

DEVELOPMENT OF THE MULTILINGUAL COLLABORATION SYSTEM FOR AGRICULTURAL PRODUCTION BY USING IP CAMERA

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ABSTRACT

As a component of the multilingual collaboration system of agricultural production, an IP camera with a small server was used in a greenhouse to observe the crops and the cultivation works at real-time on the Internet and make the multimedia database. The translation system for the multilingual collaboration consists of two stages. Firstly, the basic terms displayed on the PC screen are perfectly translated into the language of each country by the basic terminology translation dictionary and a translation engine. Secondly, the contents of data such as cultivation log and observation log, if necessary, are translated into the language of each country by using Web ASP translation services. The farmers can exchange comments and opinions in their native languages with this multilingual collaboration system. By using the function of the MSN Messenger to share application programs, each farmer can make the work record file, greenhouse control charts, etc. in collaboration. On the basis of the translation system developed, the search method was designed not only to get a lot of information of Web site in other languages but also to carry out the full-text search into other language's database. It is necessary to improve the translation accuracy and the robustness of the system for the user-friendly multilingual collaboration system.

Keywords: *Collaboration, Multilingual, IP camera, Full-text search, Agricultural information.*

1. INTRODUCTION

As a result of remarkable advancement of the information technology, the farmer of each country has utilized Internet by broadband as well as urban dwellers. They easily got a lot of information by using the Internet and shared the agricultural information and database (Kouno and Machida, 2001; Rohrig et al, 2001; Lopes et al, 2001). In order to exchange their opinions on the Internet, visual information has been shared by using the multimedia data and the users can understand it quickly (Horning et al, 2001). But there are seriously

problem of the image and the language to share the agricultural information between multi countries. In order to get a good image, Lee and Nakaji (2003) examined the various cameras images by panel test. To solve of the language problem, Nakamura and Takigishi (2001) developed Multilingual mailing list system that the e-mail of the farmers in Japan and Korea was translated into the Japanese and Korean. But the translation accuracy was very low. The agricultural production collaboration system was developed to solve the language problems by the farmer among multi countries, and it attempted against a multilingual collaboration system (Nakaji and Lee, 2002).

In this paper, the condition of growing crops could be observed in real time by the IP camera in the greenhouse, and the IP camera images would be shared and discussed by collaboration system though the Internet. The agricultural production collaboration system for each farmer using native language was developed to exchange mutual opinion, to join the work, and to get a lot of agricultural information by using their native language.

2. DEVELOPMENT OF THE COLLABORATION SYSTEM

2.1. Specification and shape of IP camera

A camera was the IP camera of the MOBOTIX Co.. The IP camera is controlled only by a Web browser. It equipped with powerful server having two onboard image sensors. The images from the two sensors are digitized continually at a rate of 12 frames per second. The IP camera including 32MB RAM stored images in the memory of the body. Table 1 shows the specification of IP camera.

Table 1. Specification of IP camera

Memory	Flash-ROM	8MByte	
	RAM	32MByte	
Image	Size	CMOS 640×480 Color	
	luminous intensity	1Lux	
	Format	JPEG	
Optical system	Position	Right	Left
	Lens	42mm(wide angle lens)	150mm(telephoto lens)
	Brightness	f=7mm/1:2.0	F=25mm/1:2.5
	Angle of view	55°•45°×34°•	16°•13°×10°•
	View	8.2×6.1m/10m	2.3×1.8m/10m
Operating temperature and humidity		temperature □-20°•60°, humidity •35%•85%	
Externals size		W143×D143×H138mm	
Weight		500g	

2.2. System configuration

Figure 1 shows the composition of the collaboration systems with Client-Server type. The IP camera was set in the greenhouse at experimental farm of Kyushu University. In the greenhouse melons were cultivated by nutrient solution culture. The crops are observed in real time by IP camera images on the screen of the agricultural production collaboration system. It will be able to confirm the cultivating situation and the cultivation log, etc. on the Internet. The farmers of each country can exchange the opinion and comment in their native language on the Internet by this collaboration system.

