THAI HERBS APPLICATION

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ABSTRACT

The purposes of this research were to develop Thai Herbs Application. The target group was the three experts into the development of application to evaluate the effectiveness of the application. The tools of this research were 1) Thai Herbs Application and 2) Evaluation form of Thai Herbs Application. Statistics used were mean and standard deviation. The research findings showed that an Thai Herbs Application helped facilitate the search using by photos and be used on smartphone that ran android operating system and predicted herbs photos by Auto ML Vision API. The Thai Herbs Application is divided into two parts. The first part is Mobile Application section. The ability of the application can search for four ways, including 1) camera, 2) pictures album, 3) herbs name, symptoms or diseases, and 4) voice. The second part is web application for administrator section to manages information such as herbal information, symptoms and diseases, contraindications and precautions for using herbs, and herbal medicine information. The results of the Thai Herbs Application performance evaluation was found that the overall result of the research was at the highest level, with the highest average ($\overline{X}$) = 4.46 and standard deviation (S.D) = 0.47.

Keywords: Applications; Search; Herbs; Photos

I. INTRODUCTION

Herbs are product of nature along with Thai society for a long time. There are many benefits that can be made into food ingredients, medicine, health care and many others (Ministry of Public Health, 2016, pp. 1-5). After the advancement of science and technology, the main of drug production has switched to chemicals than using herbs for treatment, as a result, the popularity of the herb dropped significantly which causes the knowledge of herbs to decrease. However nowadays the Thai government has a health policy that encourages people to be healthy both physically and mentally and promoting the development of biodiversity values and local wisdom.

From the aforementioned reasons, most people have focused on Thai wisdom about the use of many herbs because it has medicinal properties used in treatment and believed to have safer to use than modern medicine. In addition, the environment of Thailand is rich and diverse with plants. So, there is a lot of research and development going on to build knowledge of herbs to the released public many. It can be easily accessed such as documents, texts, books, websites, or applications that are used on smartphones,

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most of which are information in a manner that has advantages, such as cost of searching for information, storage, and the major problem in searching information is that the herbal name must be known to be able to search for that herb. In order to verify the herbal information correctly or not is difficult, it requires a specialized herbalist.

However, the advancement of technology has reduced many problems. It also has created more convenience, the one of technologies, that is machine learning. It is currently popular to use for image classification. Machine Learning is a branch of artificial intelligence developed from the study of recognition. It involves the study and creation algorithms that can learn data and predict data. The Machine Learning algorithm works based on a model built on the incoming trained dataset for further predictions or decisions replace work from step by step of computer programs and nowadays ordinary the computers programs can display images only and it cannot interpret or understand of the image.

Based on the above problems and sources, the researchers have the idea of solving and helping those interested in herbs to replacement for modern medicine by developing an application (app) to search herbs from photos. The researchers expect it can be increase the search channels of herbs to be more convenient and faster. It uses a machine learning technology known as Google 's Cloud Vision API to Image analysis. It is applied to the app to search for herbs from photographs and display information from the machine learning analysis, including herbal names, common names, scientific names, local names, general characteristics, pictures of herbs, therapeutic benefits, symptoms, and search by typing keywords such as herbal names, therapeutic properties, symptoms or diseases, as well as search from voice by speaking through the application. The research objectives are (1) to develop an application to search for herbal information from photographs and (2) to measure efficiency application to search herbal information from photographs.

II. LITERATURE REVIEW

In this research to achieve research objectives and can use it effectively and can provide information to users correctly. The researchers had studied the theoretical concepts for use in this research, including;

i. ***Machine Learning (ML)***

ML is the use of algorithms to classify and analyze data by learn from the data for create a model to predict the decisions or develop software to do the procedure prescribed by using methods of teaching machines to learn from The respective dataset (Liakos et al., 2018, pp. 1-29).

ML is the application of statistical models to computer-based data (Thai Programmers Association, 2018, Online). It is the best tool today to analyze, understand and shape data. The one of main concepts under ML is to teach computers to recognize information automatically. It uses data to pass into an algorithm that can understand the relationship between the input and the output at the end of learning a machine can predict new information (Engel et al., 2019, pp. 1-4).

