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Construct OCR on mobile mechanic system for android wireless dynamics and structure stabilization

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Abstract. In today's online social structure, people with electronic devices or network have been closely related to whether any of the activities, work, school, etc., is related to electronic devices, intelligent robot, and network control. The best mobility and the first rich media of these products as smart phones, smart phones rise rapidly in recent years, high speed processing performance and high free way to install software, deeply loved by many business people. However, not only for smart phone business aspects of the use, but also can engage in education of the teachers or the students are learning a great help. This study construct OCR-assisted learning software written by the JAVA made, and the installation is provided by the Android mobile phone users.

Keywords: smart phone; mandarin study; optical character recognition; fuzzy lyapunov; artificial intelligence

1. Introduction

In today's all wireless networks and fiber-optic network technology is becoming increasingly popular, more and more faster speed cases, can be done through the Internet has more and more, more and more people will use the net Way to help their own personal learning or query the information needed is more people to the recent hand-held devices to connect to the Internet to keep up personal e-mail and the company's circumstances, to individuals not necessarily the office again but can also handle companies. With the rapid development of internet technologies, the computer-assisted learning (CAL) is gradually moving toward to mobile learning (Koike *et al*. 2007, Morshed *et al*. 2005). As technology advances, the popularization of wireless network speed, and now almost all programs have wireless network available (Hsiao *et al*. 2005a,b,c,d,e, Chen 2004, Hsieh *et al*. 2006, Chen 2006a, b, Chen 2007a,b,c, Tsai *et al*. 2008, Yang *et al*. 2008a, b, Yang and Chen 2012), it is made more customer-friendly living and learning environment, breaking the previous school or at home, only to learn the shortcomings. Recently, more and more foreigners come to Taiwan or the Chinese to learn Chinese, not just only because he came to Taiwan to study Chinese academic needs, while more and more foreigners are intended to Taiwan and Chinese people do business on the business dealings (Chen 2008a,b,c, Yeh *et al*. 2008, Ahmadian and Azizi 2011, Abd-Alla *et al*. 2011, Chen *et al*. 2009a,b,c,d,e,f,g, Lin *et al*. 2009a,b,c). But some people say Chinese is the

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world's hardest language to learn, develop phonetic diversity as the basic text, word and word combination is ever-changing, hard to understand for foreigners. And therefore difficult to learn Chinese in a short time there is rapid growth, most people do not understand the vocabulary or experience required to ask other people to understand their meaning (Lin and Chen 2010, Chen 2010a,b,c,d,e,f,g,h, Lee 2010, Lee *et al*. 2010a, b, Li *et al*. 2010, Solihin *et al*. 2010, Lee *et al*. 2011a,b,c).

This study began in the last few years a large number of Chinese learning needs. More and more foreigners are learning Chinese needs, but then were difficult to use the Chinese dictionary. And this study found smart phones in foreign countries is common; this study develop OCR-assisted learning software from this concept (Chiang *et al*. 2010, Shih *et al*. 2010a,b,c, Chiang and Wang 2011, Cheng *et al*. 2011, Chu *et al*. 2011, Chiou *et al*. 2011).

Optical Character Recognition (OCR, Optical Character Recognition) is scanning the text data, then analyzing and processing the image files, text and layout information for the process. Android is a Linux-based core software platform and operating system (Chen 2011a,b,c,d,e,f,g,h,i,j, Shih *et al*. 2011a,b,c,d,e,f,g, Kuo *et al*. 2011, Kuo and Chen 2011), is Google in the November 5, 2007 announcement of the mobile phone platform, the earliest time by the Google developers, after the Open Mobile Alliance (Open Handset Alliance) (Open Handset Alliance) development, and open mobile alliance of Google and other handset makers recall dozens of working together to build, hoping to promote Android. Android uses the software stack (software stack, also known as the software stack) structure, the structure is divided into three parts (Lin and Chen 2011, Liu *et al*. 2011a, b, Lin *et al*. 2011a, b, Jayaswal *et al*. 2011, Marichal *et al*. 2011, Metin and Guclu 2011, Soundarrajan and Sumathi 2011, Shen *et al*. 2011, Tang *et al*. 2011, Tsai and Chen 2011a, b). The lowest level of Linux-based core work, only some of the most basic features; other types of application software development are by the companies themselves, to use Java as the programming part.

2. Literatire review

As time progress, the mobile speed and processing power have come in much faster than the years in the utility function on mobile phones than the previous multiple and practical (Yu *et al*. 2011a, b, Chen 2012a,b,c,d,e,f,g,h,i, Kuo and Chen 2012a, b, Lee and Chen 2012, Lin *et al*. 2012a, b).