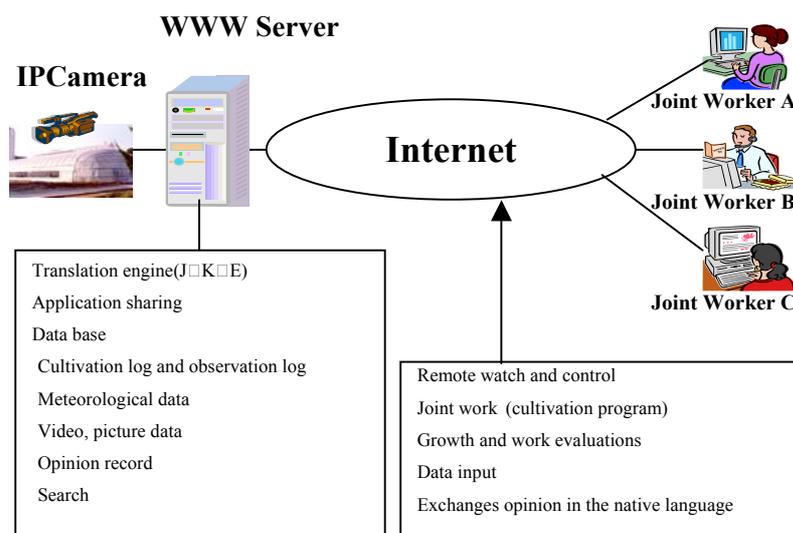


Fig. 1: The configuration of agricultural production collaboration system with Client-Server type

2.3. Translation of language method

In order to translate certainly the terms of the collaboration system's screen, we developed the basic terminology translation dictionary. The terms refer the basic terminology translation dictionary called the translation table which was composed on basic terminology of communications, an agricultural terminology, a technical terminology, data base names, and file names, etc.. It's including Japanese, Korean, and English languages. When the farmers of each country use the collaboration system, firstly, the basic terms of screen will be completely translated into corresponding language of each country by the basic terminology translation dictionary and a translation engine. Secondly, the farmers can share the contents of data such as a cultivation log and observation log, etc. it also to be translated into the language of each country by using Web ASP translation services. By the method of two translation, farmers of each country can join works on the Internet with their native language.

2.4. Mutual opinion exchange method

The farmers of each country might exchange mutual opinions and comments by the agricultural production collaboration system. They could exchanged the opinion at real-time by using the function of the text chat of the Web ASP translation service. The content of the files like the cultivation log and the observation log were updated on the Internet by the function of MSN Messenger and the Web ASP translation service.

2.5. Using Search function of site in other languages

Search function is a tool to search a necessary data in a lot of information easily and quickly. The basic terminology translation dictionary and the Web ASP translation service on the site of other language were adopted as a Search method. The range of the search had to be distinguished according to whether the WWW search or in Site search (Figure 2). In order to search the site in other language, firstly, the user inputs a keyword in native language on the computer, and then it is translated into the search term of other language by using the basic terminology translation dictionary. Secondly, the user can search the term in the Web site of other language exactly. Finally, the result of searching is translated into native language by using the Web ASP translation service.