Machine learning and image classification

Machine learning image analysis has been applied in many areas. For example, in archeology, including labeling, classification of artifacts, coin collections. The classification of the architectural architecture of the ancient pagoda (Phaudphut, 2018, Online) are agricultural examples such as the detection of plant diseases, detect weeds livestock management, water management and soil management (Phongchit, 2018, Online).

ii. ***API information from images.***

Nowadays the computers can display images but it cannot interpret or understand then means of images. The humans then created and developed MLs to help analyze images in the use of machine learning to find that image. Google currently has an image analysis API. From this study the researchers used a Google Vision® Api has and AutoML Vision® Each API provides a way for the user (Google Cloud, 2020, Online; Tangerine, 2015, Online).

a) Google Vision API

The Google Vision API is a machine learning service that reviews and extracts images, and has an OCR component that inspects text from images. The user can test by go to https://cloud.google.com/vision. https://cloud.google.com/vision. The nature of work is requested through the web service (REST) the api and encrypted data in its original format base64 encode to the server of a Google (Phongchit, 2018, Online). From the server analyzes the image and when the analysis is completed, it will display search results into five categories as follows.

1) Objects are the examination of objects within the images entity detection.

2) Labels are to read text within images (OCR) or display search results as text.

3) Can work on web to check with a logo inside the image or not (Logo detection).

4) Properties are the analysis and color separation (Color) in the image.

5) Safe search is to detect inappropriate images such as pornography by using the same engine as Google safe search in Google image search.

b) Auto ML Vision

Auto ML vision is a Google Cloud platform service that facilitates easy of ML modeling by delivering data to the system. It trains with the technology of Google to come out as a model that can be put to immediate use. It can be activated via the REST of API in which to run the model through a REST API with the following steps.

c) REST API

Step 1 Make a command to convert the image to Base64 format.

```
try
{
    val imgString : String!  = Base64.encodeToString(getBytesFromBitmap(bitmap!!), Base64.NO_WRAP)

    val requestBody = ModelRequestBody(PayloadRequest(ModelImage(imgString)))
    Network( baseUrl: "https://automl.googleapis.com/v1beta1/",  token_name: "$token_name", enableLog: tru
```

Figure 1: Convert the image to the Base64 format.

Step 2 Make a command to send pictures to https://automl.googleapis.com/v1beta1/ projects/project-automl-vision/locations/us-central1/models/titl data models that have the Train successful example in Figure 2:

Execute the request

```
curl -X POST -H "Content-Type: application/json" \
  -H "Authorization: Bearer $(gcloud auth application-default print-access-token)" \
  https://automl.googleapis.com/v1beta1/projects/project-automl-vision/locations/us-central1/models/ICN2527419763808761060:predict
```

Figure 2: A data model that can be classified as the Train successfully completed.

Step 3 Write command to execute API through REST API.

```
val imgString : String! = Base64.encodeToString(getBytesFromBitmap(bitmap!!), Base64.NO_WRAP)

val requestBody = ModelRequestBody(PayloadRequest(ModelImage(imgString)))
Network( baseUrl: "https://automl.googleapis.com/v1beta1/",  token_name: "$token_name", enableLog: true).getRetrofitClient
    Callback<PayloadResult> {

    override fun onResponse(call: Call<PayloadResult>?, response: Response<PayloadResult>?) {
        if (response!!.isSuccessful) {
            Log.d( tag: "Hello", response?.body().toString())
            val Label =  "${response?.body()?.items?.first()?.displayName}"

            retrieveJSON(Label)
        }
    }
```

Figure 3: Write commands to execute the API through the REST API.

