Your Perfect Companion Application for Managing Your Calorie Intake

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Abstract

This research aims to develop an Android application to calculate and track daily calorie intake and expenditure. The main programming languages used were JavaScript, SQL, Kotlin, and Dart, along with design and testing tools such as Android Studio and Figma. The goal is to enable users to conveniently manage their health and nutrition, receive appropriate nutritional and exercise recommendations, promote healthy behaviors, and reduce the risk of diseases related to unbalanced nutrition. The population of this study consisted of individuals residing in Bangkok, Thailand, and a sample of 400 participants was selected using simple random sampling. The results show that the application fully meets its objectives, excelling in ease of use, calculation accuracy, and convenient access via mobile devices. However, some limitations remain, such as an incomplete food database and lack of specific recommendations. Future development plans include integration with smart wearable devices and personalized meal recommendations.

Keywords: Application, Managing, Calories

Background and Statement of the problem

In recent years, awareness of health and nutrition has significantly increased among people around the world. One of the main reasons for this growing awareness is the rapid rise in chronic health problems, particularly non-communicable diseases (NCDs) such as obesity, diabetes, cardiovascular disease, and cancer. These diseases have become major public health challenges in the 21st century. In Thailand, the situation is

particularly concerning. According to the World Health Organization (WHO), NCDs—including cardiovascular disease, cancer, diabetes, and chronic respiratory diseases—are the leading causes of death in the country, accounting for approximately 400,000 deaths annually, or about 74% of all deaths. Additionally, around 32% of the Thai population is overweight and 9% is obese, representing one of the highest rates in Southeast Asia (World Health Organization, 2016).

The primary factors contributing to these health problems are excessive energy consumption and insufficient physical activity. Maintaining a proper balance between caloric intake and energy expenditure is therefore an essential mechanism for preventing and controlling these diseases. However, calculating daily energy requirements and monitoring calorie expenditure through different activities can be complex and often requires specialized knowledge. Various factors must be considered, including weight, height, age, gender, physical activity level, and individual health goals.

With the rapid advancement of digital technology, artificial intelligence (AI) and smart health innovations have emerged as important tools for improving personal health management. AI-based health applications can analyze user data, calculate calorie intake and energy expenditure, and provide personalized recommendations for diet and physical activity. These technological innovations make health management more accessible, convenient, and effective for the general population without requiring extensive nutritional knowledge.

Although many calorie-calculating applications are currently available in the global market, most are designed for users in other countries and may not fully align with the lifestyle, dietary habits, and cultural context of Thai people. In addition, some applications are complex or costly, which limits their accessibility and widespread use. Therefore, the development of an AI-driven healthy innovation application that is suitable for the Thai context, user-friendly, and accessible to people at all levels of society is highly necessary. The main idea of this research is to develop a digital health solution that enables individuals to effectively manage calorie intake and physical activity through intelligent technology.

The development of this AI-based health innovation is expected to have a significant impact on improving people's quality of life. By helping individuals better

understand and manage their health behaviors, the application can support the prevention and control of non-communicable diseases, promote sustainable healthy lifestyles, and enhance overall well-being. Furthermore, such technological innovation also supports national public health strategies aimed at reducing the burden of chronic diseases, lowering healthcare costs, and improving the long-term quality of life for the Thai population.

Objective

1. To develop an application that can accurately calculate and track daily calorie intake and expenditure
2. Promoting health care through appropriate nutritional and exercise advice, while supporting the prevention of diseases caused by unbalanced eating habits

Expected benefits

1. Users have various tools to research and track calorie intake without knowing the balance of energy intake and intensity
2. This helps users modify their eating habits to suit their health goals (e.g., weight loss or maintaining fitness)

