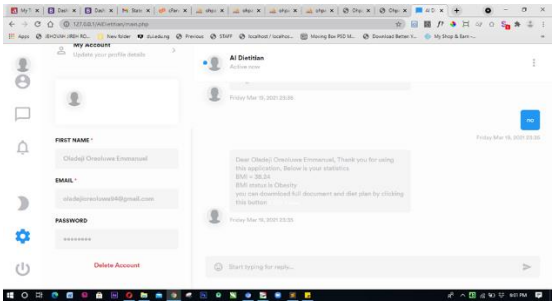

Figure 5 User Profile Page

- Dietitian Meal Plan

This is more like the output or result of the system after the user is done chatting with the Informativedietitian. After the conversation with the Informative dietitian, one can fall into any of these four categories:

i. underweight
ii. normal weight
iii. overweight
iv. obesity

and each of those categories has its own diet plan i.e., proper food intake to maintain good health as directed by the WHO. While testing the system a user was diagnosed as obese and was instructed to download the report, report is shown in Figures 6a, 6b and 6c respectively.

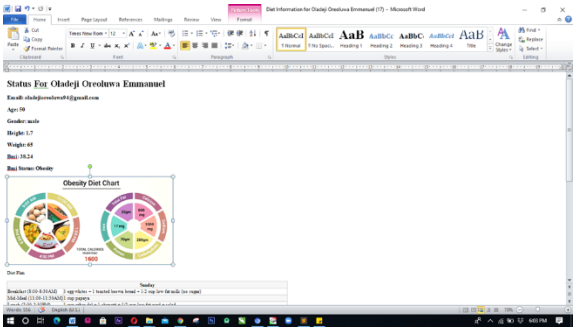

Figure 6a Obese Diet Plan Report (page1/3)

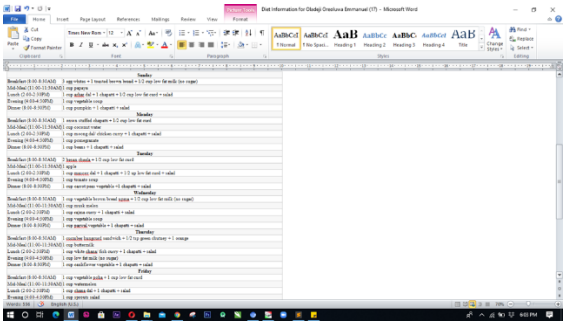

Figure 6b Obese Diet Plan Report

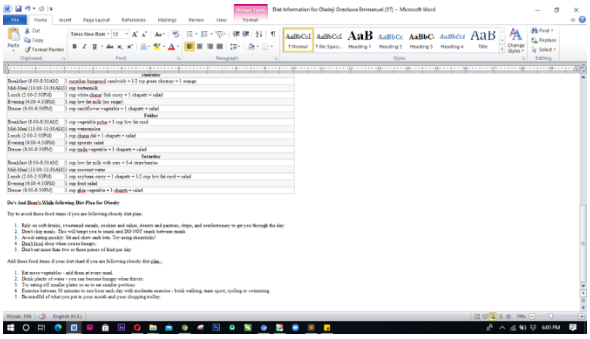

Figure 6c Obese Diet Plan Report

CONCLUSION

In conclusion, people these days are more aware of their health, they are always searching for ways to help them be healthier. The use of Information systems can improve people awareness and help them get a proper healthy style advice. Providing an Information system for nutrition and diet advising adds value to people life especially in developing countries. This rule-based system captures nutrition and diet knowledge from human expert and relevant websites and then presents it in if-then statements format, with necessary healthy living solutions.

REFERENCES

[1] Becerra-Fernandez, Gonzalez, & Sabherwal. (2016). *Knowledge management: Challenges, solutions and technologies.* New Jersey NJ: Pearson Education Inc.

[2] Duan, Edwards, & Xu. (2017). Web-based expert systems: benefits and challenges. *Information & Management*, 799–811.

[3] Hong, & Kim. (2017). Web Expert System for Nutrition Counseling and Menu Management. *J Community Nutrition*, 107 -113.

[4] Horn, Popow, Miksch, & Seyfang. (2017). Benefits of a Knowledge-based System for Parenteral Nutrition Support: a Report after 5 Years of Routin Daily Use. *Proceedings of the 15th European Conference on Artificial Intelligence (ECAI 2017)* (pp. 613–617). Berlin: Van Harmelen, F. (Ed.).

[5] Nordqvist. (2020, December 13). *What Is Nutrition? Why Is Nutrition Important?* Retrieved from Medical News Today: http://www.medicalnewstoday.com/articles/160774.php

[6] Salam, & Hoffmann. (2017). An Advanced Artificial Intelligent Tool for Menu Design. *Artificial Intelligence Laboratory, School of Computer Science and Engineering, The University of New South Wales, Sydney 2052, Australia*, 43-53.

[7] WHO. (2020, August 13). *Healthy Diet.* Retrieved from WHO Internationsal: https://www.who.int/news-room/fact-sheets/detail/healthy-diet