

A Supplement for Learning Herbal Medicine Using a Web-Based Tool and Social Network

Verayuth Lertnattee¹, Sinthop Chomya¹, and Virach Sornlertlamvanich^{2,3}

¹ Faculty of Pharmacy, Silpakorn University
Nakorn Pathom, 73000, Thailand

{[verayuths@hotmail.com](mailto:verayuth@hotmail.com), verayuth@su.ac.th, sinthop@su.ac.th}

² Thai Computational Linguistics Laboratory, NICT Asia Research Center

³ National Electronics and Computer Technology Center

Klong Luang, Pathumthani, 12000, Thailand

{virach@tccllab.org, virach.sornlertlamvanich@nectec.or.th}

Abstract. With the fast growing of using herbal medicine, pharmacists now need a basic knowledge of these topics for their professional practices. To serve the need, a set of courses on herbal medicine, is arranged for pharmacy students. Due to a limitation of time, it is hard for a student to familiar with medicinal herbs. In this paper, we introduce KUIHerbRx, a Web-based supplement learning tool on herbal medicine. The KUIHerbRx is a modified version of the Knowledge Unifying Initiator for Herbal Information (KUIHerb), which is used as a platform for building a Web community for collecting the intercultural herbal knowledge with the concept of a collective intelligence. Due to the diversities of herbs, geographic distribution and their applications, social network collaboration is important for enhanced learning. Three types of information creation, i.e., initial, voting and non-voting information, is designed. KUIHerbRx provides a supplement learning to improve knowledge and skill in herbal medicine with a scientific method. Information of medicinal herbs in several regions can be distributed and exchanged among groups of students.

1 Introduction

Due to the growing use of herbal medicine and other products by patients and consumers, pharmacists now need a basic knowledge of these topics for their professional practices [1]. To serve this need, a set of courses on herbal medicine, e.g., general botany, medicinal botany, etc., is arranged for pharmacy students. Due to a limitation of time for study, it is hard for a student to familiar with medicinal herbs. Normally, students learn herbal medicine in both lecture and practice classes. In a practice class, some activities should be assigned to students such as taking pictures of some medicinal herbs or interview traditional practitioners. Students usually keep the result into the simple file and print them out when they need. Using the conventional technique, it is hard to find the way, which students to create a community for exchanging their information. With

Web 2.0 system, it provides an opportunity for sharing information from a group of members on a topic of interest. The Knowledge Unifying Initiator for Herbal Information (KUIHerb), a system for collective intelligence on herbal medicine, is used as a platform for building a Web community for collecting the intercultural knowledge [2]. Information in KUIHerb has been collected for a period of time. It has only a little room for a non or a little experienced student to share a new opinion. Furthermore, pharmacy students should contribute herbal information related with scientific evidences. From these reasons, the real KUIHerb's Web site is not suitable for using as a learning tool for a pharmacy student. In this paper, we present an idea for building a new and clean Web site based on KUIHerb and use it as a Web-based and social network learning tool for herbal information creation, which is called KUIHerbRx. Three types of information creation, i.e., initial, voting, and non-voting information are suggested. Information of herbs in several regions can be distributed and exchanged among groups of students. Several types of media can be contributed. Information about traditional and modern herbal medicine can be combined and linked together by collaborative work from students and professors. KUIHerbRx provides a supplement learning to improve knowledge and skill in herbal medicine with a scientific method.

In the rest of this paper, learning herbal medicine in school of pharmacy is described in Section 2. Section 3 gives a detail of the concept of the social network with Web 2.0 and the future Web. Section 4 presents KUIHerbRx, a learning tool for herbal information creation. The experimental results from volunteers are described in Section 5. A conclusion and future works is made in Section 6.