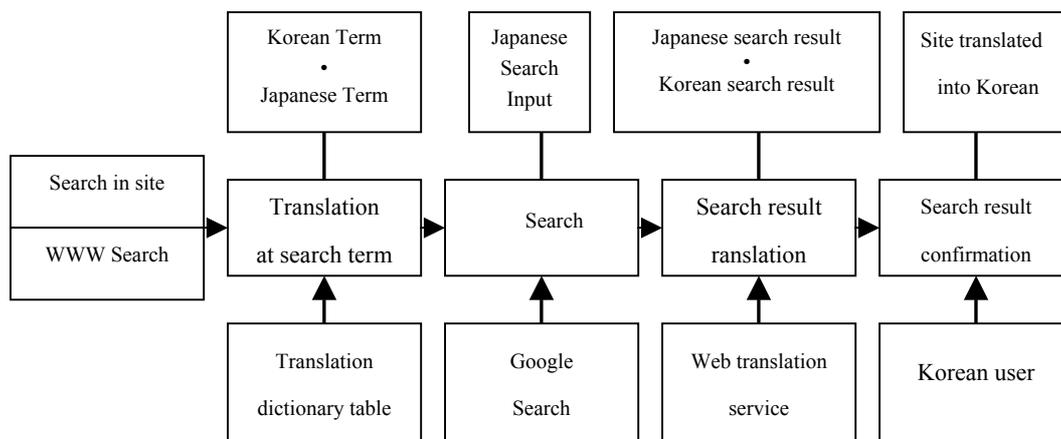


Fig. 2: Search method (when you search a Japanese site in Korean)

As a result, the farmers in a country can get a lot of information by this search method. Figure 2 shows the flow chart to search Japanese language Web site in Korean language. First of all, a Korean search term is translated into Japanese search term by using basic translation dictionary. The translated Japanese search term is used and searched in google search function. After a result of Japanese search is translated into Korean by using the Web ASP translation service, the farmer of the Korea obtains information of search contents.

3. RESULT AND DISCUSSION

3.1. Screen of collaboration system by using IP camera

Figure 3 shows the screen of 3 country languages of the agricultural production collaboration system developed. The basic terms on the screen were translated certainly by the subsystem of the basic terminology dictionary of Japanese-Korean-English language.