III. METHODOLOGY

i. Research tools

a) Application to search herbal information from photos.

b) Performance appraisal Application to search herbal information from photos.

ii. Target group

Expert developer applications of three people to assess the performance image applications.

iii Research procedures

The researchers divided the research into five steps as follows.

a) Analysis

In this analysis process, the researcher has studied to develop an application to search from photos, text and to know the need for apply information technology to manage information about medicinal plants correctly and setting the purpose measurement and evaluation.

b) Design

The design phase is where the researcher uses the results of the analysis to design a photo-based herb search application, application performance assessment form, knowledge, and present information about medicinal plants divided into three parts as follows;

1) Application capabilities

The researchers designed the capability of the application into two parts include user and the administrator as follows;

General users

The users can use the application via smartphones/tablets running Android kitkat 4.4 or higher by downloading the Thai Herbs application to install on the device. The users can search for herbal information from photography, photo album, and herbarium name by typing or voice. They can search for medicinal plants with general characteristics or therapeutic properties based on symptoms or diseases.

Administrator

The administrator can add/edit/delete plant information such as medicine, recipes, other information, and show the status of herbs that have not been images taken for Machine Learning to learn in the Image Search API.

2. Design a user interface

The researchers had designed the user interface screen which is divided into two parts application and website as follows;

Application part contains the main page of the app, searching for herbs by photo in the shooting mode, and accessing by typing in the herb name. The output section includes show herbal information, treatment information precautions for use, search for herbal information by symptoms or properties, and website section for information management system.

Website part contain of the information management herbal consists of a login, main menu, information management, lists the herbs in database, symptom/disease display, adding symptoms/disease information, show contraindications and precautions, lists formulation of the additional drug information, and administrative management.

3. Database Design

Database design of application for photos herbs from the research database was designed using entities relationship model feature.

List of entities upon completion of the design phase is complete, the researcher leading the design was designed entities recognize innovation in all six entities which contain herbal data lineage information, symptoms and diseases, contraindications and precautions pharmacopoeia information, and admin information.

ER-Diagram when designing entities completed. The researchers designed the ER-Diagram as shown in Figure 4.

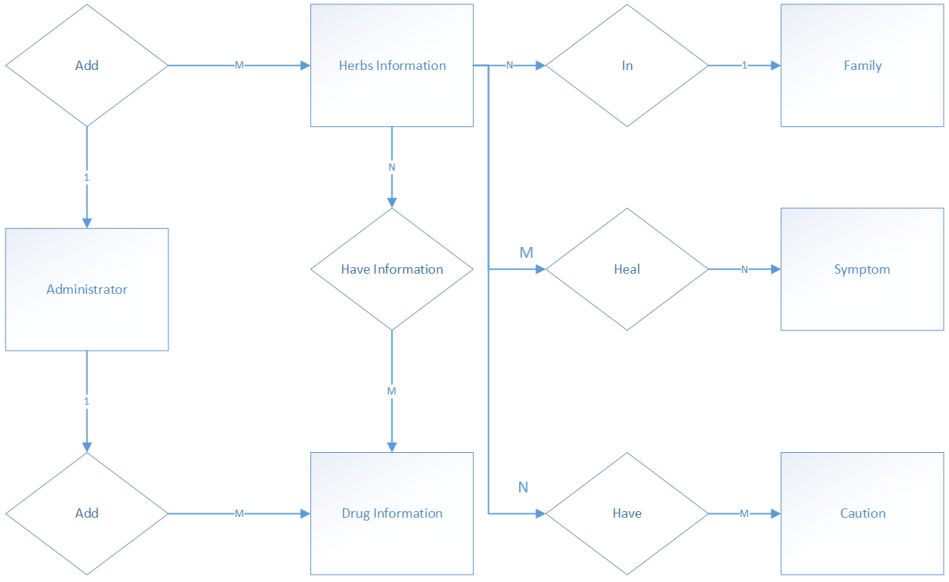

Figure 4: ER-Diagram of application to find herbs from photos.

Mapping Table

Once the ER-Diagram design was complete, the researchers had mapping tables. A total of eight tables contained the administrator, herbal, family information, symptom and disease information, formulation information, herbal properties, ingredient, and contraindications.