2 Learning Herbal Medicine in School of Pharmacy

Herbal information is a special type of information dealing with medicinal herbs. In a pharmacy curriculum, a series of courses about herbal medicine are arranged, i.e., general botany, medical botany, chemistry of natural products and quality control of natural products. The first course is usually general botany. Students are introduced to morphology of plant organs, e.g., leaves, roots, seeds, fruits, rhizomes. They also study on plant physiology. The second course is medicinal plants. It also covers the nomenclature of medicinal plants in a scientific method. Common names in both Thai and English are also given. In these periods, students should be familiar with several herbs in both fresh form and dried form. Due to a limitation of time, it is hard for a student who living in a city or urban area to familiar with medicinal herbs. Normally, students learn herbal medicine in both lecture and practice classes. In a practice class, professors usually prepare some parts from several medicinal plants for students. They study from these samples and some pictures, which are used for describing the dominant features of herbs. Some topics such as name identification and medicinal uses, which may be different among cultures, are still problems. Another way to make students familiar with herbs, they should see the plant and take pictures of those plants in both whole plants and their parts used. A set of images of an herb is excellent sources for sharing knowledge about herb identity. From the images, students

can discuss, which species (including varieties) it should be. The scientific name of an herb and its images are used for common understanding.

For more understanding in herbal medicine, each pharmacy student is assigned to search and collect herbal information for some particular herbs. Several mechanisms are used to acquire and collect information, for example

- Knowledge from their experiences.
- To seek information from several sources, e.g., standard references, proceeding, journal including information on the Internet
- Interview some experienced traditional practitioners

In the traditional method, students report the result from their study in files and print them out when they need. With this method, it is hard to share information among students. Moreover, information about local names and medicinal usages may be different among different regions. Some herbs are hard to find in the region where students live in. Using a Web-based learning tool for sharing information of students is an excellent method for sharing and exchanging herbal information in several regions. Three levels of collaboration are considered, i.e., region, national and international levels.

3 Social Network with Web 2.0 and the Future Web

Nowadays, the Internet users easily contribute their opinions and resources. As a result, users can collectively contribute to the Web community and generate tremendous content behind their virtual collaboration [3]. For a system with collective intelligence, implementing scalability can indeed be challenging, but sensibility comes at variable sophistication levels. Several approaches are dealing with the sensibility, e.g., user feedback, recommender systems, search engine, and mashups. As suggested by Gruber T., if the data collected from all those participants is aggregated and recombined to create new knowledge and new ways of learning that individual humans cannot do by themselves, it will be considered as the true collective intelligence [4]. However, Opinions contribute from users may be controversial because Web 2.0 provided only a little bit on control of information.

We are going to the new generation of Web technology, i.e., Web 3.0 or the future Web. Although general agreement of its definition is not stable, some useful features of the future Web are described as follow. The control of sharing information is better than in Web 2.0. The decision for the opinions, which are provided in the future Web, is more accurate. The intelligence component will be added in the future Web while in Web 2.0, it is only the simple social Web [5]. Unlike Web 2.0, which participants are usually general Internet users, wisdom of the expert is essential for constructing more knowledge that is valuable. From these features of the future Web, it should be a better social network system for building a supplement learning tool for herbal medicine. Due to the diversity of herbs and their applications, pharmacy students who are interested in herbal medicine from several universities, may contribute their knowledge about herbs based on their local area.

4 KUIHerbRx: A Learning Tool for Herbal Information Creation

At present, the first version of KUIHerb, which has collected herbal information for two years. Several opinions of herbs are presented to public. For this reason, it has only a little room for a non or a little experienced student to share a new opinion. Furthermore, pharmacy students should contribute herbal information related with evidences from scientific background. However, the structure of KUIHerb is very valuable. We can establish a new and clean Web site and use it as a learning tool for herbal information creation. This KUIHerb's version, which is used as a tool for a supplement learning herbal medicine is called KUIHerbRx. Three types of information creation are initial, voting, and non-voting types.

4.1 Initial Types

The initial information is created and provided by professors. Three topics are initialized, i.e., scientific and general names (both Thai and English), general characteristics and references. Professors select a set of medicinal herbs and assign some of them to students. Normally (but not limit to), these herbs are common in the region of which the campus is located.

