DEVELOVMENT OF THE BOOK FOR BLIND APPLICATION USING TEXT RECOGNITION, TEXT TO SPEECH AND BRAILLE CONVERSION IN SLBN KAB. CIREBON

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Abstract - State Special Schools (SLBN) Cirebon is a school for persons with disabilities in the district. Cirebon with 21 faculty and students a total of 144 people from the education unit TKLB until SMALB with diverse species specificity. Based on the interview with the father of Imam as teachers in the blind part SLBN district. Cirebon there are problems. That difficulty getting and the lack of books available that use Braille. Certainly blind students can not read ordinary books that do not use Braille. Lack of books available in Braille would be an obstacle to students either in the teaching process as well as in terms of looking for additional teaching materials. In this study, the authors build applications that implement text recognition using google cloud API to detect the text, google text to speech to convert text into voice and can also convert the results of text recognition into Braille named "Book for the Blind" so that students and teachers can read books that are not written in braille form. Based on the results of alpha and beta testing of the application can be concluded that this application can help students and teachers to be able to read ordinary books that are not written in braille form. google text to speech to convert text into voice and also can convert text recognition results into Braille named "Book for the Blind" so that students and teachers can read books that are not written in braille form. Based on the results of alpha and beta testing of the application can be concluded that this application can help students and teachers to be able to read ordinary books that are not written in braille form. google text to speech to convert text into voice and also can convert text recognition results into Braille named "Book for the Blind" so that students and teachers can read books that are not written in braille form. Based on the results of alpha and beta testing of the application can be concluded that this application can help students and teachers to be able to read ordinary books that are not written in braille form.

Keywords: Blind, Braille, text recognition, text to speech, braille conversion

I. INTRODUCTION

State Special Schools (SLBN) Cirebon is a school for persons with disabilities who are in Jl. AR Hakim No. 33, Sindang Sea, district. Weak Abang, Kab. Cirebon Prov. West Java. With a land area of 3960 m2. SLBN Kab. Cirebon has 21 faculty and students a total of 144 people from the education unit SMALB TKLB up with the kind of specificity varied as the blind, deaf, tunagharita, quadriplegic and autism.

Based on the interview with the father of Imam as teachers in the blind part SLBN district. Cirebon there are some problems. The first is the difficulty in obtaining and limited books available that use Braille. Books received from the government is not always intended for blind students because in SLBN district. Cirebon has diverse types of specificity so that the book received did not use Braille. It is certainly an obstacle in the process of teaching both the teachers and the students with visual impairment.

Certainly blind students can not read ordinary books that do not use Braille. If they want to read ordinary books are of course they need the help of a sighted person to read the book in because of their limitations in sight. Lack of books available in Braille would be an obstacle to students either in the teaching process as well as in terms of looking for additional teaching materials.

Shipment of books from the government that are not available in Braille course must be converted into Braille before given to the students. In this case the father of Imam have to change their own books into Braille which would require the assistance of a sighted person to read the book because the father of Imam also a visual impairment. But It also takes time and also be assisted by a sighted person, too.

Based on the problems and constraints that have been described, the author will build applications to help the visually impaired to read books that are not using Braille and are not available in digital form using text recognition which will be used to detect text and text to speech to convert text into sound and also can convert text recognition results into Braille named "Book for the Blind".

II. LITERATURE REVIEW

A. SLBN KAB. CIREBON

SLBN Kab. Cirebon is among SLB in the district. Cirebon that state schools. Located at Jl. AR Hakim No. 33, Sindang Sea, district. Weak Abang, Kab. Cirebon Prov. West Java, with a land area of 3960 m2. SLBN Kab. Cirebon has 21 faculty and students a total of 144 people from the education unit SMALB TKLB up with the kind of specificity varied as the blind, deaf, tunagharita, quadriplegic and autism.

B. Disability

According to the Dictionary of Indonesian people with interpreted by people who bear (suffer) something. While disability is an Indonesian word that comes from the English loan word disability (plural: Disabilities) meaning a defect or incapacity[1],

According to Law No. 19 Year 2011 on Ratification of the Rights of Persons with Disabilities, persons with disabilities are those who have physical limitations, mental, intellectual or sensory long periods that interact with the environment and the attitude of the community can see the obstacles that make it difficult to participate fully and effective based on equality.