Conceptual Framework

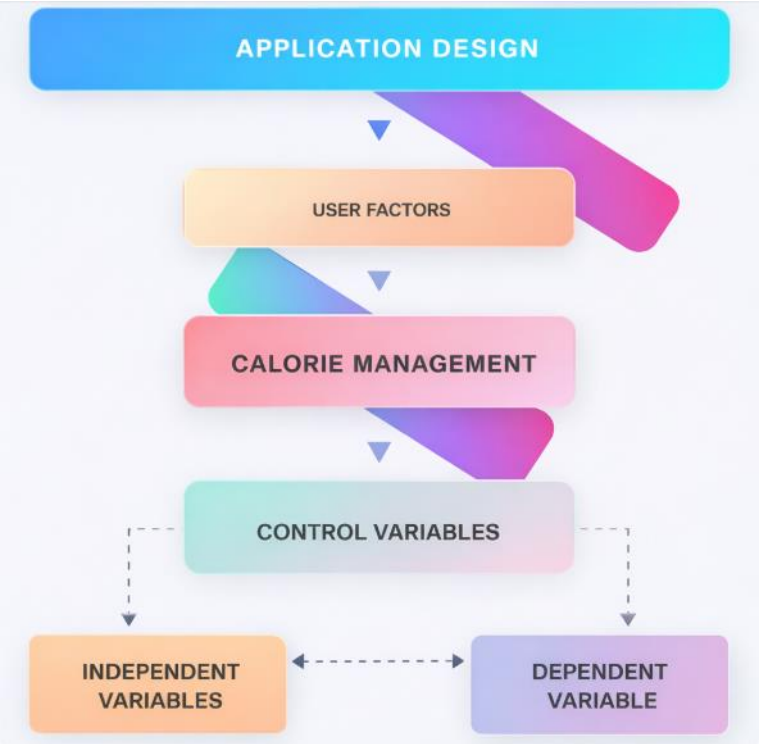

Figure 1 Conceptual Framework

Related Research

Research on calorie counting applications aims to develop a smartphone application tool that allows users to accurately calculate calories consumed and burned, as well as provide knowledge about correct nutrition. This helps users, especially those who want to lose weight or prevent various diseases, make better decisions about healthy eating and plan exercise for weight loss or health control effectively. Therefore, the main objective of the research is to create a tool that helps solve health problems arising from inappropriate food consumption, focusing on raising user awareness and adjusting eating and exercise habits correctly according to nutritional principles (Rung Moolom and Nattapol Kindaw, 2020).

This research on calorie control applications aims to 1) study the development of calorie control applications and 2) determine user satisfaction with calorie control applications. The researchers studied theories related to the project, including the meaning of calories, calorie metabolism, the meaning of body mass index, the

importance of water to the body, and the processes of blood function in the body. In addition, they studied the development of technology systems and programming languages. The calorie control application was developed using Eclipse and Java for greater ease of use. The researchers designed it to be offline so that it can be accessed anywhere without internet access. The researchers began analyzing, designing, and developing the system. The calorie control application is categorized into food groups and can be added to a list of accumulated calories. The application provides calorie information and activity data to help burn energy, calculate body mass index, energy requirements, water needs, and blood volume, allowing users to utilize this information effectively in their daily lives. From the results of the calorie control application development, it can be concluded that the application can function correctly, meets its intended purpose, and demonstrates its capabilities efficiently, ready for practical use (Anongnat Namchomphu, Internet, 2015).

The research on the development of a food recommendation application for weight loss aims to develop an application that assists in the weight loss process, focusing on controlling the amount of food consumed each day to suit the user. This application emphasizes nutritional recommendations and healthy foods to help users effectively control their weight. The goal is for users to choose foods with complete nutrients and reduce the amount of fat and energy accumulated in the body.

The role of this application is to promote knowledge and discipline in eating, as well as making decisions about choosing foods that are appropriate to individual needs, so that users can achieve their weight loss goals and maintain overall health (Wipada Ya-on, Panyaporn Siangyen, Natthasinee Tangsiripaiboon, and Methawat Kawilkrue, 2024).

The research on the project management system for schools under the Nakhon Si Thammarat Primary Educational Service Area aims to develop a project management system. This research aimed to study user satisfaction with a project management system. Nakhian School, under the Nakhon Si Thammarat Primary Educational Service Area 1, was selected as a case study for system development. A purposive sampling method was used, considering the school's personnel readiness and computer network infrastructure. The satisfaction evaluation sample consisted of four schools: Ban Nakhian School, Ban Sarabua School, Ban Khlong Nga School, and Ban Bang Phra School. The

system development followed the principles of the System Development Life Cycle (SDLC) and utilized PHP programming with a MySQL database. The research found a project management system that can serve as a prototype for other schools, preventing data loss, improving work processes efficiency, and ensuring accuracy. Furthermore, the user satisfaction survey revealed a high level of satisfaction across all aspects of the project management system. Based on these findings, the researchers hope this information will be useful in the application of technology. The information will be used to further develop schools under the Nakhon Si Thammarat Primary Educational Service Area (Manoros Borirak Arawin, Sunisa Kidjai, and Jeerawat Naksuwan, 2010).