4.2 Sharing Opinions with Voting System

The voting mechanism is widely used to improve accuracy of the system such as in [6]. To collect more accurate data, only registered students (and the administrator) in the system are able to contribute and modify their opinions. Any opinions or suggestions are committed to voting. While opinions may be different, majority votes determine the view of the communities. These features naturally realize the online collaborative works to create the knowledge communities. The weighting system for each opinion can be calculated by the formula

$$Wsum_{ik} = \sum_j w_{ijk}$$

Here, $Wsum_{ik}$ is defined as the total weight of the i^{th} opinion of the k^{th} topic. The w_{ijk} is the weight of the i^{th} opinion, which is given by the j^{th} member who would like to vote in this opinion for the k^{th} topic. The value of w depends on the priority and agreeeness of the member. The weight from the member, who contributes more accurate opinions for a long period, should be higher than the new one. The w is needed to update from a period of time. Furthermore, if the member agrees with the opinion, the value is positive and vice versa. A set of higher weight opinions for each topic, tends to be more believable. Three topics are applied by voting system, i.e., local names, medicinal usages, and images of herbs. When data from these topics has been collected for a period of time, several data mining techniques, e.g., association rules [7], may be applied for finding valuable knowledge in herbal medicine.

Local Names. In the herbal world, the content is usually the scientific name and its pictures, which can be used for identification. However, local people know an herb with its local names. Name confusion may cause several serious problems. Students should keep in mind that an herb may have several names and one name may be referred by several herbs. The relationship between herbs and their names is many-to-many. From these problems, the social network on the Internet can be used as an excellent tool for gathering these terms.

Medicinal Usages. Medicinal uses may be different among cultures. For example, ginger is fried and eaten plain, and used in curry pastes in India. In Indonesia, it is grilled and used to flavor fish and meats or for making ginger tea. KUIHerbRx is used for pharmacy students who concern to create link between beliefs of the communities to scientific methods. From this reason, opinions are given here should cite to reliable sources of information, e.g., scientific research, standard textbooks. Furthermore, more advance methods of representation can be used. For example, in the topic of method of preparation, video is applied instead of the simple text message. Due to different applications for an herb on each region, knowledge transfer is faster by using social network. Students in the northern region learn the way of the southern region to apply the same herb.

Images of Herbs. In this system, images of an herb can be uploaded to the system. Students are assigned to take their own pictures of herbs (from real herbs). The images should relate to the whole plant. The parts, which have medicinal usages such as leaves, roots, flowers, seeds or other portions, should be included. This is very useful to other students who would like to see parts used of an herb. They should be in both fresh and dry forms. The voting system may summarize the popularity and quality of the images. The basic idea is that images, which high quality and/or useful for treatments should be more popular. To make these images more reliable, keywords and contributors' names should be given to the system: keywords suggest visitors about the focus point on the image. Contributors' names guarantee visitors for quality of their images. Comments from professors help students to provide more quality images. In case of an image has some problems, e.g., incorrect picture, image is not clear. This comment can be used as a tool to inform visitors. The owner and administrator may have a decision to keep or delete the image. The social network is very useful for this case. Some herbs are easier to find in some regions than the others are.

4.3 Sharing Opinions with Non-voting System

Two topics are separated from the others. These are precaution/toxicity and additional information. These two topics are free text without majority voting. For a precaution, any suggestions will be kept for warning when someone would like to use the herb. Although the voting system does not apply to the opinion, nonetheless different opinions can be given to the KUIHerb. For additional information, other valuable information such as cultivation may also be given. This space can be applied for suggesting references for an opinion in order to make the opinion more reliable.

5 Experimental Results

The KUIHerbRx is tested by a group of volunteers. Four pharmacy students, three pharmacists and a botanist are assigned to contribute their knowledge and their material such as images of herbs and video for presenting preparation of herbs. All volunteers suggest that the tool is valuable for teaching herbal medicine. Some interesting results are shown as follow.