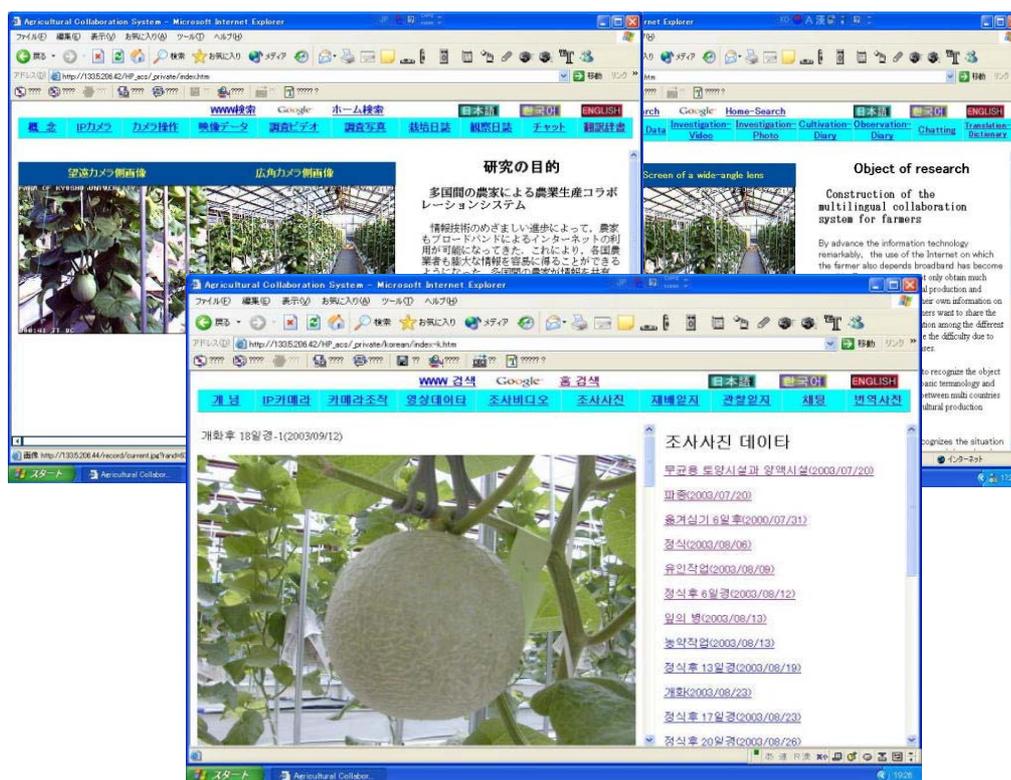


Fig. 3: Screen of agricultural production collaboration system developed

The farmer of each country could observe crops in the greenhouse by the image of the IP camera in real time. The image of the IP camera can be controlled directly by the user in the Internet. Controlled items are the telephoto lens or the wide angle lens, the image size (160×240, 320×240, 640×480), brightness, saturation, and sharpness, etc.. The observation of the crops in the greenhouse became easy by direct operation. The farmer of each country can confirm the image every hour or day by the database of the IP camera images. Figure 4 shows a part of the image database of the IP camera on melon cropping. It is recognized easily the growing condition of crops. The growing condition of crops can be observed all over the cropping period by the database of the IP camera images.

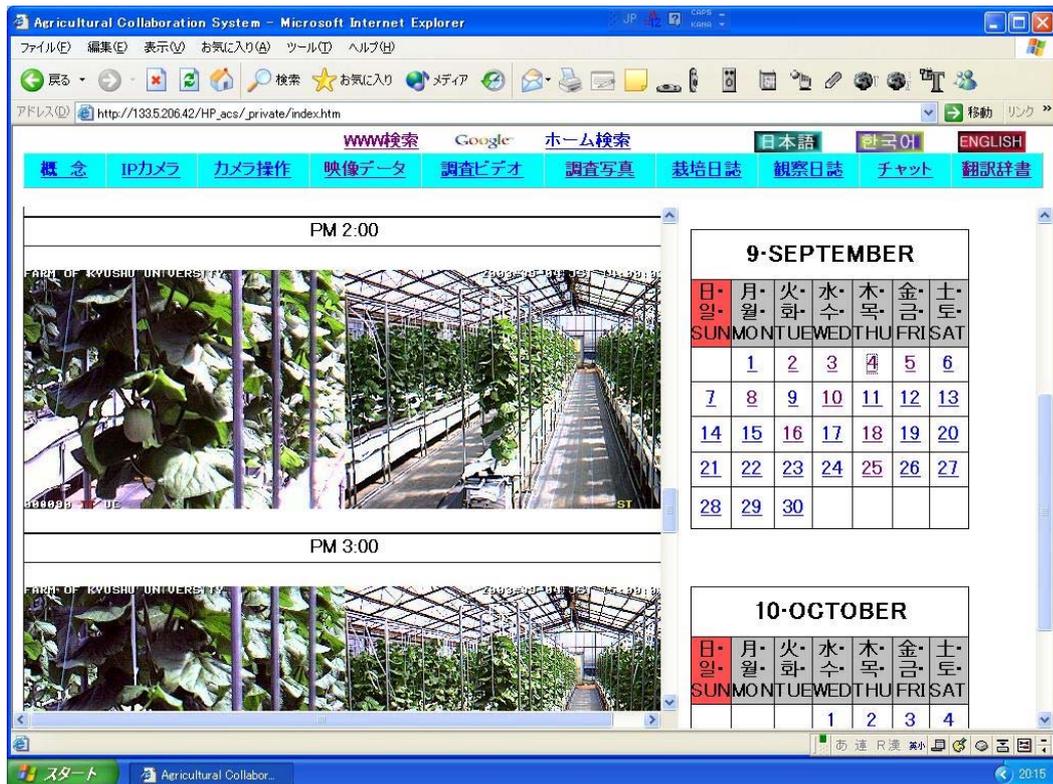


Fig.4: Screen of image database of IP camera

3.2. Share of crops cultivation work

To share the cultivation activity, it's need to take a picture of the situation of the cultivation work by using a digital camera and video besides the IP camera, when he(she) does a cultivation activity such as sowing, transplanting, training, pollinating, fruit hanging, bagging, applying agricultural chemicals, etc. . The farmer of each country can confirm the cultivation works anytime by recording the photograph and the video. When the photograph of the cultivation practice and the data of the video are used in agricultural production collaboration system on the Internet, it becomes easy to understand about the situation of cultivation of crops. Figure 5 shows the photograph of pollination activity by a farmer.