2.1 Android

Android stream is increasing, as Fig. 1. In particular, smart phones emerged in recent years, is

Fig. 1 Android robot and text logo

deeply loved by all business people. Smart phone processing speed and large screen are a number of business people on the demand for mobile phones, faster processing speed, more unrestricted access to the Internet means more representative of the "Office Away From the Office Can Do" concept.

Google Android by the company since the publication in 2007 (Claburn 2007, Pearce 2007) has maintained the traditional structure of the software stack is divided into three layers, from top to the lowest level application layer, respectively, the middle layer, and the core OS structure of the bottom three. The top layer for applications, using JAVA as the basic preparation of the language, so users can design their own interface for the android system (Fig. 2) is functional even can have endless change, which is like the syntax in the Activity inside J2ME MIDlet, an Activity the type (class) is responsible for establishing a window (window).

View property the same as J2ME of Displayable, plus Image equivalent to J2ME's BitMap. Program developers can View Category and "XML layout" file placed in the window on the UI, the version in the Android 1.5 (Ducrohet 2009) can be used to create a View called Widgets, Widget fact only one of View, so you can use to design the layout xml. Although the Android using JAVA language environment for the development and maintenance, but this does not mean that Android is full compliance with the standards JAVA set. That is Android, and JAVA SE and ME are not identical. This prevents JAVA with Android can be exchanged between the presence of syntax. Although the Android use the JAVA syntax, but does not provide the full-class libraries and APIs bundled with Java SE or ME. However, Myriad's J2Android, launched on 19 March 2010 (Android Developers 2010, Shabtai *et al.* 2010, Lin and Chen 2012, Liu *et al*. 2010, 2012a,b,c, Su *et al*.

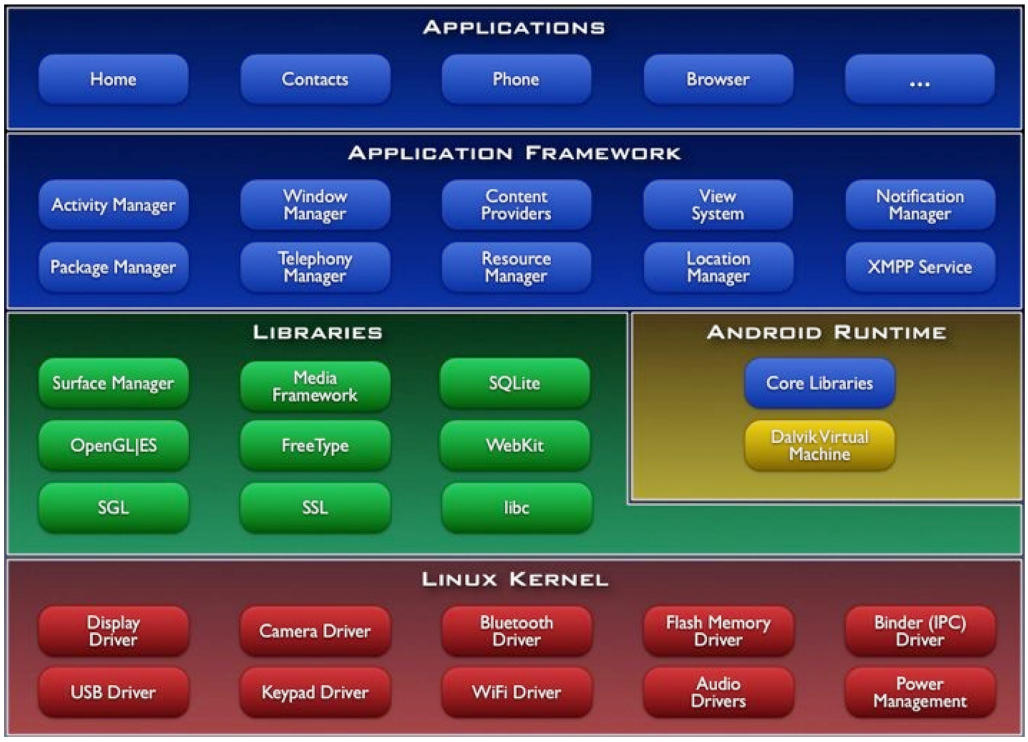

Fig. 2 Android-System-architecture. Blue: application layer. Green and yellow: middle software. Red: operating system core

2012, Tseng 2012a,b,c,d, Yeh *et al*. 2012, Zhang *et al*. 2010a, b, 2011a,b,c,d), allows seamless conversion of Java MIDlets into Android applications.

Android's application also very much, from the GPS system or flash (Ducrohet 2010) software. Recognition software is also a part of the Android mobile application, now is used mostly for scanning business cards or the font.

2.2 Optical character recognition (OCR)

OCR first commercial system is installed on the Reader's Digest. And then OCR system was sold to Standard Oil Company under the read credit card imprint as a billing system. As for the rest of the OCR system is sold by the IMR companies Out, time is in the late 1950s. Including the Ohio Bell Telephone Company's bill stub reader and the U.S. Air Force to deliver telegrams to read and developed by the page scanner.