5.1 Learning Schema

With careful design, information of an herb can be divided into three types of information, i.e., initial information, which is initialized by professors, voting system and non-voting system information is initialized by students who are assigned to gather information of some herbs. With collaborative system, other students (including professors) are able to vote the opinions in a list or suggest new opinions. The detail description of learning schema is shown in Figure 1. In junior level, students usually apply their experience as well as seek herbal information on standard textbooks or the Internet while the senior students should collect information from traditional practitioners or finding herbal information from primary sources, i.e., journals or proceedings.

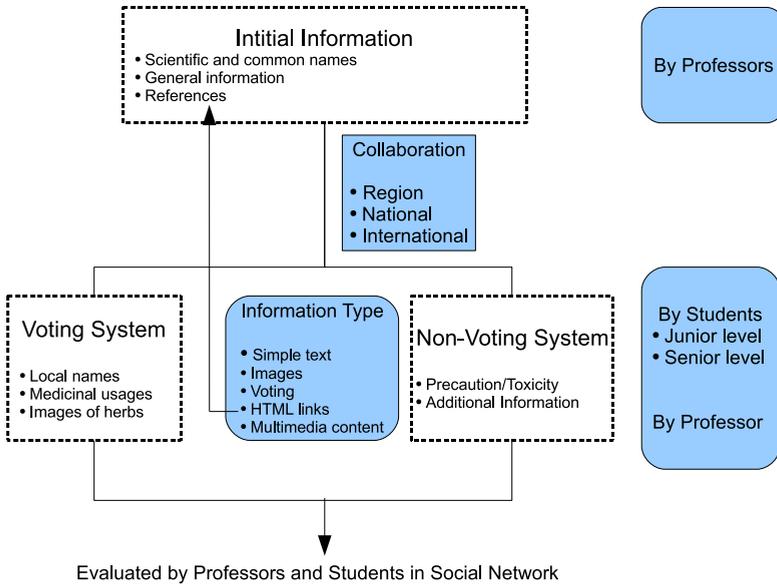


Fig. 1. Learning schema of a supplement learning for herbal medicine

5.2 Learning Topics in Voting System

In this version, a majority voting score is applied on the topics of local names, medicinal usages, and images. Due to the first period of use, all students are given equal weight. The positive score is applied. A student can suggest a new opinion, which the score of one is initiated. When other members agree with the opinion, a simple click on the button “Vote” will increase the score by one. Each member has only one vote for an opinion. The opinion with the higher score will be moved to the upper part of the window. For free text opinions, student should include their source of information (from scientific papers or interview) by creating a html link. Otherwise, opinions are assumed that from their experiences.

KUIHerb / Categorized by Part Used / ใบ / ว่านหางจระเข้

Thai Common Name and Scientific Name : ว่านหางจระเข้ - *Aloe vera* (L.) Burm.f.

Herb Images | General Inform. | **Herb Name** | Part Used/Indication | Precaution/Toxicity | Additional Inform | Ref.

Thai Names : ว่านหางจระเข้
 English Names : Star cactus, Aloe, Aloin, Jafferabad, Barbados
 Sci. Names : *Aloe vera* (L.) Burm.f.
 Families : ASPHODELACEAE

Please contribute names of this herb in your local language. If possible, please contribute the location where the herb is called. Click VOTE for voting the names in a list OR Click: +Contribute Other Names for the new name. **If the + does not appear, This indicates that you are not the member, please click Go to Member Registration**

Other Names List All (10) | Back: 1 - 10 Next >

	Local Name	Location	Score
VOTE	ว่านไฟไหม้	ภาคเหนือ	7
VOTE	หางตะเข้	ภาคกลาง	6
VOTE	ว่านหางจระเข้		3
VOTE	หางจระเข้		1
VOTE	ว่านตะเข้		1
VOTE	الألوه نبات	Arabic	1
VOTE	芦荟	Chinese	1
VOTE	Medicinal aloe	English	1
VOTE	Aloès	French	1
VOTE	Cây Lô Hội	Vietnamese	1

