

DESIGN AND DEVELOPMENT OF A MINI PROGRAM IN WECHAT APPLICATION TO ASSISTING CHINESE TOURISTS IN IDENTIFYING THAI VEGETABLES



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DESIGN AND DEVELOPMENT OF A MINI PROGRAM IN WECHAT APPLICATION TO ASSISTING CHINESE TOURISTS IN IDENTIFYING THAI VEGETABLES



A Master's Project Submitted in Partial Fulfillment of the Requirements for the Degree of MASTER OF ARTS (Master of Arts (Design for Business)) College of Social Communication Innovation, Srinakharinwirot University 2023

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THE MASTER'S PROJECT TITLED

DESIGN AND DEVELOPMENT OF A MINI PROGRAM IN WECHAT APPLICATION TO ASSISTING CHINESE TOURISTS IN IDENTIFYING THAI VEGETABLES

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HAS BEEN APPROVED BY THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF ARTS IN MASTER OF ARTS (DESIGN FOR BUSINESS) AT SRINAKHARINWIROT UNIVERSITY

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THAI VEGETABLESAuthorTIAN GAODegreeMASTER OF ARTSAcademic Year2023Thesis AdvisorAssistant Professor Dr. Noppadol Inchan

This study aims to bridge the gap in knowledge about Thai vegetables among Chinese tourists visiting Thailand. Through a combination of questionnaires and literature reviews, the researchers identified a lack of familiarity with Thai vegetables among Chinese tourists, potentially influenced by regional cultural differences and eating habits. To address this, this study proposes the development of a WeChat mini program as an educational tool to assist Chinese tourists in identifying and understanding Thai vegetables. Materials and Methods: Data was collected through questionnaires administered to Chinese tourists to determine their level of knowledge and familiarity with Thai vegetables. The findings were complemented by a comprehensive literature review on the types, nutritional values, and promotion status of Thai vegetables in the Chinese market. The questionnaire survey revealed specific Thai vegetables that were unfamiliar to Chinese tourists. This information was then incorporated into a database to develop the "Identifying Thai Vegetables" WeChat mini program. The "Identifying Thai Vegetables" WeChat mini program is a well-designed and effective tool that facilitates the identification of Thai vegetables and enhances users' understanding of Thai cuisine and culture. By continuously innovating and expanding its features, the mini program has the potential to become an indispensable resource for individuals interested in exploring the rich culinary landscape of Thailand, promoting awareness and increasing the consumption of Thai vegetables among Chinese tourists.

Keyword : Chinese tourists; Thai vegetable; WeChat Mini-program; Cultural understanding; Culinary tourism; Identification tool.

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TIAN GAO

TABLE OF CONTENTS

Pa	age
ABSTRACT	D
ACKNOWLEDGEMENTS	E
TABLE OF CONTENTS	F
LIST OF TABLES	Η
LIST OF FIGURES	.1
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 Research objectives	4
1.3 Scope of the study	5
1.4 Benefit(s) of the study	5
1.5 Definition of terms	5
1.6 Conceptual Framework	6
CHAPTER 2 LITERATURE REVIEW	8
2.1 Thai Vegetables	9
2.2 Chinese-Thai Language10	0
2.3 UX/UI Design (UX/UI)12	2
2.4 Technologies that involve language-assisting program/ program	3
2.5 Article/Research Papers1	7
CHAPTER 3 RESEARCH METHODS	4
Step 1: Investigate the unfamiliar vegetables in the supermarkets that Chinese	
tourists	4

Step 2: Design a questionnaire to know the vegetables
Step 3: Designed and developed wechat mini program to educate Chinese tourists.
CHAPTER 4 DATA ANALYSIS AND RESEARCH RESULTS
Step1: To study the Thai words for vegetables that are difficult for Chinese tourists in
Thailand to understand
Step2: Design a questionnaire survey and draw a final conclusion about which
vegetables are least familiar to Chinese tourists
CHAPTER 5 CONCLUSION, DISCUSSION AND SUGGESTION
5.1 Conclusion
5.2 Discussion
5.3 Suggestion
REFERENCES
APPENDIX
VITA

LIST OF TABLES

			Page
Table	1 Result of the	vegetable survey	. 31
Table	2 Result of the	16 kinds of vegetable questionnaire	. 33



LIST OF FIGURES

	Page
Figure 1 Conceptual Framework	7
Figure 2 Diverse Vegetable Assortment: A Snapshot of Big C Supermarket by	
researcher. 2023	24
Figure 3 Diverse Vegetable Assortment: A Snapshot of Foodland Supermarket by	
researcher. 2023	25
Figure 4 Diverse Vegetable Assortment: A Snapshot of Huai Khwang Market by	
researcher. 2023	25
Figure 5 The draft of design of mini program main interface (End to End)	38
Figure 6 Mini program main interface	40
Figure 7 Mini program select photo interface	41
Figure 8 Mini program photo interface	42
Figure 9 The mini program is identifying	43
Figure 10 The end result of the mini program	44
Figure 11 The process of identifying Eryngium	45
Figure 12 The process of identifying Sunflower seedling	46
Figure 13 The process of identifying thai pepper	46

CHAPTER 1 INTRODUCTION

1.1 Background

Between January 1 and June 25, 2023, Thailand received 12.46 million tourists, marking a 539% increase compared to the same period the previous year. The top five source countries for tourists to Thailand were Malaysia with 1.98 million visitors, China with 1.38 million, Russia with 784,000, South Korea with 741,000, and India with 732,000 (Bangkok Post, 2023). Projections indicate that the influx of foreign tourists to Thailand will continue to grow in the second half of 2023, surpassing the numbers recorded in the first half. According to a report by the Kailai Research Center of Thailand, the total number of foreign tourists entering Thailand in 2023 is expected to reach 28.5 million (Yingmin, L. 2023).

Given China's emergence as the largest source of tourists to Thailand and the strong bilateral relations between the two nations, a significant number of Chinese nationals travel to Thailand for business and many also reside in the country. However, language barriers present considerable challenges, as many Chinese individuals do not understand Thai. The Thai language, with its complex phonetic and tonal structure, poses particular difficulties for Chinese speakers. The Thai language comprises 44 consonants and 15 vowel phonemes (Nadeau, J. L. & Nadeau, J. 2017). As a tonal language, Thai relies on five distinct tones to convey different meanings, making accurate pronunciation essential for comprehension. Additionally, the grammatical structure of Thai diverges from that of Chinese; it typically lacks explicit verb conjugation between the subject and predicate, relying instead on word order and auxiliary words.

learners to master an entirely new set of characters for reading and writing. Furthermore, Thailand's cultural and social norms differ significantly from those of many Western countries, necessitating an understanding and correct application of proper etiquette and respect in the learning process. In addition to the complexities of the Thai language, Chinese tourists often face challenges in identifying Thai vegetables. Given Thailand's tropical climate, many local vegetables are unfamiliar to Chinese visitors and are prepared using distinct culinary methods. Upon arrival in Thailand, Chinese tourists may find it difficult to acclimate to the local produce and may hesitate to try unfamiliar vegetables. While visual aids, such as images, can sometimes help tourists recognize the ingredients in their meals, they often remain uncertain about the specific contents of the dishes they are consuming.

Chinese tourists often express an appreciation for Thai cuisine and actively seek to sample various Thai dishes during their travels in Thailand. However, linguistic challenges frequently arise when they attempt to pronounce food-related vocabulary, given the inherent difficulties of the Thai language. Thai cuisine incorporates a wide variety of vegetables, yet Chinese tourists may struggle to correctly identify or name these vegetables. This challenge extends to grocery stores and supermarkets, where unfamiliar vegetables can pose identification difficulties in terms of type, variety, or nomenclature. In multicultural settings, these language barriers can further complicate the recognition and understanding of specific vegetables. Consequently, there is a need for a dedicated mini program to assist Chinese tourists in efficiently and accurately identifying Thai vegetables, thus enhancing their overall culinary experience and reducing communication hurdles.

According to an old Chinese saying, "民以食为天" (Food is the life of the people), if the Chinese eat well, they will feel that they live a good life. In a foreign country, the ability to quickly identify food ingredients is important for helping Chinese tourists adapt to foreign life faster and strengthening essential daily life skills. Leveraging technology is an effective solution as it provides convenience and speed when tourists need information quickly.