Data Dictionary

From ER-Diagram designed a total of eight data tables, the researchers had added a table of administrators, resulting in a total of nine tables of data as follows;

Table 1: shows the tables in the application database for finding herbs from photographs.

No.	Table name	Stored data	note
1	Herbs	Medicinal plant information	
2	Family	Family information	
3	Symptoms	Symptoms and disease information	
4	Formularies	Pharmacopoeia information	
5	Warnings	Contraindications and precautions	
6	Careful	Medicinal properties	
7	careful	Information, herbal advice	
8	Ingred	Information on ingredients of traditional medicine	
9	User	System Administrator	

Development

When the researchers had finished designing an application to search for herbs from photographs. The researchers took the part that had been designed for development which had the following development steps;

Algorithm design

The researchers designed the algorithm of the application into three parts as follows;

1. Save information about herbs such as herb description, symptoms/diseases, information, contraindications and precautions, and information pharmacopoeia.

2. Upload the image to the Image Search API and input herb's name of the image according to the herbal science name in the database.

3. Select a search type.

- Find the image.
    1) Upload image.
    2) Find Herbal Info from images using Image Search API.
- Search by typing the name, herb, symptom or disease
    1) Enter the name of the herb, symptom or disease.
    2) Search for herbal information by typing the herbal name, symptom or disease. corresponding to the search term in item 1.
- Search by speech, herbal name, symptom or disease.
    1) Name the herb, symptom or disease.
    2) Convert speech to text using Speech Recognition.
    3) Find herbal information from text converted from speech.

Herbs Information Management System

The researchers designed the herbs information management system that can be manipulated add/search/edit/delete by web application included herbal information, symptoms/disease, contraindications, and precautions list of drug recipes.

Application part

The application part was developed that run on smartphones to facilitate and easy to use for users finding the herbal information by photos from the camera, photo album, herbal name, and symptoms of the disease.

Implementation

The implementation part is the process of bringing the application to test the use that it works properly as designed.

Evaluation

The evaluation part is evaluated the results of the experiment with three application development experts to evaluate the effectiveness of the application and to collect data.

IV. RESULTS

i. Application development results to search for herbal information from photographs.

The researchers have developed application to search herbal information from photos according to the designed research procedure by using the data from the study and analysis to create an application to search for herbal information from photos. The results of the research are divided according to the user 's part into two parts: the admin and the user as follows;

Admin section

The admin section can manage various information such as herbal information, symptoms / disease, contraindications and precautions, herbal pharmacopoeia of user management, and part of the refresh token to access the API shown in Figure 6.

Main menu

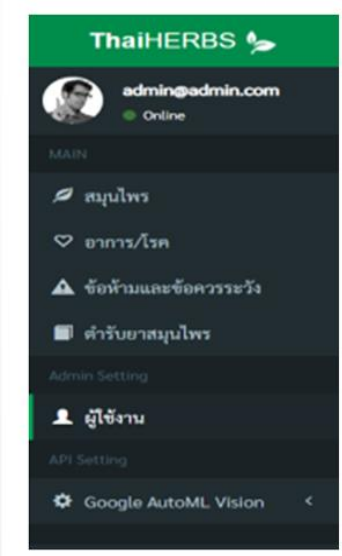

Figure 6: The screen showing the main menu of the Herbal Information Management System.

Figure 7: Screen to add symptoms / disease information.

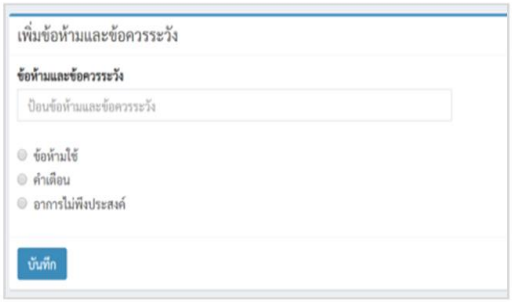

Figure 8: The screen for adding contraindications and cautions.