The research on the development of an information system for managing the Five Precepts Village Project in Nakhon Pathom Province aims to 1) design and develop an information system for managing the Five Precepts Village Project in Nakhon Pathom Province and 2) evaluate user satisfaction with the system. The information system was developed in the form of a web application and the SDLC (System Development Life Cycle) model was used for design and development. Afterwards, the system's efficiency was evaluated by 3 experts, and the user satisfaction of the Five Precepts Village information system was evaluated from a group of users, including officials from the Nakhon Pathom Provincial Buddhist Office and 30 general users (Kairung Hengpraprom, Det Thammasiri, Sutharat Chawanafang, and Supoj Hengpraprom, 2019).

From studying research related to the development of health applications, it was found that calorie calculation applications play an important role in promoting health-care behaviors, focusing on accurately calculating energy consumed and burned, as well as providing appropriate nutritional advice. To help users control their weight and reduce the risk of diseases caused by unbalanced diets (Rung Moolom and Nattapol Kindao, 2020; Wipada Ya-on et al., 2024), this work

Research Methodology

Population, a Sample

The population of this study consisted of individuals residing in Bangkok, Thailand. From this population, a sample of 400 participants was selected using a simple random

sampling method to ensure that every individual in the population had an equal chance of being included in the study.

Data Collection and Study

Existing System Workflow: Describe your system's operation in chronological order.

1) Users must calculate calories from food themselves.
2) Paper or notebooks are used to record calorie consumption.
3) Users do not receive guidance on diet and exercise.
4) Users must track the calorie consumption of those they care for themselves.
5) There is no central system for storing calorie data.

New System Requirements:

1) The system must be able to record and calculate calories consumed.
2) Users can view information and details of daily calorie consumption.
3) Users can view information and guidance on nutrition and exercise.
4) The system can view the user's calorie consumption history.
5) Supports mobile and portable device access.