With the advancement of artificial intelligence, there are already applications and software on the market for identifying plants, flowers, fruits, and vegetables, which are very educational for recognizing various flora (Zong K, Z. 2023). Today, with the widespread use of mobile devices, the number of queries on these devices has increased, and users typically search for information online. However, sometimes relevant information cannot be found on the Internet. Some software is useful for identifying plants, agriculture, and related education, but there are few apps specifically for identifying vegetables and dishes. The existing identification tools exhibit regional differences; Chinese software cannot identify Thai vegetables, and Thai software lacks Chinese language support.

By analyzing the strengths and weaknesses of plant retrieval systems both domestically and internationally, (Zhang, Y. 2004) developed an application utilizing fuzzy recognition and name retrieval by integrating plant characteristics with retrieval tables and image information. This approach effectively facilitates plant learning and simple retrieval. The application provides convenient and practical plant retrieval and identification services for international tourists, enabling non-botany professionals and travelers to identify plants more efficiently, quickly, and accurately, thereby enhancing their botanical knowledge.

A comparison of existing Chinese translation software reveals various functionalities across different applications. Some include images and pronunciation features. Most of the translation software available on the market can be downloaded for free and supports multiple input methods, including text, speech, and image translation. Additionally, some software offers voice output, while others may have regional restrictions or provide support for parsing key and difficult words.

WeChat is very popular in China, and everyone uses it. WeChat can be used in Thailand without any issues. As a comprehensive platform, WeChat has penetrated every aspect of daily life, not only changing communication methods and payment habits but also bringing new possibilities and convenience to various fields such as business, media, and social networking. WeChat mini programs are lightweight applications based on the WeChat platform. These mini programs are smaller and more convenient than traditional applications, allowing users to open and use them directly within WeChat without installation. Users can access them by scanning QR codes, searching, or from the recommended entrances in WeChat, and close them after use without occupying additional storage space. Mini programs can seamlessly integrate WeChat's social, payment, sharing, and other functions, covering a variety of application scenarios, including business services, social communication, education, entertainment, and more, providing users with rich functions and services. WeChat provides the framework and tools for developing mini programs, such as WeChat developer tools and mini programs development documents, making it relatively easy for developers to create and publish mini programs (WeChat, 2023).

Moreover, important information about Thailand's wide variety of vegetables is scarce in the existing applications available for Chinese tourists. Similar to "shape and color recognition of flowers," current tools are more inclined to identify flowers and trees, lacking comprehensive recognition for vegetables. Additionally, Google's recognition is relatively monolingual, typically supporting only one language at a time. With an increasing number of Chinese tourists studying abroad, many are unfamiliar with Thai vegetables and their culinary uses. At present, there is no software that provides bilingual translation and information display for Thai vegetables. This mini program will be developed and integrated with existing applications such as WeChat. Given that WeChat is widely used by Chinese tourists, leveraging this platform can increase user interest and convenience. Thus, the author aims to research and develop a new mini program.

In summary, this paper aims to investigate the design of a mini program intended to assist Chinese tourists in Thailand with the accurate identification of Thai vegetables. This mini program will serve as an educational tool, enabling users to familiarize themselves with various Thai vegetables and practice their identification skills.

1.2 Research objectives

1.To study the Thai words for vegetables that are difficult for Chinese tourists in Thailand to understand.

2.To design and develop a mini program in WeChat for assisting Chinese tourists in identifying Thai vegetables.

1.3 Scope of the study

1. Population and sample:

Chinese tourists - The subjects of the study were Chinese tourists who visited to Thailand and stay in Bangkok's Huai Khwang District more than 7 days.

2. Content - Thai seasonal vegetables.

Chinese tourists in Thailand are Chinese who need to stay in Thailand for a while and are curious but not aware of Thailand's tropical vegetables.

The researcher will use vegetable divided into seasons in Thailand, inclouding summer, raining, and winter.

1.4 Benefit(s) of the study

This mini program is designed for Chinese tourists in Thailand to help them understand the names and culinary uses of local vegetables. It aims to address the language barriers and unfamiliarity with Thai vegetables that many Chinese tourists face, thereby making their stay in Thailand more convenient. The software provides valuable assistance to Chinese tourists temporarily living in Thailand by helping them identify vegetables more conveniently, quickly, and accurately. It also offers information on cooking methods, enhancing the interest, practicality, and efficiency of cooking. Additionally, it prevents users from purchasing vegetables that do not suit their tastes, thereby reducing food waste.

1.5 Definition of terms

When designing this mini program, researcher need to understand the basis and significance of the mini program, the popularity of bilingual application, the unfamiliar degree of Thai vegetables to Chinese tourists, and the distribution of Chinese tourists in Thailand. In the vegetable identification application, the most important thing is to understand the user's understanding of Thai vegetables. Set the range of vegetables in the software.

WeChat: WeChat is a multifunctional instant messaging software developed and operated by China's Tencent, designed to provide users with a variety of communication methods and rich services

Mini program: WeChat mini program is a lightweight application that users can open and use directly within WeChat without downloading and installing.

WeChat mini programs utilize various methods for data storage and data collection, ensuring both functionality and user privacy. Data storage typically involves leveraging WeChat's cloud infrastructure, where user-specific information, preferences, and application data can be securely stored. This cloud-based approach allows for efficient access and management of data across devices, ensuring seamless user experiences.

Bilingual application: Two languages can be reflected in the application, which is convenient for users traveling abroad to use and understand

Thai vegetable: The designer finds out the Thai vegetables that Chinese tourists are not familiar with through a questionnaire survey, summarizes them and organizes them in the WeChat mini program.

Chinese tourists: Chinese tourists staying in Thailand for more than 7 days.

1.6 Conceptual Framework

This flow chart shows the conceptual framework of the research "design and development of a WeChat mini program for assisting chinese tourists in identifying thai vegetables"



Figure 1 Conceptual Framework

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CHAPTER 2

LITERATURE REVIEW

This chapter includes the concepts of the application of Thai vegetables, Chinese and Thai Language,UX/UI design, Database and Languge Assisting Program, Article and Research Papers, as follow:

- 2.1 Thai Vegetables
 - 1) Kinds of vegetables
 - 2) Vegetable classification
 - 3) summary
- 2.2 Chinese-Thai Language
 - 1) Thai language system
 - 2) Chinese and Thai translation
 - 3) summary
- 2.3 UX/UI Design
 - 1) UX/UI
 - 2) summary
- 2.4 Database and Language Assisting Program
 - 1) Database on image recognition software
 - 2) Computer vision and image recognition
 - 3) Cross-platform compatibility
 - 4) summary
- 2.5 Article/Research Papers

2.1 Thai Vegetables

1) Kinds of Thai vegetables classified by season

An exploration of Thailand's context highlights that its focus on modern culinary traditions stems from a distinctive history of decolonization, Buddhist philosophies, the influence of the monarchy, and strategic national economic development. The study then details the four fundamental components of Thai cuisine, essential cooking methods, and how everyday Thai individuals compose their meals by combining dishes with various characteristics. These characteristics expand upon three key concepts: element, refinement, and vibrancy. The sequence of dining and social interactions during meals are discussed in greater depth (Seubsman, S.-A., Suttinan, P., Dixon, J., & Banwell, C. 2013)

Investigated Thai eating habits, changes, preferences, and acculturation in the United States. Through this paper, I can learn how to conduct questionnaire research, how to select research groups, changes in diet, and preference for vegetables. In this paper, it is shown that acculturation is significantly positively correlated with the consumption and preference of some local foods and significantly negatively correlated with the consumption and preference of some native foods (Sukalakamala, S., & Brittin, H. C. 2006).

2) summary

Through the classification of vegetables and the differences between tourist and regions, the author can organize and classify Thai culture well. Under the influence of regional and cultural environment, foreigners have a different understanding of the country they live in. There will be curiosity to try new food. There will also miss the taste of home psychology. The creation of this software can help Chinese tourists studying in Thailand to better understand Thai vegetables, so that they can deal with their loneliness in a foreign country.

2.2 Chinese-Thai Language

1)Thai language system

According to Nadeau, J. L. & Nadeau, J. (2017), alphabet and phonemes Thai uses the Thai alphabet, which contains 44 consonants and 15 vowel phonemes, some of which may not exist in other languages and therefore require additional learning and practice.