Since 1965 The United States Postal Service has been using OCR systems to handle and organize mail. This system is the inventor Jacob Rabinow. On the other hand, the first in Europe to use OCR systems and technology is the British General Post Office (GPO). They started in 1965 plans to OCR systems used in allocating the entire country and the banking system, and radical change in the UK bill payment system. Canada Post is from 1971, began using the OCR system to help business treatment. They use the distribution center of the message OCR system to read the recipient's address and the name and print the above by the postal code conversion from the bar code. In order to avoid confusion they are using a special ink, which is to be used UV rays can see the ink. This envelope can use the barcode reader to easily handle.

The OCR software recently the application is use in business card scanning, license plate recognition, and helps the police identify the handwriting and so on. In this study, the OCR software construction in the android phone system. This software is translating Chinese into English from the photo which takes by the mobile phone's camera (Vikram *et al*. 2010, Zhao 2010a, b, 2011a, b, Zheng *et al*. 2011, Zhu *et al*. 2011). Let those who are learning Chinese can more easily know what the word meaning in the English vocabulary. And users can expect to achieve through the use of the software to support teaching purposes.

3. Research method

In this study, the model is building in the mobile phone software, OCR-assisted learning. Fig. 3 is the model of research.

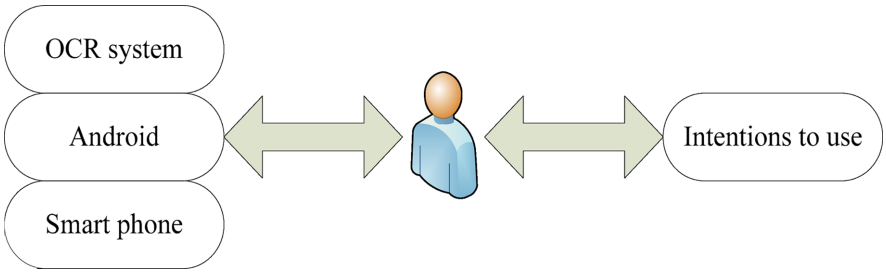

Fig. 3 Research model

The system kernel is written by the JAVA and the system interface is made by the XML syntax. The kernel of this study is using Android version 2.2, because version 2.2 has added OCR's library, so it can be using this API to construct the OCR assist Learning system.

4. The OCR system and basic statistics of questionnaires

System by JAVA and XML to write complete, and installed on the Android phone operating very smoothly and above. The recognizable of OCR system also has a certain standard, can provide in daily use and does not constitute.

The questionnaire was set up on the web site. And in the front of the questionnaire has a software film to increasing the understanding of answer the questionnaire's people. After recovery, a total of 304 valid questionnaires and the basic statistics of questionnaires are in Table 1.

Table 1 Basic statistics of questionnaires

	Class	Percent
SEX	Boy	63.8
	Girl	36.2%
Educational Background	Bachelor	69.4%
	Master	24.3%
	Doctor	4.9%
	Others	1.3%
Majors	Computer Science	46.7%
	Education	10.5%
	Science and Engineering	30.6%
	Business Management	6.6%
	Literature	3.9%
	Others	1.6%
Frequent use of computers	Yes	98.7%
	No	1.3%
Used touch platform	Yes	59.5%
	No	40.5%
Using the Internet	0 hour	0%
	1 to 3 hr	1.0%
	4 to 6 hr	3.9%
	7 to 9 hr	8.2%
	10 to 12 hr	25.3%
	More than 12 hr	61.5%
Reading per Week	0 hour	1.0%
	1 to 3 hr	66.8%
	4 to 6 hr	9.5%
	7 to 9 hr	3.3%
	10 to 12 hr	2.3%
	More than 12 hr	17.1%

4.1 Validity analysis

The questionnaire has 36 questions, after the three validity analysis, the question number 27 of the correlation coefficient does not meet the criteria ≧ 0.4, it is necessary to remove the question number 27. The remaining 35 questions have passed all the validity of analysis and both could be retained. Scale validity of the results in Table 2.

4.2 Reliability analysis

The various dimensions before delete the number 27 of this study the reliability of analysis results are: Perceived Usefulness is 0.869, Attitude is 0.815, Intentions to Use is 0.819, Concentration is 0.759, Perceived Enjoyment is 0.790, Satisfaction is 0.760, Perceived Ease of Use is 0.770. And the reliability of all question's value is 0.960. Reliability analysis showed good internal consistency of this questionnaire, the using Chinese OCR software to assist learning's questionnaire's reliability analysis results compile to Table 3 and Table 4.