[+Contribute Other Names](#)

Fig. 2. Majority voting system for the local names in Thai and other languages

Local Names. The Figure 2 represents a list of local names for an herb with their scores. Moreover, a hierarchy of locations is provided in the list. For Thai, names of province, district and subdistrict are provided. If a local name is called in several provinces of a region, we can conclude that the local name is belonged to the region. Moreover, names of several languages are provided. This is useful when the collaboration is extended to students who are major in foreign languages or the international level. The Figure 2 represents names of the famous herb for burn healing, i.e., *Aloe vera* (L.) Burm. f. Several Thai local names and names in other languages are shown with their voting scores. Various terms about herb name may use as keywords for searching herbal information.

Medicinal Usages. This topic may be the most attractive. Information on part used, its indications, and methods for preparation, are given. Junior students may contribute simple text to the system. On the contrary, senior students or graduated students should contribute more scientific evidences and more advance representation. For example, when they share an opinion about an indication of a part used of an herb, a set of scientific references should be added. Furthermore, multimedia can be applied for more understanding. For example, it is more interesting to describe method of preparation with video representation. The video may be their own production or a link to some video community Web site such as YouTube. The Figure 3 presents medicinal usages of an herb. Links to scientific references and video are applied.

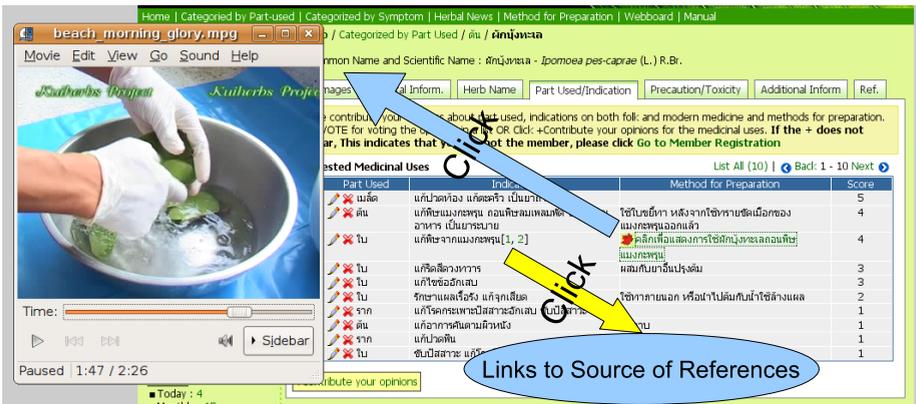


Fig. 3. Describing a method for preparation by video and links

5.3 Images of Herbs

For this topic, keywords (herb name and part used) and a comment are applied on contribution of images. With voting system, an image that is frequently clicked by visitors will obtain the higher score and this image will be shifted to the upper part of the window. For example, images of *Piper nigrum* L., is shown in Figure 4. Five images of the herb has been collected. Keywords below an image help us for identifying it. The Table 1, represents parts of an herb given by volunteers. The first part used for each cell (in bold) is the part which gained the highest score. Moreover, the comment is valuable for controlling quality of an image. When professors (including other students) find that an image is incorrect and/or low quality, they can write a message to the system for warning other users. The owner or the administrator may delete the imperfect image.

From the result, almost all parts used on image topic can be found on medicinal usages topic. The most popular part used is quite similar. In addition, information on medicinal topic also suggests that images of an herb should be included into the system. Students are advised by the system to find some more pictures to fulfill information of herbs.

KUIHerb / Categorized by Part Used / เมล็ด / พริกไทย

Thai Common Name and Scientific Name : พริกไทย - *Piper nigrum* L.