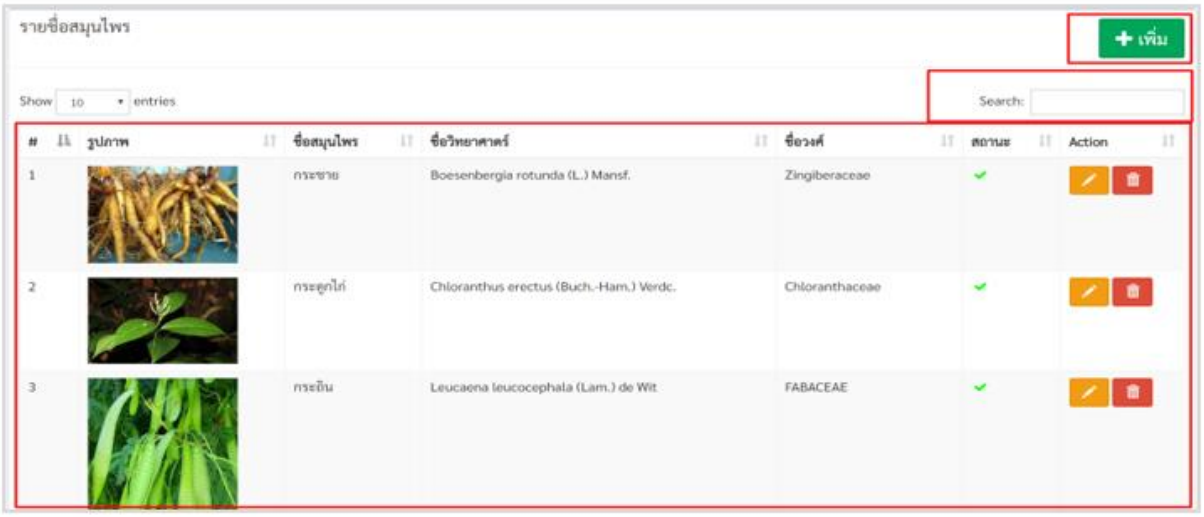

Figure 9: Manage herbs.

User part

The user part is part of the application that runs on the smartphone for facilitate and easy to use for users. It consists of the following parts: search from camera, photo album, herbal name, and search for the symptoms of the disease shown as Figure 10.

Figure 10: ThaiHERBS application.

From Figure 10, the application screen of the user section consists of 1) Shooting menu entering the camera mode for taking the pictures of herbs that want to search; 2) Album menu is to enter the photo album to select pictures of herbs that have been taken and want to search for herb information; and 3) Herbs menu for entering the herbal search page by herbal name by typing name or sound. When user speaks and the symptom menu goes to the herbal search page by properties, symptoms or disease, shown as an example in Figure 11-15 is shown in order as follows.

Figure 11: From camera.

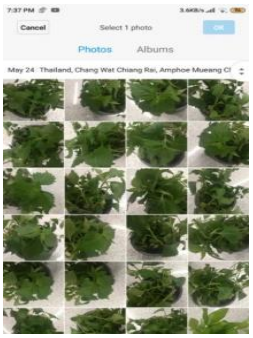

Figure 12: From albums.

Figure 13: From name.

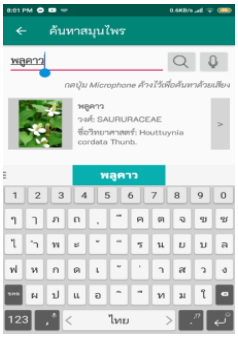

Figure 14: From voice.

Figure 15: From symptom.

From Figure 15, screen shots the searching by typing herbal names. The picture shows the herb search page and entering the name of the herb to search for information, press and hold the button to search by voice.

When the application searching information successfully, it will show the information as shown in Figure 16.

Figure 16: Herbal information screen.

ii. Verification of accuracy

In this research, the researchers examined the accuracy of the herb search by photographs. It was found that the accuracy depends on several factors from the four tests, namely the number of pictures of each herb with time to train photo clarity one herb in different locations. The search accuracy was found as shown in Table 2.

Table 2: Photo search test for herbs.