C. Blind

According to Daniel P. Hallahan, James M. Kauffman, and Paige C. Pullen Blind is someone who has a visual acuity of 20/200 or less in the eye / vision better after correction (ie glasses) or have a visual field is so narrow in diameter has the widest range viewing angle is not more than 20 degrees[2],

According to Jeanne Ellis Ormrod who experience visual disturbances have some or all of the following characteristics:

1. Other senses functioning normally
2. Have the same ability as others
3. The limited public knowledge
4. Limited ability to mimic other people
5. Misunderstood the message that uses the signs of non-verbal
6. Feeling confused and worried[3]

D. *Google Cloud Vision*

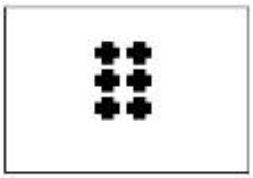
OCR (Optical Character Recognition) is a character pattern recognition which is one branch of pattern recognition.[4]Google Cloud Vision is among the products made by google menginplementasikan OCR. Google Cloud vision can be used to detect or identify objects that exist in a picturesuch as text, symbols, types of objects in digital products. Google's cloud vision can detect or detect an object, analyze the emotions of the image, identify inappropriate content, as well as the text in the image mengektraksi with automatic language identification.

E. Google Text to Speech

Text to speech can be defined as the process of converting text into spoken form of digital audio and digital audio[5], Google text to speech is used to convert text into sound. Google-made products can be used both online and offline. However, offline use only use the languages available in each device / smartphone.

F. Braille

Braille is a system created by the touch paper Louis Braille derived from the French now used by blind people to read. The letter writing system framework using a 6 point down dominoes with 3 points and 2 points to the side. Braille writing system framework can be seen in Figure 1



Picture 1

G. SQLite

SQL is a language used to manage data in a database. Not all the standards listed in the SQL required in all existing databases. While SQL lite is a library that is serverless, which means the database can access the database directly from the file without going through the process server[6]

III. RESEARCH METHODOLOGY

The research methodology for this application pembagunan using two methods of data collection methods and methods of software development:

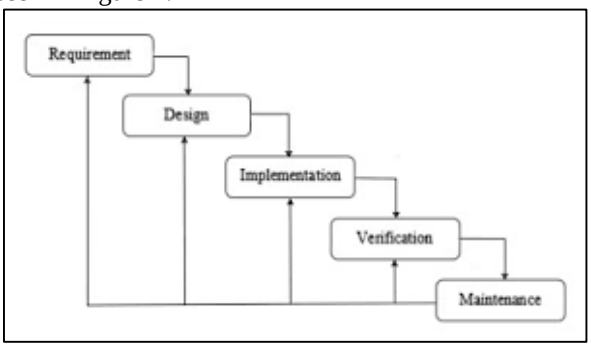
A. Method of collecting data

Methods of data collection in this study consists of several stages: A Literature Review, Interview and Observation

B. Software Development Methods

Software development method used is the waterfall method. Waterfall is a classic model that is systematic and sequential in software development.[7]

Here is the flow of the waterfall method which can be seen in Figure 2.



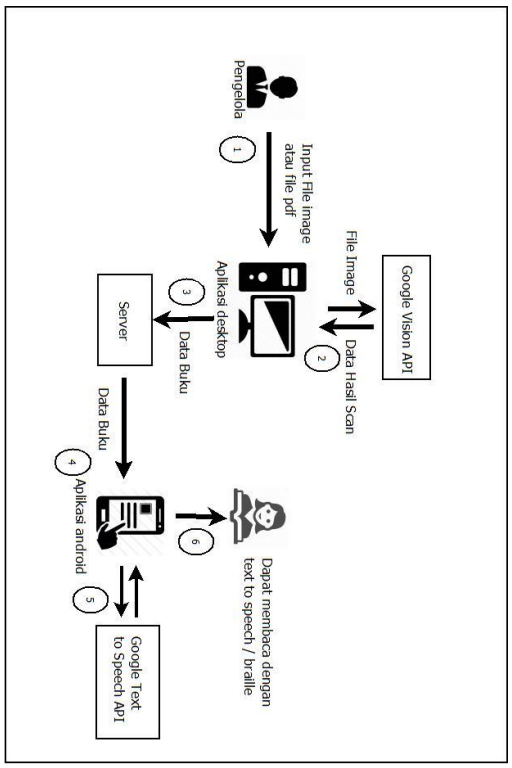
Picture 2

IV. RESULTS AND DISCUSSION

This stage consists of a general overview of the system, analysis and system design. The last step to do that is to test so it can be concluded.

A. Analysis and Design System

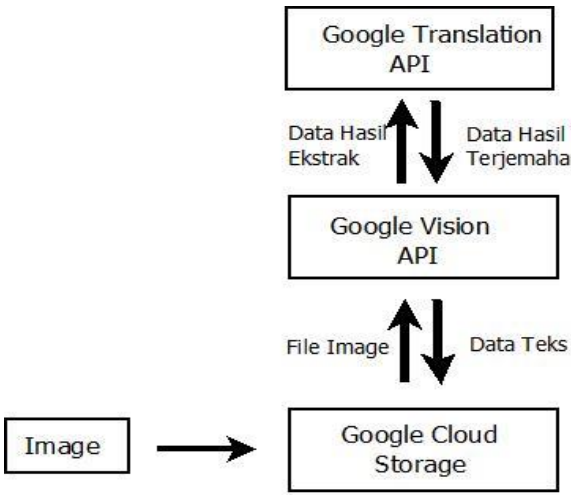
The system will be built is the application of "Book For Blind". This application aims to help teachers and students with visual impairment in SLBN district. Cirebon to read ordinary books that do not use Braille. This application uses text recognition feature to use Google APIs Vision, Text To Speech Using the Google API Convert Text to Speech and Braille. Here are the workings of the application that will be created that can be seen in Figure 3.