Tone: Thai is a tonal language, meaning that the meaning of a word can change depending on the tone of its pronunciation. Thai has five different tones, and correct pronunciation is crucial to understanding meaning.

Complex grammar: The grammatical structure of Thai is quite different from that of some Western languages such as English. For example, there is usually no explicit verb conjugation between the subject and the predicate, but is expressed through word order and auxiliary words.

Different writing system: The Thai alphabet is different from the Latin alphabet, which means that learners need to master a new alphabet to read and write Thai.

Cultural and Social factors: Thailand's cultural and social habits are different from those of many Western countries, so understanding and correctly applying proper etiquette and respect is part of learning Thai.

2) Chinese and Thai translation

As a new form of application, WeChat mini program has the characteristics of no need for separate installation and a good user experience. Also, it provides a new platform and innovation space for mobile learning. Mobile learning has also begun to be widely accepted by the public, and many people, especially young people, are more willing to choose mobile learning (Tang, Y. X. 2021). Learning freedom, but also more independence, in the background of supporting the traditional classroom to improve the interest in learning while improving the efficiency of learning. There are various learning mini program and public accounts on the market, but most of them are about English learning or various kinds of exam guidance. As a non-universal language, the use of Thai is relatively narrow. Most of the existing public accounts or mini program related to Thai or Thailand push articles related to Thai tourism, cuisine, folk culture, current politics, etc... At the same time, there are relatively few articles about systematic learning of Thai. Therefore, to learn the basic knowledge of Thai in a better and more comprehensive way, this team develops and designs based on the actual learning of Thai A WeChat mini program called "Taikuai", compared with some existing public accounts," Taikuai "WeChat mini program adds a lot of basic knowledge of Thai language on the basis of the original public number. The WeChat mini program uses text combined with video, audio, figures, and other ways to present the content vividly, adding learning fun for learners.

3) Summary

By studying the differences between Thai and Chinese, we understand the difficulties of Thai, which creates a great necessity for the creation of this product. With the rapid development of the information age and the wide popularity of mobile devices, mobile phones are playing an increasingly important role in the lives of contemporary young people. WeChat, the communication medium with mobile phones as the carrier, is also sought after by many young people. Its powerful functional system provides a new learning way for language learning. In order to effectively combine traditional classroom learning and online independent learning, and realize the mixed learning mode of online and offline, this paper designs a mini program suitable for professional Thai learners or Thai lovers to learn relevant basic knowledge of Thai language learning to improve the utilization rate of Thai language learning resources and tourists' learning interest.

2.3 UX/UI Design (UX/UI)

1) UX/UI

The application's user interface should be user-friendly, allowing users to easily upload images, view recognition results, and get more information. User interfaces should be designed to consider the needs and skill levels of different users.

Research on User experience design of food mini programs based on users' social characteristics. In the design and research of food mini programs, too much attention is paid to the development of their functionality. Still, the design of social functions is not studied from the perspective of users. At the strategic level, the social features of user topic commonality, relaxed atmosphere and emotional proximity suggest the psychological needs of users. At the scope level, the user's social behavior reflects the user's usage habits. By studying the interaction design of the structural layer, the interface layout of the framework layer and the visual design of the presentation layer of the specific social module in the typical food mini programs, the design principles of the social function of the food mini programs are summarized, which provides evaluation criteria for analyzing and evaluating the social module design in the food mini programs, and provides a theoretical basis for improving the social experience of users (Xu, Y. & Bao,Y. 2017).

The visual design of food application, and then puts forward the visual design strategy of food mini programs based on regional cultural experience. From the three aspects of regional characteristics of visual style, cultural image of visual ICONS and hierarchical content of visual information, it discusses how to make the visual design of food applications not only spread regional and food culture, but also meet the needs of food mini programs Users' aesthetic needs, functional needs and emotional needs (Li, R. & Huang, W. 2023).

In the design of a vegetable recognition application, the choice of color scheme significantly impacts user experience and the application's usability. According to the research by Wang Li and Li Jie (2019), green is identified as the most appropriate primary color. This choice is based not only on green's natural association with vegetables, which intuitively communicates the application's purpose, but also on its visually soothing and relaxing effect, enhancing user comfort and satisfaction. Additionally, green, as a color symbolizing health and positivity, fosters user trust and affinity towards the application. Therefore, selecting green as the primary color in the design of a vegetable recognition application is the optimal choice, considering both user experience and functionality.

2) Summary

Based on the review of other literature, the user interface of the software should adhere to user-friendly principles, enabling users to conveniently upload images, view identification results, and access additional information. The design of the user interface should consider the diverse needs and skill levels of users, primarily utilizing the predominant colors of vegetables. Furthermore, providing educational materials about vegetables will help users better understand their characteristics, uses, and nutritional values. Encouraging user participation, feedback, and the sharing of experiences will also contribute to the improvement of the mini program.

2.4 Technologies that involve language-assisting program/ program

1) Database on image recognition software

Database storage and simplification

The research and application of cloud database systems is becoming increasingly extensive, which mainly aims at the corresponding creation operation of SQL or business environment access objects, forming a data system with optimized relative properties and deploying in bandwidth requirements. The cloud database system simplifies the operation of application information, supports the integrated storage of information in business software programs, and automatically switches data backup from the monitoring list intelligently according to the portability inherent in the cloud database system. This study mainly discusses the overview and characteristics of cloud database systems and explores the deep application of cloud database system technology (Wang, W. D. 2017).

Learn how to simplify some features that repeat hundreds of times in a complex information system so the system will not be complicated. Therefore, identifying these characteristics and proposing suitable design solutions can simplify these complex systems' development and maintenance. The proposed design patterns are illustrated using UML diagrams in a generalized manner, enabling their application across diverse web development platforms and facilitating development with widely-used object-oriented programming languages. (Al-Hawari, F. 2022).

2) Computer vision and image recognition

This is the core concept of the application, based on computer vision techniques such as convolutional neural networks (CNN), etc., to process and recognize uploaded vegetable images. These techniques can help the mini program understand features in the images to identify vegetables.

Information Technology and Informatization. With the rapid development of artificial intelligence technology, the network image recognition technology of machine learning has achieved great success in computer vision system and production life. By using machine learning, a computer network image recognition system is constructed by cross-validation, fitting, accuracy, feature selection and dimensionality reduction. The results show that the machine learning algorithm improves the stability and multi-domain application of computer image recognition by cross-validation and bias operation of decision tree units. Feature vector extraction, edge information, texture features and other recognition techniques also improve the accuracy of image recognition (Li, X. F. 2022).

With the development and progress of computer technology, image processing technology and pattern recognition theory, a new image recognition technology - neural network image recognition technology has been produced. Through the application of this technology, the accuracy and effectiveness of image recognition have been improved. In this paper, based on the neural network, the image recognition system is researched and designed (Wang, L. 2021).

The intelligent image recognition system studied in this paper takes business card images as the recognition object and mainly studies the main algorithms in the process of business card image recognition. This paper first introduces the significance, background, and research status of business card recognition and then analyzes the overall framework of the software system, including image preprocessing, layout analysis, character segmentation, and recognition and classification. Then the function modules of each step are explained respectively, the related algorithms involved in each part are compared and discussed, and the experimental results of this paper are given at last. The main research of this subject is software algorithm, aiming at the recognition of business card images captured by mobile phones. In this paper, the improved Bersen algorithm is used to binarize the image, Unger smooth filtering and fast labeling methods are used to denoise the image, and tilt correction is carried out based on the rectangular frame features of the business card image. Then, the paper uses a connected domain method combined with expansion processing to analyze the image layout. Then, The author of the document use a "water drop" algorithm to optimize the character segmentation, and based on this character recognition (Zheng, R. H. 2013).

This article elucidates how deep learning enables computers to autonomously learn pattern features. It primarily reviews various neural network architectures in plant image recognition and the latest advancements in neural network improvements. Additionally, it discusses three significant future directions for plant image data acquisition and processing methods. By summarizing the research progress in plant image recognition over the past five years, the article offers the most recent and practical insights for addressing related challenges (Chen, Y., Huang, Y., Zhang, Z., Wang, Z., Liu, B., Liu, C., & Qian, W. 2023).