Herb Images General Inform. Herb Name Part Used/Indication Precaution/Toxicity Additional Inform Ref.

Please contribute images of this herb, the whole plant and the parts which can be used for medicinal or other proposes. Size of the image should not be exceed 800x600 in jpeg format. **If the + does not appear, This indicates that you are not the member Go to Member Registration**

click for larger view [#555] ใบ พริกไทย

click for larger view [#556] ผลแก่ พริกไทย

click for larger view [#557] ผลแห้ง พริกไทย

click for larger view [#558] เมล็ด พริกไทย

click for larger view [#559] ใบ พริกไทย

Keywords for Each Image

+ contribute the image

a comment to images

Add your comment :

Add your comment

ยังไม่มีชื่อเสนอแนะ

Fig. 4. Images of *Piper nigrum* L. Willd. are ranked according to popular view

Table 1. Information about part used on image topic and medicinal usage topic

Scientific Name	Image	Part Used for Medicinal Usages
<i>Centella asiatica</i> (L.) Urb.	whole plant (include leaves)	whole plant (include leaves), seed
<i>Citrus hystrix</i> DC.	fruit, leaves	fruit, leaves, root, peel
<i>Cymbopogon nardus</i> Rendle.	whole plant , flower	Rhizome , whole plant, leaves, root
<i>Mimusops elengi</i> L.	flower, whole plant, fruit, dried form	flower, wood, bark, flower, root, leaves, seed
<i>Piper nigrum</i> L.	leaves, fruit (in fresh and dried form), seed	leaves, root, flower, seed
<i>Quisqualis indica</i> L.	flowers, leaves and whole plant	whole plant, seed, leaves, root

6 Conclusion and Future Works

In this work, the KUIHerbRx was used as a Web-based supplement learning tool on herbal medicine. Due to the diversities of herbs, geographic distribution and their applications, social network was important for enhanced learning. Three

types of information creation, i.e., initial, voting and non-voting information was applied. KUIHerbRx provides a supplement learning to improve knowledge and skill in herbal medicine with a scientific method. Information of medicinal herbs in several regions can be distributed and exchanged among groups of students. Several topics were assigned to students, e.g., local names, indications, and images. Activities of collecting, contributing new opinions or vote to exist opinions, and providing comments to the system, enhanced skill in herbal medicine.

In pharmacy curriculum, more advance topics such as chemistry in natural product and quality control of natural products are taught. Using webboard and/or blog will be considered to be a part of the learning tool. These topics should be included in KUIHerbRx and will be implemented for our future works.

Acknowledgments

This work has been supported by National Science and Technology Development Agency (NSTDA) under project number P-09-00159 as well as the National Electronics and Computer Technology Center (NECTEC) via research grant NT-B-22-MA-17-50-14.

References

1. Dvorkin, L., Gardiner, P., Whelan, J.S.: Herbal medicine course within pharmacy curriculum. *Journal of Herbal Pharmacotherapy* 4, 47–58 (2004)
2. Lertnattee, V., Chomya, S., Sornlertlamvanich, V.: Applying collective intelligence for search improvement on thai herbal information. In: *Proceedings of the 2009 IEEE International Conference on Computer and Information Technology*, Xiamen, CN, pp. 178–183 (2009)
3. Lin, K.J.: Building web 2.0. *IEEE Computer* 40, 101–102 (2007)
4. Gruber, T.: Collective knowledge systems: Where the solcial web meets the semantic web. *Web Semantics: Science. Services and Agents on the World Wide Web* 6, 4–13 (2007)
5. Glustini, D.: Web 3.0 and medicine. *British Medical Journal* 335, 1273–1274 (2007)
6. Ko, Y., Park, J., Seo, J.: Using the feature projection technique based on a normalized voting method for text classification. *Information Processing and Management* 40, 191–208 (2004)
7. Luo, X., Yan, K., Chen, X.: Automatic discovery of semantic relations based on association rule. *Journal of Software* 3 (2008)