Herb	Number of pictures	Number of times in search	Search results		% Found
			found	Not found	
Cat grass	17	20	3	17	15
Cha Phlu	50	20	15	5	70
Yanang leaves	20	20	3	17	15
Pea	60	20	15	5	75
Parsley	48	20	16	4	80
Aloe vera	80	20	18	2	90
Plukaw	60	20	17	3	85
Vegetables	46	20	14	6	70

In addition, the researchers found that the duration of the train data affects the accuracy of applications, the more time it takes to train, the higher the accuracy. For example, the following example shown in Figure 17.

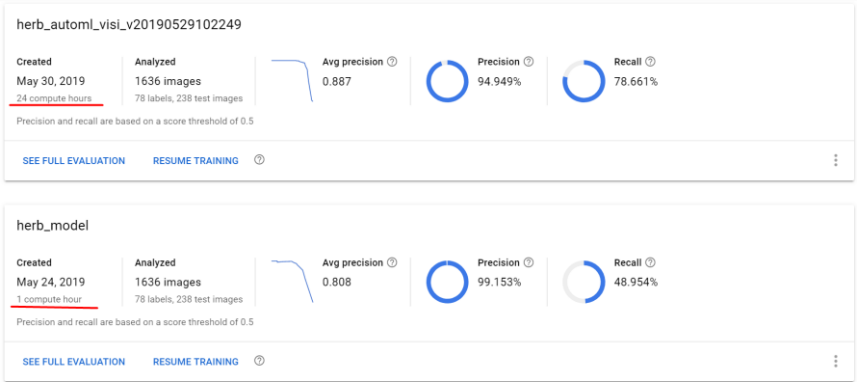

Figure 17: Comparison of data models.

iii. Evaluate performance

The researchers had submitted to the expertise of three people to assess the performance of the present studies which were analyzed using descriptive statistics and compared the results as shown in Table 3. This research has interpreted the mean efficiency results as follows.

4.50 - 5.00 Most effective
3.50 - 4.49 Very effective
2.50 - 3.49 Medium efficiency
1.50 - 2.49 Low efficiency
0.00 - 1.49 Minimal efficiency

Table 3: Results for evaluation of the efficacy of herbs search application by photo.

The assessment	$\bar{x}$	SD	Interpret results
1. The application allows the user to work with ease, use, and simplicity.	4.50	0.30	The most
2. The application is accurate and reliable.	4.54	0.37	The most
3. Applications are versatile, flexible, and multi-channel search capabilities.	4.35	0.45	very
4. The app can run continuously without errors.	4.36	0.36	very
5. Applications can be applied to a wide variety of plants.	4.54	0.37	The most
Total	**4.46**	**0.47**	**The most**

The results as a whole is at the highest level ($\bar{X}$ = 4.46, the SD = 0.47) when considering issues are at the top on an application allowing users to perform convenient, intuitive, and uncomplicated. The application can be applied to a wide variety of plants ($\bar{X}$ = 4.5 4, SD = 0.37), the application has the accuracy and reliability, followed by applications, functional, convenient, intuitive, and uncomplicated ($\bar{X}$ = 4. 50, the SD = 0.31), the lower levels of the application can run continuously without errors ($\bar{X}$ = 4 3 6 . SD = 0.37) and the application side has a wide range of capabilities, and flexible using can be searched for information in multiple channels ($\bar{X}$ = 4. 35, SD = 0.45).

V. CONCLUSION AND DISCUSSION

The Thai Herbs Application is the tool for facilitating the search of thai herbs information, divided into two parts. The first part is mobile application section. The ability of the application can search for four ways including 1) camera, 2) pictures album, 3) herbs name, symptoms or diseases, and 4) voice. It can be used on smartphone that runs android operating system and predicts herbs photos by Auto ML Vision API. The second part is web application for administrator section to manages information such as herbal information, symptoms and diseases, contraindications and precautions for using herbs, and herbal medicine information.

The results of the Thai Herbs Application performance evaluation were found that the overall result of the research was at the highest level, with the highest average was 4.46 and standard deviation was 0.47.

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