The researcher can learn how to quickly and accurately classify or identify vegetables according to quality standards through this literature (Dataset of vegetable quality images for machine learning applications.). Machine learning and deep learning technology are also desirable technologies in classification and target detection. At the

same time, the basic condition for developing accurate and reliable machine learning models for real-time environments is a clean data set. To generate the data set, we start simply by classifying a variety into different levels: (1) immature, (2) mature, (3) damaged, and (4) intact. With the corresponding data set, machine learning models for vegetable classification can be well developed, evaluated, and validated (Suryawanshi, Y., Patil, K., & Chumchu, P. 2022).

3) Cross-platform compatibility

Ensure that the application can run on different operating systems and devices to expand the user base

In the era of rapid development of information technology, the application of Internet technology in enterprises is more and more extensive. With the expansion of enterprise scale, the increase of office area, and the complex and changeable working environment, a single Internet technology can no longer meet the needs of enterprise mobile office. The emergence of mobile Internet technology has injected new force into the development of enterprise informatization. It rebuilds the platform through a combination of wireless communication, desktop virtualization and information security technologies to upgrade traditional applications to a new service-oriented architecture. Enterprise employees can access the application system through mobile terminals without any data transplantation, and can easily access the terminal through the virtual service network, which facilitates office work and effectively improves work efficiency(Wang, G., Guo, A., Gong, L., Yang, Z., & Li, X. 2017).

4) Summary

Through the research of the above three points, the author concludes that the software designed by the author can be better improved through the storage and simplification of the database, computer vision and image recognition, and the theoretical research of cross-platform compatibility. Related technologies can be used to simplify the operation of application information in the cloud database system of the product designed by the author, support the integrated storage of information in business software programs, and automatically and intelligently switch the data backup in the monitoring list according to the inherent portability of the cloud database system. Identifying these vegetable characteristics and proposing suitable design solutions for them can simplify the development and maintenance of these complex systems. In the aspect of image recognition, with the development and progress of computer technology, image processing technology and pattern recognition theory, a new image recognition technology - neural network image recognition technology has been produced. Through the application of this technology, the accuracy and effectiveness of image recognition are improved.

2.5 Article/Research Papers

Suryawanshi, Y., Patil, K., & Chumchu,P. (2022) studied that VegNet: Dataset of vegetable quality images for machine learning applications. They found that through this literature, author can learn how to quickly and accurately classify or identify vegetables according to quality standards. Machine learning and deep learning technology are also desirable technologies in classification and target detection. At the same time, the basic condition for developing accurate and reliable machine learning models for real-time environments is a clean data set. To generate the data set, we start simple by classifying a variety into different levels (1) immature, (2) mature, (3) damaged, and (4) intact. With the corresponding data set, machine learning models for vegetable classification can be well developed, evaluated and validated.

Al-Hawari, F. (2022) studied that Software design patterns for data management features in web-based information systems. He found that how to simplify some features that repeat hundreds of times in a complex information system, so that the system will not be complicated. Therefore, identifying these characteristics and proposing suitable design solutions for them can simplify the development and maintenance of these complex systems. The proposed design patterns are documented using UML diagrams in a generic way, so that they can be used in different web development platforms and allow for development using popular object-oriented programming languages.

Tang, A., Aleti, A., Burge, J., & van Vliet, H. (2010) studied that What makes software design effective? They found that how to design an effective software and how to design software. Software design is a complex cognitive process in which decision making plays an important role, but our understanding of how decisions are made is limited, so in this study we learned to observe software designers at work and analyze how they make decisions during the design process.

Sukalakamala, S., & Brittin, H. C. (2006). studied that Food practices, changes, preferences, and acculturation of Thais in the United States. They found that investigated Thai eating habits, changes, preferences, and acculturation in the United States. Through this paper, I can learn how to conduct questionnaire research, how to select research groups, changes in diet, and preference for vegetables. In this paper, it is shown that acculturation is significantly positively correlated with the consumption and preference of some local foods and significantly negatively correlated with the consumption and preference of some native foods.

Li Xuefang (2022) investigated a machine learning-based system for computer network image recognition. She observed that with the rapid advancements in artificial intelligence, machine learning-based image recognition technology has achieved significant success in computer vision systems and various practical applications. Consequently, a computer network image recognition system was developed utilizing machine learning techniques, including cross-validation, fitting, accuracy enhancement, feature selection, and dimensionality reduction. The findings indicate that the machine learning algorithm enhances the stability and multi-domain application of computer image recognition through procedures such as cross-validation and deviation of decision tree units. Moreover, the algorithm's feature vector extraction, edge detection, and texture analysis techniques contribute to the improved accuracy of image recognition. Wang Lihua. (2021).studied that research on Image recognition System based on neural network. She found that image recognition technology plays a very important role. With the development and progress of computer technology, image processing technology and pattern recognition theory, a new image recognition technology - neural network image recognition technology has been produced. Through the application of this technology, the accuracy and effectiveness of image recognition have been improved. In this paper, based on the neural network, the image recognition system is researched and designed.

Zheng R H. (2013). studied that research and Design of intelligent image recognition system. He found that the intelligent image recognition system is based on business card image, and the main algorithms in the process of business card image recognition are studied. This paper first introduces the significance, background and research status of business card recognition, and then analyzes the overall framework of the software system, including image preprocessing, layout analysis, character segmentation and recognition and classification. Then the function modules of each step are explained respectively, and the related algorithms involved in each part are compared and discussed, and the experimental results of this paper are given at last. The main research of the subject is software algorithm, aiming at the recognition of business card images captured by mobile phones. In this paper, the improved Bersen algorithm is used to binarize the image, Unger smooth filtering method and fast labeling method are used to denoise the image, and tilt correction is carried out based on the rectangular frame features of the business card image. Then the paper uses a connected domain method combined with expansion processing to analyze the image layout. Then we use a "water drop" algorithm to optimize the character segmentation, and on the basis of this character recognition. Character recognition requires a variety of characters and has a certain difficulty, which is the focus of this paper. We use a language classifier to classify character objects, focusing on the recognition of non-Chinese characters, and directly use a BP neural network identifier to recognize English and other non-Chinese characters. Finally, this paper synthesizes layout information and

grammar knowledge, and uses an enlightening membership degree method to classify business card information. Experiments show that the above method can improve the character recognition rate of the system to some extent

Wang Guangjie, Guo Andong, Gong Luyan, Yang Zhitong, & Li Xinlei. (2017). studied that mobile terminal cross-platform compatibility. They found that in the era of rapid development of information technology, the application of Internet technology in enterprises is more and more extensive. With the expansion of enterprise scale, the increase of office area, and the complex and changeable working environment, a single Internet technology can no longer meet the needs of enterprise mobile office. The emergence of mobile Internet technology has injected new force into the development of enterprise informatization. It rebuilds the platform through a combination of wireless communication, desktop virtualization and information security technologies to upgrade traditional applications to a new service-oriented architecture. Enterprise employees can access the application system through mobile terminals without any data transplantation, and can easily access the terminal through the virtual service network, which facilitates office work and effectively improves work efficiency. Mobile Internet technology enables enterprise employees to access internal resources in a timely and secure manner, becoming a natural extension of enterprise IT architecture without additional development, saving a lot of resources for enterprises and reducing enterprise informatization costs

Wu Weidong. (2017). studied that exploration and research of cloud database system. He found that with the development of science and technology, the research and application of cloud database system is becoming more and more extensive, which mainly aims at the corresponding creation operation of SQL or business environment access objects, forming a data system with optimized relative properties and deployed in bandwidth requirements. The cloud database system simplifies the operation of application information, supports the integrated storage of information in business software programs, and automatically switches data backup from the monitoring list intelligently according to the portability inherent in the cloud

database system. This study mainly discusses the overview and characteristics of cloud database system, and explores the deep application of cloud database system technology.

Xu Yiwen, & Bao Yixi. (2017). studied that research on User experience design of food applications based on users' social characteristics. they found that in the design and research of food applications, too much attention is paid to the development of their functionality, but the design of social functions is not studied from the perspective of users. At the strategic level, the social features of user topic commonality, relaxed atmosphere and emotional proximity suggest the psychological needs of users. At the scope level, the user's social behavior reflects the user's usage habits. By studying the interaction design of the structural layer, the interface layout of the framework layer and the visual design of the presentation layer of the specific social module in the typical food application, the design principles of the social function of the food application are summarized, which provides evaluation criteria for analyzing and evaluating the social module design in the food application, and provides a theoretical basis for improving the social experience of users.