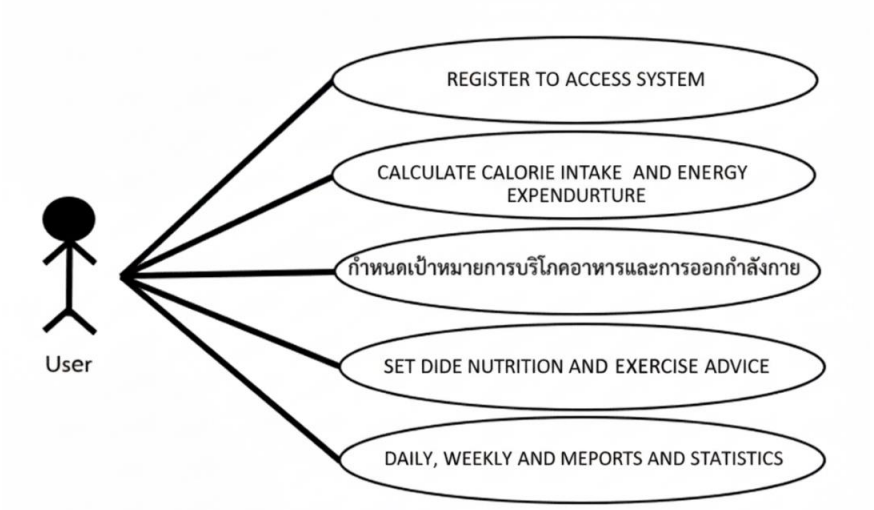

Figure 2 Application screen design

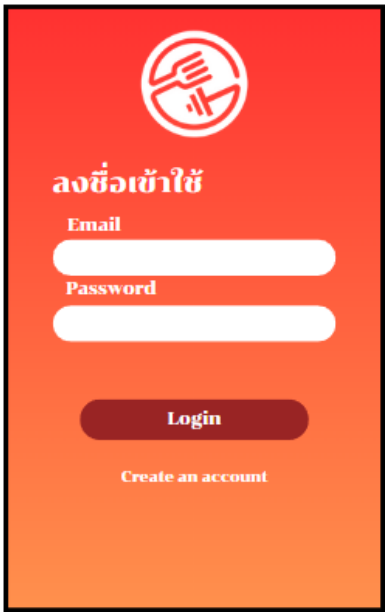

Figure 3 Login screen

Figure 4 Personal information entry screen

Figure 5 Recording menu screen

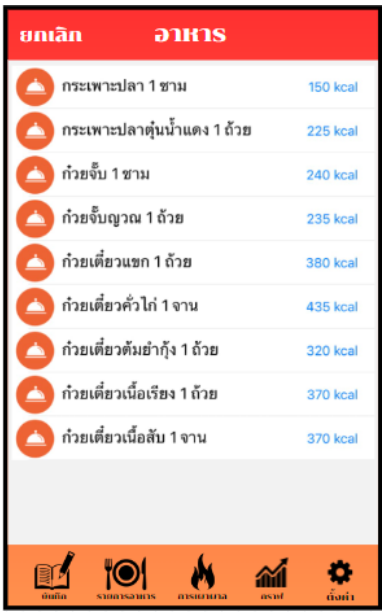

Figure 6 Menu screen

Figure 7 Metabolism screen

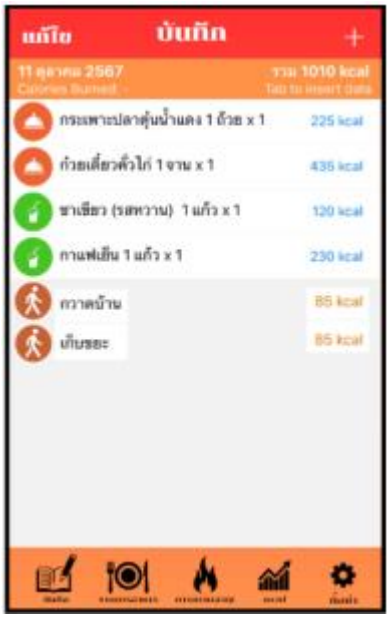

Figure 8 Log entry screen

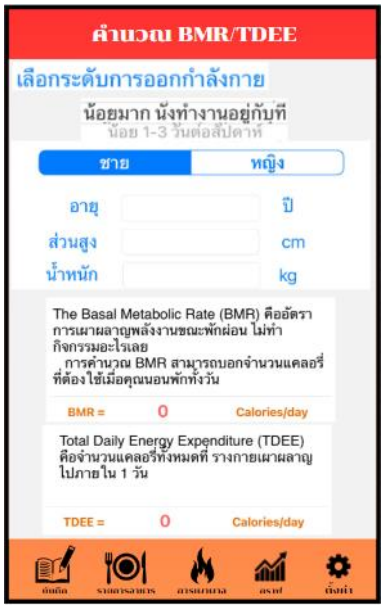

Figure 9 Shows the screen for calculating BMR and TDEE

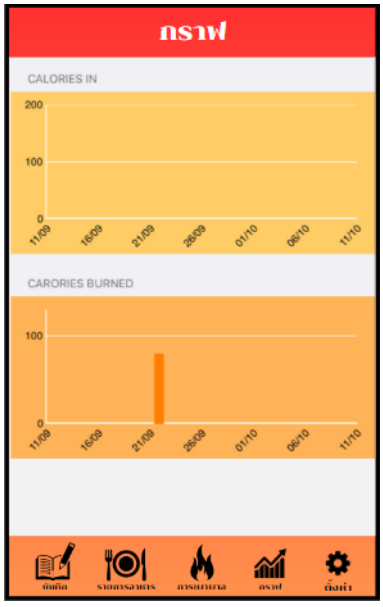

Figure 10 Screen displaying the graph menu

Research Results

The results of this study indicate that the developed application can effectively calculate and track users' daily calorie intake and energy expenditure with a high level of accuracy. The system allows users to input personal information such as age, weight, height, gender, and activity level, which is used to calculate Basal Metabolic Rate (BMR) and Total Daily Energy Expenditure (TDEE). In addition, the application promotes health care by providing nutritional guidance and exercise recommendations to support balanced eating behaviors and encourage regular physical activity, which can help prevent diseases related to unhealthy dietary habits. The application is easy to use, provides fast automatic calculations, and can be accessed conveniently via mobile devices. However, some limitations remain, including an incomplete food database, general nutritional recommendations that may not suit all user groups, and the lack of a notification or motivation system to encourage continuous use. Future development should focus on integrating wearable device connectivity, linking with healthcare systems for personalized health monitoring, and developing meal planning features that align with users' daily calorie needs.