The farmers can exchange opinions and comments in their native languages with the multilingual collaboration system. By using the function of the MSN Messenger for share application programs, files of the cultivation log and the observation log were recorded by farmers in each country and the contents of file were updated in collaboration by using their native language. Moreover, the MS Office files were translated in native language by the Web ASP translation service.

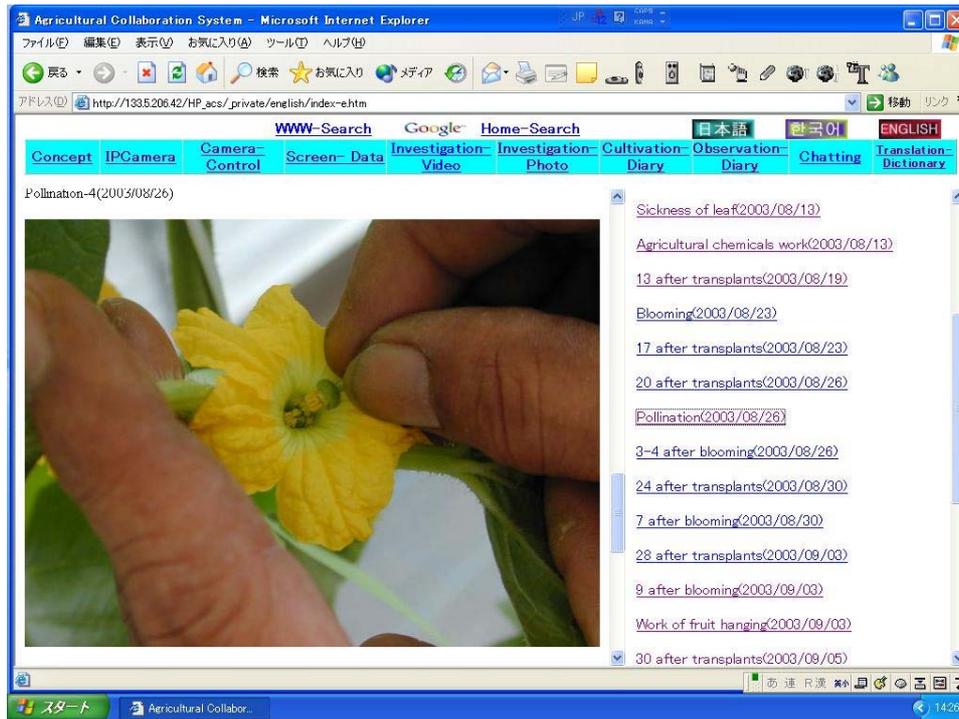


Fig. 5: The Photograph data of work of pollination

3.3. Translation system

In order to translate the collaboration system, we have to use two subsystems, that is, the basic terminology translation dictionary and Web ASP translation service. The basic terminology translation dictionary translated the basic terminology of the collaboration system screen such as the agricultural terminology, a technical terminology, data base names, and file names, etc. in Japanese, Korean, and English languages. The input of the terms of the basic translation dictionary is possible everyone on the Internet. The Web ASP translation service translated contents of cultivation log and observation log, a text chatting, a Web site page, and MS Office files, etc. in real time on the Internet.

The translation system for the multilingual collaboration consists of two stages. Firstly, the basic terms displayed on the PC screen are perfectly translated into the language of each country by the basic terminology translation dictionary and a translation engine. Secondly, the contents of data such as cultivation log and observation log, if necessary, are translated into the language of each country by Web ASP translation service.

The farmers of each country exchanged the mutual opinions in real time by using the text chatting of the Web ASP translation service. For example, the Korean farmer can exchanged their opinion with the Japanese farmer in Korean language. Figure 6 shows the screen of the text chat of the Web ASP translation service. As a result, the farmer of each country had been exchanged their opinion and comment in native language at this

multilingual collaboration system. The cultivation log and the observation log were shared by using the share function of MSN Messenger and the contents of the files were updated on real time in native language by Web ASP translation service.