Li Runyu, & Huang Wenshan. (2023). studied that research on visual design of food application based on regional cultural experience. They found that analyzes the existing problems in the visual design of food applications, and then puts forward the visual design strategy of food applications based on regional cultural experience. From the three aspects of regional characteristics of visual style, cultural image of visual ICONS and hierarchical content of visual information, this paper discusses how to make the visual design of food applications not only spread regional and food culture, but also meet the requirements of users Beauty needs, functional needs and emotional needs.

Tang Yin-Xun. (2021). stuied that study on Learning Mode of Thai WeChat mini program. He found that with the rapid development of the information age and the wide popularity of mobile devices, mobile phones are playing an increasingly important role in the lives of contemporary young people. WeChat, the communication medium with mobile phones as the carrier, is also sought after by many young people. Its powerful functional system provides a new learning way for language learning. In order to effectively combine traditional classroom learning and online independent learning, and realize the mixed learning mode of online and offline, this paper designs a mini program suitable for professional Thai learners or Thai lovers to learn relevant basic knowledge of Thai language based on research. Combine WeChat mini program with traditional Thai language learning to improve the utilization rate of Thai language learning resources and tourists' learning interest.

Wang Li and Li Jie. (2019). The article titled "The impact of color schemes on the usability of vegetable recognition applications" shows: In the design of a vegetable recognition application, the choice of color scheme significantly impacts user experience and the application's usability. According to the research by Wang Li and Li Jie (2019), green is identified as the most appropriate primary color. This choice is based not only on green's natural association with vegetables, which intuitively communicates the application's purpose, but also on its visually soothing and relaxing effect, enhancing user comfort and satisfaction. Additionally, green, as a color symbolizing health and positivity, fosters user trust and affinity towards the application. Therefore, selecting green as the primary color in the design of a vegetable recognition application is the optimal choice, considering both user experience and functionality.

Wiwatkitbhuwadol,N.(2023).The article titled "The Art of Entrepreneurship: Navigating Success through Design for Business" investigates the crucial role that design principles play in entrepreneurial success. By examining the strategic integration of design into business ventures, the research underscores how design serves as a compass for entrepreneurs, guiding them toward innovative solutions and resilient foundations.

The study draws on detailed case studies and existing literature to illustrate the successful integration of design in business. This analysis reveals that design strategies are not only vital for creating innovative products but also for establishing robust business models. By highlighting real-world examples, the p aperdemonstrates the tangible benefits of a design-centric approach.

Based on the aforementioned 14 articles, the researcher has studied the use of the VegNet dataset to facilitate vegetable quality image classification using machine learning, emphasizing the critical role of clean datasets in developing accurate models. The research on simplifying data management features in web-based systems through software design patterns documented in UML diagrams is deemed crucial. Studies on decision-making processes in effective software design highlight the cognitive complexities involved. Regarding vegetable research, the investigation into Thai food practices and cultural adaptation in the US provides valuable insights into dietary changes and preferences. The development of a computer network image recognition system leveraging machine learning has significantly enhanced accuracy and stability. Similarly, advancements in neural network-based image recognition have markedly improved its effectiveness in UX/UI aspects. The creation of an intelligent image recognition system for business cards, employing various algorithms for image preprocessing and character recognition, showcases technological innovation. Research into mobile terminal cross-platform compatibility has contributed to improved enterprise informatization. Studies on cloud database systems emphasize their efficiency in data management. By focusing on social features, user experience design in food applications has been enhanced. Visual design strategies in food applications based on regional culture have been explored. The design of a learning mode for Thai WeChat mini programs has improved language learning methodologies. Research on the impact of color schemes on vegetable recognition applications found that green is the optimal choice, enhancing user experience. Lastly, the role of design in entrepreneurship has been examined, demonstrating its significance in fostering innovative solutions and robust business models.

CHAPTER 3

RESEARCH METHODS

In the research titled Design and development mini program in WeChat application assisting Chinese tourists in identifying Thai vegetables, the researcher performed the following steps:

Step 1: Investigate the unfamiliar vegetables in the supermarkets that Chinese tourists.

The researcher collected vegetable information through self-collection at three locations: 1. Big C, 2. Foodland, and 3. Huai Khwang Market, gathering data and photographing all Thai vegetables (Photos of the researcher collecting information in the field, depicted in figures 3.1-3.3). The study concluded that there are a total of 73 kinds of vegetables available.



Figure 2 Diverse Vegetable Assortment: A Snapshot of Big C Supermarket by researcher. 2023



Figure 3 Diverse Vegetable Assortment: A Snapshot of Foodland Supermarket by researcher. 2023



Figure 4 Diverse Vegetable Assortment: A Snapshot of Huai Khwang Market by researcher. 2023

Step 2: Design a questionnaire to know the vegetables.

The collected vegetable information was documented and presented to 40 Chinese tourists who had been residing in Bangkok for more than seven days. They were asked three questions:

1. Do you know this kind of vegetable? (The answer is, know or don't know.)

2. If you know, can you read the pronounce of that vegetable? (The answer is, can you pronounce it or not?) The real answer will be devised by:

1) Know vegetables and pronounce them.

2) Know vegetables but can't pronounce them.

3. Don't know them so can't pronounce them.

Data collection involved personal interviews where participants were shown images and names of various Thai vegetables. Their responses to these questions provided an initial assessment of their familiarity with the vegetables and their pronunciation skills. This phase aimed to identify gaps in knowledge and pronunciation abilities among Chinese residents regarding Thai vegetables.

Based on insights gathered from the preliminary interviews, the researcher developed a comprehensive questionnaire. This questionnaire included images and names of the vegetables, along with the three questions mentioned above. The objective was to systematically assess the participants' knowledge and pronunciation capabilities in a structured manner.

The researcher collected basic demographic information from the respondents, including age, gender, area of residence, and length of stay in Thailand. This information was essential for understanding the backgrounds of the participants and for analyzing the data in the context of different demographic variables. Following this, they asked a series of questions designed to measure respondents' familiarity with various Thai vegetables. Each question required respondents to rate their familiarity with a particular vegetable and indicate whether they could correctly identify it. The questionnaire comprised single-choice questions, which provided definite options for
easy responses, and fill-in-the-blank questions, which allowed for more detailed answers.

The questionnaire was distributed through the "Wenjuanxing" online survey platform. This platform was selected for its ability to maintain a consistent sample of participants and its robust data collection capabilities. It enabled the researchers to quickly collect and integrate responses, which was essential for timely analysis. The platform's features allowed for real-time monitoring of responses, ensuring that any issues could be promptly addressed.

After collecting the data, the researcher focused on identifying vegetables with the highest proportion of "unfamiliar" responses. The researcher calculated the familiarity percentage of each vegetable by dividing the number of respondents who were familiar with the vegetable by the total number of respondents. Vegetables with less than 50% familiarity were flagged for further analysis. This detailed approach allowed the researchers to identify specific vegetables that were unfamiliar to Chinese tourists. **Step 3: Designed and developed wechat mini program to educate Chinese tourists**.

In the initial stage of the design process, researcher should study relevant theories, acquire necessary knowledge, establish process maps, and delineate tasks for each stage. They should then proceed to complete the preliminary software design based on collected data and theoretical foundations.

During the middle phase of design, designers are tasked with adhering to their established workflow and ensuring timely completion of content while striving to enhance each stage.

In the final stages of design, designers conduct self-testing of the software, identifying gaps and refining imperfect aspects in alignment with relevant theories.

The proposed application of deep learning in real-time vegetable recognition integrates with big data analysis and prediction from the vegetable market. This software captures photos of vegetables for identification using a deep learning model. It extracts vegetable type information, along with their Chinese and Thai names and relevant culinary practices. The software standardizes vegetable names, adopting Thai names based on Thai supermarket norms and Mandarin for Chinese names.

The process involves image recognition learning where collected vegetable photos undergo machine learning processing. A trained machine learning model is hosted on a cloud server. Users can capture vegetable photos with their mobile phone cameras, and the system connects to the cloud for deep learning-based identification. Upon identification, the system presents relevant information and recipes directly on the mobile phone interface.