By using the validity of the result after that the question number 27 must be deleting. So the Table 3 is after delete the question number 27 of the reliability of Satisfaction dimension structure analysis, data was 0.766 compared with no higher than before the deleting was 0.006. The result of the overall reliability after deleted question number 27 has not changed, maintained at 0.963. Table 4 and Table 5 for the deletion of article 27 of title after finishing the reliability of the table.

Table 2 The results of validity analysis

	CR	Correlation	Load factors		CR	Correlation	Load factors
N01	11.156	0.763	0.747	N19	10.181	0.503	0.539
N02	10.910	0.687	0.699	N20	8.930	0.514	0.643
N03	12.235	0.702	0.758	N21	8.697	0.512	0.628
N04	11.799	0.666	0.732	N22	10.653	0.634	0.718
N05	9.696	0.649	0.716	N23	9.056	0.532	0.641
N06	12.665	0.690	0.760	N24	9.507	0.567	0.644
N07	11.282	0.583	0.610	N25	9.330	0.594	0.685
N08	11.984	0.605	0.681	N26	8.408	0.638	0.713
N09	8.613	0.595	0.682	*N27	8.647	0.387	0.503
N10	9.752	0.550	0.623	N28	10.443	0.578	0.639
N11	9.214	0.653	0.714	N29	9.062	0.560	0.686
N12	11.135	0.684	0.735	N30	8.305	0.490	0.688
N13	8.456	0.565	0.669	N31	9.483	0.573	0.689
N14	10.626	0.680	0.722	N32	11.330	0.510	0.560
N15	8.767	0.482	0.563	N33	9.402	0.545	0.629
N16	9.822	0.516	0.683	N34	9.117	0.425	0.540
N17	9.560	0.583	0.663	N35	8.073	0.469	0.539
N18	10.949	0.517	0.606	N36	9.339	0.561	0.665
Standard: CR ≧ 3.00, Correlation ≧ 0.40, Load factors ≧ 0.45							

P.S.* Substandard

Table 3 The results of dimension before delete question number 27 of reliability analysis

Dimension	NO.	Cronbach's Alpha value	Dimension	NO.	Cronbach's Alpha value
Perceived Usefulness	N01	0.869	Perceived Enjoyment	N21	0.790
	N02			N22	
	N03			N23	
	N04			N24	
	N05			N25	
Attitude	N06	0.815	Satisfaction	N26	0.760
	N07			N27	
	N08			N28	
	N09			N29	
	N10			N30	
Intentions to Use	N11	0.819	Perceived Ease of Use	N31	0.770
	N12			N32	
	N13			N33	
	N14			N34	
	N15			N35	
Concentration	N16	0.759		N36	
	N17				
	N18				
	N19				
	N20				

P.S. Standard of reliability analysis is 0.6

Table 4 The results before delete question number 27 of reliability analysis

Total	NO.	Cronbach's Alpha value
All of question	ALL	0.963

P.S. Standard of reliability analysis is 0.6

Table 5 The results of Satisfaction dimension after delete question number 27 of reliability analysis

Satisfaction	N26	0.766
	N28	
	N29	
	N30	

P.S. Standard of reliability analysis is 0.6

Table 6 The results of all questions after delete question number 27 of reliability analysis

Total	NO.	Cronbach's Alpha value
All of question	ALL	0.963

P.S. Standard of reliability analysis is 0.6

5. Summary

In this study, the system use eclipse for the development environment and use of JAVA and XML programming languages to write. After wrote then install on the Android smart phone.

In the future work of this study is to strengthen system reliability. This study hopes that the Chinese software can recognize Chinese characters can be more. Then this study can increase the recognition rate, improve the recognition rate can also increase learning willing.

6. Conclusions

The purpose of this study is to investigate people now use mobile phones for the OCR software to assist Chinese learning. Based on the framework proposed hypothesis impose questionnaire and to analyze the data. After recovery of 304 valid questionnaires analysis, in this chapter assumptions for this study will be set up or not to conclusions and discussion.

The purpose of this study was to design OCR-assisted Chinese learning software and let users fill in a questionnaire. Users can be found from this study do not think supporting the learning of Chinese OCR software is very handy. Evaluations of the software are very positive, but that does not directly affect whether the user wishes to use this software. Therefore, this study That if you can access from the early learning in this area and develop a wide range of media-assisted learning to use the customary, there will be more willingness to use this software. Because after learning habit once it is not easy to do changes, so only in the habit of giving learners a lot during the use of this software will be able to develop a learner's learning method which has a “use-assisted learning software” habits.

Future research towards this direction can be more media software applications to give learners more choices (John and Angela 2004). Not just android smart phones, the increasing rise of electronic books hardware such as: IPAD could try to develop the software on this kind of platform. Because the electronic books must be obtained after learning a trend, so if the future electronic books (Noorhidawati and Forbes 2008), and OCR software assisting the learning of Chinese learners get together to increase the convenience and increased use of the opportunity, then there will be more later Learners will want to use this software to help learning.

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