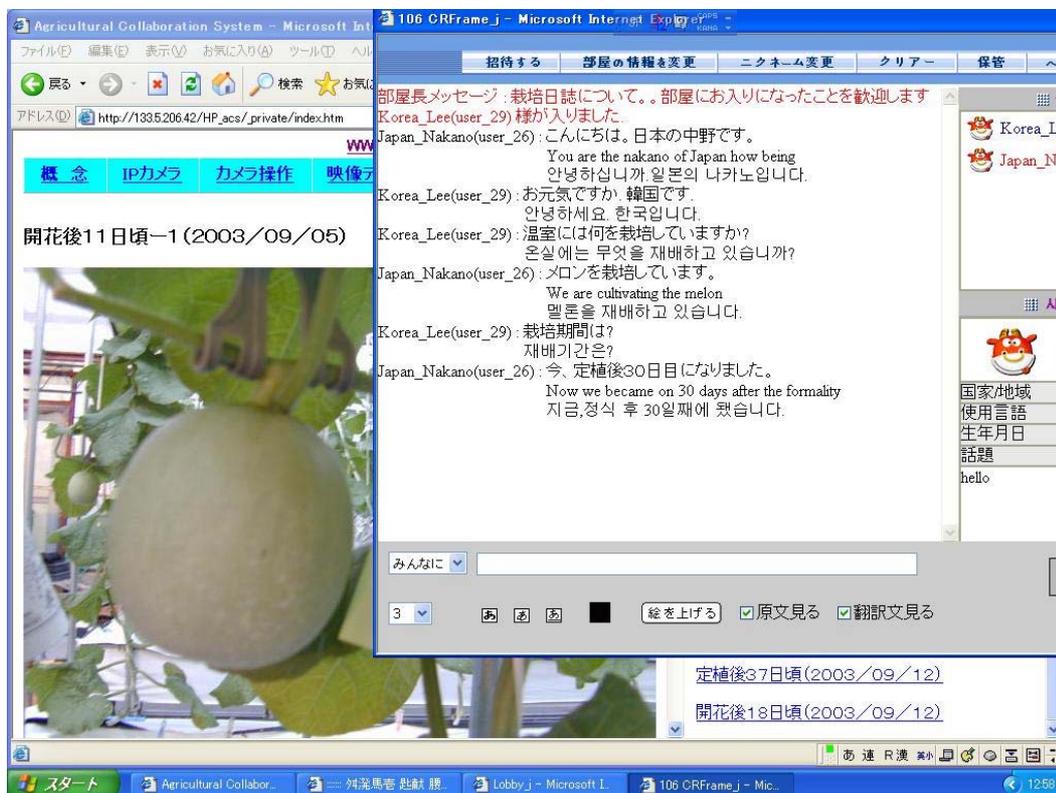


Fig. 6: Screen of text chat of Web ASP translation service

3.4. Search function of site in other language

The multilingual search function was developed for search of the Web site and in site of other country language. The amount of information was increased by the method of the multilingual search. The farmers of each country could used information of the other language as well as information of the native language.

4. CONCLUSION

The agricultural multilingual collaboration system was developed to share the agricultural information for the farmers of each country. The farmers can observe the condition of growing crop and the cultivation works in real time by IP camera on the Internet. The multilingual collaboration system was exchanged their opinion and comment in native language by using two subsystem such as the basic terminology translation dictionary and the Web ASP translation service. The multilingual search method was very useful to get a

lot of information of Web site and Database in other languages. The contents of the cultivation log and the observation log were updated in native language by farmers of the each country. It is necessary to improve the translation accuracy and the robustness of the system for the user-friendly multilingual collaboration system.

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Web ASP automatic translation-service, <http://www.sysmeta.com/main.htm/>