The design of the mini program can be approached from the following three points: style, functionality, and content.

1. Style

This mini program should incorporate appropriate colors to create a healthy and comfortable atmosphere. The primary color scheme should reflect the nature of vegetables, with a focus on green and white tones, which are known to promote relaxation and health. The logo should predominantly feature vegetable motifs, expressed through both images and text. This combination of visual and textual elements intuitively conveys the mini program's purpose and message to users.

2. Functionality

This mini program's functionality should include several key features. First, it should support figure scanning for vegetable recognition. Additionally, the program should offer bilingual display options in Chinese and Thai, along with pronunciation guides for each vegetable. Other essential features include interfaces for managing user information and collecting user feedback. These functionalities ensure a comprehensive and user-friendly experience, catering to diverse user needs and preferences.

3. Content

The content of the mini program should be clear, informative, and engaging. It should provide users with detailed information about various vegetables, including their nutritional benefits and culinary uses. The mini program should also include practical exercises related to vegetable identification and usage, enhancing user learning and engagement. By offering rich and relevant content, the mini program can effectively educate and support users in their journey towards better nutrition and health.



CHAPTER 4

DATA ANALYSIS AND RESEARCH RESULTS

In this chapter, researcher will conduct field investigation, analyze data, and draw the final research results to complete the writing of Chapter 4, which conducted a three-step study with two research objectives.

Researcher studied the Thai words for vegetables that are difficult for Chinese tourists iin Thailand to understand. (There are two steps in this objective. The first step is to investigate the kinds of vegetables in supermarkets and markets; the last step is to conduct a questionnaire survey on the integrated vegetable information to reach a final conclusion.)

Step1: To study the Thai words for vegetables that are difficult for Chinese tourists in Thailand to understand.

In survey, researcher employed a series of systematic steps to assess the knowledge level of Chinese tourists regarding Thai vegetables and to propose strategies for enhancing awareness of these vegetables in the Thailand market.

Red oak	Eoaplan	Cowpea		
Basil	Grcen Pepper	Fennel		
Eryngium	Prickly Cucumbe	Corn Shoot		
Lemongrass	Spinach	Asparagus		
Winged Bean	Celery	Green Pricklyash		
Spearmin	Cobbao	Yellow Radish		
Ocimum	Cauliflowe	Bean curd with yellow skin		
Chayote	Cabbage	Greengroccry		
Sunflower Seedling	Greenonion	Coriande		
Galangal	Spicy Mille	Green Eggplant		
Lemon Leaf	Lettuce	Water Spinach		
Radish	Small Cucumbe	Zucchin		
Butternut Squash	Longbean	Coprinus		
Thai Pepper	Red Pepper	Luffa		
Sophora Flowe	Green Pepper	Mushroom		
white Radish	Tomato	Onion		
Purplecabbag	White Mushroom	Small Eggplant		
Potato	Manioo	Caulifowo		
Needle Mushroom	Corn	Carrot		
Lemon	Okra	Btter Melon		
Fresh Ginge	Waxgourd	Bamboo Shoot		
Shallo	Purple Onion	Garlie		
Pumpkin	Cucumber	Agaric		
Sweet Potato	Radish	Bean Curd		
Bean Sprout				

Table 1 Result of the vegetable survey

Researcher collected vegetable information through fieldwork at three locations: 1. Big C, 2. Foodland, and 3. Huai Khwang Market, photographing all varieties of Thai vegetables. A total of 73 kinds of vegetables were identified, and their names are listed in Table 4.1. This step aimed to ensure comprehensive coverage of available options in the market, laying the groundwork for subsequent questionnaire design.

Step2: Design a questionnaire survey and draw a final conclusion about which vegetables are least familiar to Chinese tourists.

Following this conclusion, researcher selected 40 Chinese tourists who lived near Bangkok's Huai Khwang District and had lived in Thailand for more than seven days. Researcher made the photos of 73 species of vegetables into a demonstration document and asked these 40 respondent three questions:

1. Do you know this kind of vegetable? (The answer is, know or don't know.)

2. If you know, can you read the pronounce of that vegetable? (The answer is, can you pronounce it or not?) The real answer will be devised by

1). Know vegetables and pronounce them.

2). Know vegetables but can't pronounce them.

3). Don't know them so can't pronounce them.

vegetable	Know Vegetable and pronouce it		Know vegetable but can't pronouce it		Don't know Vegetable so can't pronouce it	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Sunflower seeding	6	15.00	29	72.50	5	12.50
Eryngium	18	45.00	007	17.50	1	37.50
Thai paper	18	45.00	19	47.50	3	7.50
Ocimum	20	50.00	9	22.50	11	27.50
Sophora flower	20	50.00	8	20.00	12	30.00
Lemom leaf	21	52.50	14	35.00	5	12.50
Galangal	24	60.00	12	30.00	4	10.00
Acacia pennata	24	60.00	13	32.50	3	7.50
Winged bean	26	65.00	7	17.50	7	17.50
Lemongrass	29	72.50	4	10.00	7	17.50
Yard long bean	29	72.50	11	27.50	0	0
Basil	22	82.50	5	12.50	2	5.00
Spearmint	33	82.50	4	10.00	3	7.50

Table 2 Result of the 16 kinds of vegetable questionnaire

Vegetable	Know Vegetable and pronouce it		Know Vegetable but can't pronouce it		Don't know vegetable so can't pronouce it	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Chayote	35	87.50	2	5.00	3	7.50
White mushroom	36	90.00	4	10.00	0	0
Manioc	38	95.00	2	5.00	0	0

Table 2 (Continue)

Through initial simple inquiries, the researcher identified a total of 16 kinds of vegetables with an error rate of less than 50%, namely: Basil, Eryngium, Lemongrass, Winged bean, Spearmint, Ocimum, Chayote, Sunflower seedling, Galangal, Lemon leaf, Thai pepper, Sophora flower, White mushroom, Manioc, Yard long bean, and Acacia pennat. Based on this data, the researcher established the primary content for the questionnaire, focusing on these 16 Thai vegetables.

The questionnaire design encompassed several components: first, participants were queried on basic information; second, figures of these 16 vegetable species were included in the questionnaire along with brief descriptions, followed by detailed inquiries regarding the participants' familiarity with each vegetable. The outcomes are presented in Table 4.2.

To ensure the accuracy and effectiveness of the questionnaire design, researcher conducted extensive discussions, made several modifications, and sought feedback from professionals. Ultimately, the final version of the questionnaire was determined, and both electronic and paper formats were produced to facilitate subsequent investigations.

Through this questionnaire survey, researcher identified three vegetable species unfamiliar to Chinese residents in Thailand: Sunflower seedling, Eryngium, and Thai pepper. These species were subsequently added to the database, marking the initiation of the WeChat mini program design.

The researcher aimed to gain a comprehensive understanding of Chinese tourists' knowledge and perceptions of Thai vegetables, intending to offer valuable information and recommendations to enhance awareness of Thai vegetables in the Chinese market. Concurrently, the survey aimed to provide insights for future research endeavors, aiming to further promote and integrate Thai vegetables into the Chinese market.

2.Design and development a mini program in WeChat for assisting Chinese tourists in identifying Thai vegetables.

Researcher conducted surveys in supermarkets and markets, administering questionnaires to 40 Chinese tourists who had resided in Bangkok for more than 7 days . Ultimately, they identified three vegetable species unfamiliar to this demographic: Sunflower seedling, Eryngium, and Thai pepper.

The images of these three vegetables were captured and processed by the researcher herself before being added to the database.

Development and implementation

After defining the design scheme and theoretical support, we formed an interdisciplinary development team and started the development work of the mini program. Team members include front-end and back-end development engineers, UI/UX designers, data analysts, and content editors. They have rich working experience and have completed the development of many programs. The development team starts from the front-end interface design, and determines the interface layout of the mini program according to the theory studied in chapter. Then start building the back-end database. The information and figures of three species of vegetables were entered into the database. Finally, the test is carried out, and the accuracy is as high as 98%.