Summary

User Evaluation Table

Instructions: Please rate your satisfaction with the system in each aspect from 1 to 5, where:

- 1 = Not satisfied at all
- 2 = Not satisfied
- 3 = Moderate
- 4 = Satisfied
- 5 = Most satisfied

Table 1 User Evaluation

ASSESSMENT CRITERIA	USER 1	USER 2	USER 3	USER 4	USER 5	AVG.	SATISFACTION LEVEL
1. overall system usability							
***1.1** ease of access and use*	5	4	5	5	4	4.6	Strongly Satisfied
***1.2** speed of processing*	4	3	4	4	5	4.0	Satisfied
***1.3** data reliability*	5	5	5	4	5	4.8	Strongly Satisfied
2. application design							
***2.1** visual aesthetics (ui)*	4	5	4	5	4	4.4	Satisfied
***2.2** convenience of use (ux)*	5	4	5	5	4	4.6	Strongly Satisfied
***2.3** clarity of text and icons*	5	5	4	4	5	4.6	Strongly Satisfied
3. calorie management							
***3.1** accuracy of calorie calculation*	4	4	5	5	4	4.4	Satisfied
***3.2** ease of data logging*	4	5	5	4	5	4.6	Strongly Satisfied
***3.3** benefits of using features*	5	5	4	5	5	4.8	Strongly Satisfied

Summary of Evaluation Results

• Overall System Usability: The average score is high (4.0-4.8), considered "satisfactory" to "most satisfied," indicating that the system is easy to use, fast, and presents information well.

• Application Design: The average score is 4.4-4.6, considered "satisfactory" to "most satisfied," indicating that the user interface (UI/UX) is aesthetically pleasing and user-friendly.

• Calorie Management: The average score is 4.4-4.8, considered "satisfactory" to "most satisfied," indicating that the system can accurately calculate and record data, and users greatly benefit from using this feature

Overall Summary:

Evaluations from 5 users indicate that the system is well-designed and developed in all aspects, including overall usability, design, and calorie management functions. All areas received an average score above 4.0, reflecting a level of user satisfaction ranging from "satisfactory" to "most satisfied" with the system.

Expert Evaluation Table

Instructions: Please rate your opinion on each aspect of the system from 1 to 5, where:

- 1 = Needs significant improvement
- 2 = Needs improvement
- 3 = Acceptable
- 4 = Good
- 5 = Excellent

Table 2 Expert Evaluation

Assessment Criteria	*Expert 1*	*Expert 2*	*Expert 3*	*Avg.*	*Quality Level*
1. Usability					
1.1 Smooth and error-free operation	5	4	5	4.67	Excellent
1.2 Consistency with standards	4	5	4	4.33	Good
1.3 User data security	5	5	5	5.00	Excellent
2. UI/UX Design					
2.1 Aesthetics and layout	4	5	4	4.33	Good
2.2 Intuitive and simple design	5	4	5	4.67	Excellent
2.3 Responsiveness	5	5	4	4.67	Excellent
3. Functionality (Calorie Management)					
3.1 Accuracy of formula calculation	5	5	5	5.00	Excellent
3.2 Diversity of food menu coverage	4	4	5	4.33	Good
3.3 Appropriateness of recommendations	5	5	4	4.67	Excellent

Findings

1. System Usability: The evaluation results indicate that the system usability received a very high average score ranging from 4.67 to 5.00, which is rated at the "Excellent" level. This finding shows that the application operates correctly, effectively meets user requirements, and complies with expected system standards.

2. Application Design (UI/UX): The application design was evaluated with an average score ranging from 4.33 to 4.67, which falls between the "Good" and "Excellent" levels. This result indicates that the application has a well-organized layout, user-friendly interface, and responsive display that can adapt effectively across different devices.

3. Overall System Quality: The overall evaluation conducted by three experts demonstrates that the developed system has high quality in both performance and design aspects. All evaluation criteria received average scores above 4.00, confirming that the application is reliable and capable of effectively meeting user needs.

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