Content

Clear Instructions and Simplicity

When designing the mini program, prioritizing a simple and userfriendly interface is essential. Clear instructions must guide users on how to use the program effectively. This includes ensuring that form fields are intuitive and easy to fill out. The goal is to minimize user effort and reduce cognitive load, enabling users to quickly understand how to interact with the application without requiring extensive explanations or a steep learning curve.

Visual Hierarchy and Navigation

Achieving a clear and consistent navigation structure is crucial for user satisfaction. Users should be able to easily find the information they need, with important elements prominently displayed. A visual hierarchy in buttons and backgrounds can effectively direct users' attention to key features and actions, enhancing usability and user engagement.

UX/UI Design

Color Scheme and Visual Appeal

The mini program's color scheme should primarily consist of green and white. As Wang Li and Li Jie (2019) study on nutrition software design, green represents vegetables and promotes a relaxed user experience. This color choice not only aligns with the nature of vegetables and health but also creates a visually appealing and calming interface. The use of white as a complementary color enhances readability and provides a clean, minimalist look.

Responsive Design

Ensuring the mini program is responsive is crucial for accommodating various screen sizes and devices. A responsive design adapts to different screens, providing a consistent and optimal user experience whether on a smartphone, tablet, or desktop. This adaptability is achieved through fluid grids, flexible images, and CSS media queries, ensuring the mini program functions well across all platforms.

Functionality

Conceptual Framework and Prototyping

Creating a conceptual framework is the first step in outlining the basic structure and layout of the mini program. This framework serves as a blueprint, detailing the arrangement of content and interactive elements. Developing interactive prototypes based on this framework allows for the simulation of the user experience. Prototyping is a critical phase where user feedback can be gathered and incorporated, enabling designers to make informed adjustments before the final development stage.

Development and Iteration

The development phase involves bringing the conceptual framework and prototypes to life using agile development practices. Agile methodology supports iterative development, allowing for quick iterations and continuous improvement based on user feedback. This approach ensures that the mini program evolves in response to user needs and preferences, enhancing its functionality and overall user satisfaction.

According to these theories, the design direction of mini program is basically determined.

The name of the mini program is "泰香了(Tai Xiang le)". Please ask a professional team to write a mini program and complete the entire process of the mini program.



Figure 5 The draft of design of mini program main interface (End to End)

1. Interface 1: Main Interface

Overview: This is the primary interface that users encounter when they open the mini program.

Elements:

Identify Vegetables Button: A prominently placed button labeled "Identify Vegetables," designed to be easily noticeable and clickable.

Desktop Image: A visually appealing background image relevant to vegetables, enhancing the aesthetic appeal of the interface.

2. Interface 2: Vegetable Image Selection

Overview: This interface allows users to choose how they want to provide the image of the vegetable they wish to identify.

Options:

1. Take a Photo: An option that activates the device's camera, allowing users to take a new photo of the vegetable.

2. Choose a Photo from the Gallery: An option that opens the device's photo gallery, enabling users to select an existing photo of the vegetable.

3. Cancel: An option to exit the selection process and return to the main interface.

3. Interface 3: Photo Capture

Overview: This interface is displayed when users choose to take a new photo of a vegetable.

Elements:

Camera Viewfinder: A live display of what the camera is capturing, allowing users to position the vegetable correctly.

Capture Button: A button that users press to take the photo, prominently placed for ease of use.

4. Interface 4: Final Result

Overview: This interface presents the results after the vegetable image has been processed and identified.

Sections:

1) Detailed Image: The top section displays a clearer and more detailed version of the captured vegetable photo, ensuring users can see the vegetable clearly.

2) Vegetable Names: The middle section shows the Chinese and Thai names of the identified vegetable, providing users with bilingual information.

3) Vegetable Information: The bottom section includes comprehensive details about the vegetable, such as nutritional information, common culinary uses, and any other relevant data.

Identification button



Figure 6 Mini program main interface

This is the home page (figure 6) of the mini program, the user can clearly see the identification button on the interface, click the button to take photos and identify vegetables.



Figure 7 Mini program select photo interface

Click the button to choose whether to take a photo using the camera or select an existing photo from your device for identification purposes. This step initiates

the process of capturing and analyzing images to accurately identify the subject matter, enhancing user interaction and functionality within the application.



Figure 8 Mini program photo interface

This figure (Figure 8) depicts the vegetable shooting interface, where users can utilize their device's camera to capture images of vegetables. This interface serves as the initial step in the identification process, enabling users to acquire clear and detailed photographs for subsequent analysis within the application.



Figure 9 The mini program is identifying

This figure (Figure 9) illustrates the mini program's process of recognizing information, showcasing its efficient operation. Users experience rapid results, typically within one to three seconds, demonstrating the program's quick response time and usability. This swift turnaround enhances user satisfaction by providing timely and accurate information, thereby optimizing the overall user experience of the mini program.



Figure 10 The end result of the mini program

The final output presents the identified Chinese and Thai names of the vegetables along with their pronunciation, accompanied by a detailed description of each vegetable.

Following the initial stages, three vegetable species were identified as unfamiliar to Chinese users: Sunflower seedling, Eryngium, and Thai pepper. Information regarding these three vegetable species was added to the database of the mini program, enabling customers to access these processes and results. The mini program designed by the researcher and the results are shown in the figure below:

1. Eryngium



Figure 11 The process of identifying Eryngium

shows the researcher useing the mini program scan the Erygium, and can follow steps 1 to 4 to get the results that include a figure, name and detailed description of the Eryngium.

2. Sunflower seedling



Figure 12 The process of identifying Sunflower seedling

Figure 12 shows the researcher useing the mini program scan the Sunflower seedling, and can follow steps 1 to 4 get the results that include a figure, name and detailed description of the Sunflower seedling.

3. Thai pepper



Figure 13 The process of identifying thai pepper

Figure 13 depicts the researcher using the mini program to scan a Thai pepper, following steps 1 to 4 to obtain results that include an image, name, and detailed description of the Thai pepper.

In summary, spanning from Objective 1 to Objective 2, the scholar developed a WeChat mini program capable of vegetable identification. Through this mini program, users can acquire three pieces of information about vegetables: images, names, and detailed descriptions. Following a survey involving 40 Chinese residents who had lived in Bangkok for more than 7 days, the findings were integrated into the WeChat mini program for accurate identification. Corresponding results are accurately depicted in Figures 11 to 13



CHAPTER 5

CONCLUSION, DISCUSSION AND SUGGESTION

The researcher will discuss summarizing the results, discussing the results, and making recommendations. This is consistent with the research objectives of this research.

5.1 Conclusion

Researcher obtained vegetable information from self-collection at 3 places: 1. Big C, 2. Foodland, and 3. Huai Khwang Market to collect data and take photos of all Thai vegetables. 73 species in total. Then, 40 Chinese tourists who have lived in Bangkok for more than 7 days were selected to conduct a simple inquiry in the early stage, and the data needed to be made into a questionnaire survey was obtained. These 40 respondent were then sent questionnaires to fill out. The final conclusion is that there are three vegetables that are unknown to Chinese living in Bangkok: Sunflower seedling, Eryngium and Thai pepper.

Reasearcher follow the bata set up a design team, and a team of experienced software designers began to write mini program. And enter the result into the database.mini program interface is simple and clear, easy to operate. The user can easily operate the mini program, after identifying the user can get the figure, name and detailed description of the vegetable they want. The information and figures of three species of vegetables were entered into the database. Finally, the test is carried out, and the accuracy is as high as 98%.

Materials and Methods: Data was collected through questionnaires administered to Chinese tourists to determine their level of knowledge and

familiarity with Thai vegetables. The findings were complemented by a comprehensive literature review on the types, nutritional values, and promotion status of Thai vegetables in the Chinese market.

The questionnaire survey revealed specific Thai vegetables that were unfamiliar to Chinese tourists. This information was then incorporated into a database to develop the "Identifying Thai Vegetables" WeChat mini program.

The mini program have also played an important role in promoting cultural exchanges between China and Thailand. By introducing the history, culture and traditional uses of Thai vegetables, users not only learn how to identify and use these vegetables, but also gain a deeper understanding of Thailand's food culture. This cross-cultural learning and exchange helps to enhance tourists' sense of identity and belonging to Thai culture and enhance their travel experience. Finally, the mini program has also achieved some success in promoting Thai vegetables.

5.2 Discussion

From a technical implementation perspective, the core function of the mini program is grounded in image recognition technology. According to the literature "VegNet: Dataset of Vegetable Quality Images for Machine Learning Applications" (Suryawanshi, Y., Patil, K., & Chumchu, P., 2022), machine learning and deep learning techniques have demonstrated promising results in classification and object detection tasks. A crucial prerequisite for developing accurate and reliable machine learning models in real-time environments is a clean dataset. This study leverages these techniques and integrates them into a mini program. Researcher captured independent photos of various vegetables and incorporated them into the mini program's database. While this technique generally performs well, there is still room for improvement in terms of accuracy and stability. By continuously optimizing the algorithms and augmenting the training dataset, recognition accuracy can be progressively enhanced. User experience is a critical metric for evaluating the success of mini program. Feedback indicates that most users are satisfied with the interface design and functional settings of the mini program, underscoring its practical utility and user-friendliness. And the implementation of small program operation is simple, four steps can complete all operations and get the corresponding results.

Users report that the operational steps are simple and the overall user experience is positive. The importance of design knowledge is highlighted in the literature "Knowledge and Information in Nutrition Software Design" (Karanikolas, N. N., 2014). The mini program for vegetable identification employs green in its design to convey a healthy and positive concept to users. Simplifying the operational process and enhancing the user interface are also key directions for future improvements. From a cultural perspective, the mini program has positively contributed to promoting cultural exchanges between China and Thailand. By incorporating the historical and cultural background of Thai vegetables, users can learn not only how to identify and use these vegetables but also gain a deeper understanding of Thai food culture. This crosscultural learning and communication enhance users' sense of identity and belonging to Thai culture. However, to further expand its cultural impact, it is essential to include more information about the diversity and richness of Thai food culture in the content.

In this article "The Art of Entrepreneurship: Navigating Success through Design for Business," Natthawat Wiwatkitbhuwadol emphasizes two key points: User-Centric Design in Entrepreneurship and Market Relevance and Design. These principles have been instrumental in the successful design of a WeChat mini program aimed at assisting Chinese expatriates in Bangkok.

By focusing on user needs, a survey of Chinese tourists who have lived in Bangkok for more than seven days was conducted. The survey revealed a significant demand for a convenient and readily accessible tool to help them identify unfamiliar Thai vegetables, thereby easing their daily lives abroad. In response, a WeChat mini program was developed to meet this need, leveraging user-centric design principles to ensure it was intuitive and effective.

Additionally, the design strategy was tailored to align with market needs. The research team conducted extensive interviews and found that even long-term Chinese residents in Bangkok struggle with identifying and using various Thai vegetables due to unfamiliarity with their names and culinary uses. This insight guided the creation of the mini program, ensuring it addressed a specific and relevant market need.

By adhering to Wiwatkitbhuwadol's points on user-centric design and market relevance, the WeChat mini program effectively bridges the gap between Chinese expatriates and their culinary environment in Thailand. The program not only provides practical assistance but also enhances the overall user experience, illustrating the powerful impact of strategic design in entrepreneurial ventures.

5.3 Suggestion

Following the above conclusions and discussions, we propose the following suggestions to further enhance the function and impact of identifying Thai vegetable.

1. Multi-language support: Develop multi-language versions of mini program to meet the needs of users in different countries and regions. In addition to Chinese and Thai, priority can be given to adding international languages such as English, Japanese, and Korean to improve the internationalization level of mini program.

2. Expand the vegetable database: Constantly update and expand the vegetable database to cover more local and seasonal vegetables. It is possible to cooperate with local agricultural institutions and experts to obtain the latest information on vegetable types and keep the database up-to-date.4. Improve user experience: Simplify the operation process of mini program, optimize the user interface design, and make it more friendly and easy to use. Through user testing and feedback, the function Settings and interface layout of the mini program can be continuously improved to enhance user satisfaction.

3. Establish feedback mechanism: Establish user feedback mechanism to collect and analyze the problems and suggestions encountered by users in the process of use in a timely manner. Through regular user research and data analysis, understand the needs of users, and constantly improve and perfect the mini program.

4.Enhancing the database with additional photos from various angles can significantly improve the comprehensiveness of the database and the accuracy of the mini program. By incorporating a diverse set of images, the recognition algorithms can better identify vegetables under different conditions and perspectives, leading to more reliable and accurate results. This improvement will enhance the user experience and increase the overall effectiveness of the vegetable recognition mini program.

Design and development of a WeChat mini program for assisting chinese tourists in identifying thai vegetables, This paper examines the development of a mini program designed to aid Chinese residents in Thailand in identifying unfamiliar vegetables, there by enhancing their daily convenience. By leveraging technological innovation and user-centric design, the Thai Vegetable Identification mini program offers practical and efficient tools for Chinese tourists, significantly improving their culinary experiences and cultural integration in Thailand. Despite existing limitations in technology and application, ongoing optimization and enhancements are expected to amplify the mini program's impact, fostering Sino-Thai cultural exchanges and contributing to economic development. It is anticipated that with the incorporation of the proposed suggestions, the Thai Vegetable Identification mini program will continue to evolve, ultimately serving as a successful model for global dissemination and application.

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Questionnaire

This is a survey on Chinese tourists's unfamiliarity with Thai vegetables. This survey consists of two parts. The first part will ask for basic information. The second part will show a series of pictures of vegetables and choose the correct vegetable name according to the pictures.



关于泰国蔬菜的调查

尊敬的参与者:

感谢您参与我们的调查!我们正在进行一项关于调查中国人对于泰国蔬菜的不熟悉 程度的调查研究。您的参与对于我们的研究非常重要。

这份问卷分为两个部分。第一部分将询问您的基本信息,以便我们更好地了解受访者的背景情况。第二部分将展示一系列蔬菜的图片,请您根据图片选择正确的蔬菜名称。

您的回答将被保密,并仅用于学术研究目的。请您根据实际情况如实填写,谢谢!

第一部分 基 础信息
1.性别 [单选题] *
○男
○女
∘LGBT
2.年龄 [单选题] *
018-24
025-30
o30-35
035-40
041-46
3. 籍贯 [填空题] *

4. 是否来过泰国 [单选题]*

o是

o否

5. 在泰国是做什么的 [单选题]*

○学生

o游客

0商人

o公司员工

○其他_____

第二部分 关于在泰华人对泰国蔬菜认识程度的信息



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○罗勒叶 (ga pao)

○九层塔(huo la pa)

○甜罗勒(Ming lak)



[单选题] *

o刺芹 (pa qi fa lang)

o蒜叶 (bai ga tiao)

○七叶兰 (bai dei)



•••

请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○香茅草 (da kai)

○芦笋 (nuo mai fa lang)

○姜的茎叶(don ka)



[单选题] *

○翼豆 (tua pu)

○荷兰豆(huo lan dao)

○秋葵 (pa ga jiao)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○薄荷 (sa la nei)

○罗勒叶 (ga pao)

○九层塔(huo la pa)



[单选题] *

○九层塔(huo la pa)

○罗勒叶 (ga pao)

○甜罗勒(Ming lak)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○佛手瓜 (fa miao)

○苦瓜 (ma la)

o木瓜 (ma la guo)



[单选题] *

○豆芽 (duo miao)

○向日葵苗(yao ao tan da wan)

○积雪草 (bai bua bo)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

o高良姜(ka)

○生姜 (king)

○姜黄 (ka ming)


请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○柠檬叶 (bai ma gelu)

○酸角叶 (yao ma kam)

○薄荷 (sa la nei)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

o胡椒 (pi tai suo)

o花椒 (pi tai si chuan)

o黑胡椒 (pi tai dam)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○白槐花 (dao kie)

o槐花 (dao sa no)

○蝶豆花 (dao an chan)



13.

请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○金针菇 (hie kinm tong)

o银耳 (hie hu nu kao)

○白玉菇 (qi mei ji kao)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

- ○红薯 (man tie)
- ○木薯 (man san pa lang)
- ○紫薯 (man muang)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○蕨菜 (pa gu)

- ○含羞草 (yao ga ting)
- ○羽叶金合欢(臭菜)(cha ong)



请选择图片中蔬菜的最正确名称(单选)

[单选题] *

○豇豆 (tua fa yao)

○豆角 (tua kie)

○翼豆 (tua pu)





VITA