Picture 3

B. analysis *Google Cloud Vision*

In Book For Blind application will use Text Recognition feature available on Google Vision API. This feature will be used when it will take the text from the image of the books that have been scanned. The workings of google vision can be seen in Figure 4.



Picture 4

Here is penjelasasn of images 19 about text recognition in google vision:

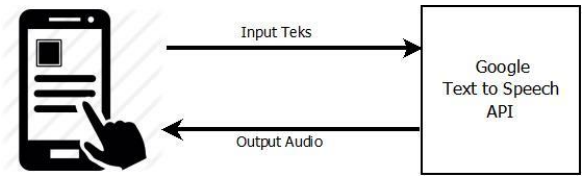
1. Pictures will be uploaded to cloud storage with text in various languages. (Text that appears in the image). Google Cloud is a cloud storage media provided by Google which is in the google cloud platform
2. Cloud storage within the text will be extracted from the image using google vision of fire. Then the text will be translated according to the language that has been set.
3. The text that has been extracted and the translation will be saved back to cloud storage. And can be used.

Based on the analysis vision google API is suitable for vision google API also uses the Google translation API which can support multiple languages so the books that will be in the fox into digital form is not limited to only a few languages.

C. *Analysis of Google's Text To Speech API*

*Google text to speech*is used to convert text into sound. Google-made products can be used both online and offline. However, offline use only use the languages available in each device / smartphone unlike online usage that allows a complete language support.

Flow use Google Text To Speech API to be able to convert text into voice (speech) can be seen in Figure 5.



Picture 5

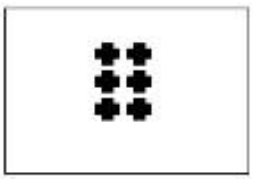
Here is an explanation of Figure 5:

1. Input of text and language will be sent to Google text to speech of a device using the http request.
2. The inoutan then will be converted by the Google text to speech into sound.
3. Once the conversion process is complete then google text to speech voice device will run in realtime.

Input on google text to speech also should pay attention to the number of characters and punctuation because it will affect the pause and show the end of the sentence.

D. Analysis Braille

Braille is a system created by the touch paper Louis Braille derived from the French now used by blind people to read. The letter writing system framework using a 6 point down dominoes with 3 points and 2 points to the side. Braille writing system framework can be seen in Figure 6



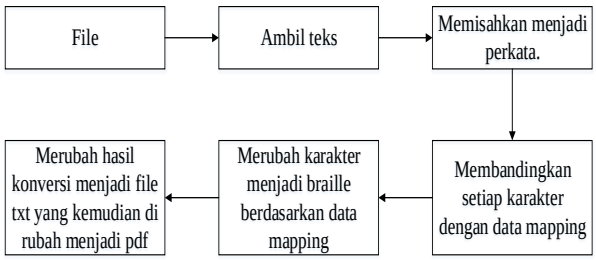
Picture 6

To make it easier to learn Braille then the point - the point can be given numbers starting at the top left in the given point No. 1, 2 and 3, while the right side in the given point No. 4, and 6. The numbering in Braille can be seen in the picture 7.

1	4
2	5
3	6

Picture 7

In Book For Blind application are braille conversion feature. There are several steps in the conversion date braille as below:



Picture 8

Here is an explanation of Figure 3.6 above:

1. On the desktop application will be in recognition of image files using google cloud vision.
2. Ekstaksi text from files that have vision beyond that by google will be concatenated into a .txt file.
3. Applications will mengexecute program in python where the program will convert text on file.txt.
4. The text on the .txt file will be converted into Braille by comparing each character in the text by mapping the data that has been made.
5. The first sentence in .txt separated into perkata based spaces and new lines.
6. Words that have been split and then will check whether the character is no number or not. Figures are converted beforehand because braille characters on the same figures with 10 first alphabet in Braille and added (⠼) In front of the figure.
7. Uppercase characters will be converted after the code number for the characters capital letters will be added (⠠) In front of the alphabet.
8. After converting numbers and uppercase characters will change other than numbers and capital letters in the word.
9. Looping on every word until the last word.
10. Once completed later txt file that has been converted into Braille form will be concatenated into a pdf file.

E. Software Requirements Specification

Based on the analysis of the problem that has been done, then the spesifiksi obtained on application software needs books for the blind. Software requirements specification is based on the application needs books for the blind so the software must meet the criteria that can be seen in the following table:

Table 1

No.	Code Needs	Description of Requirement
1	SKPL-F-01	The system provides a facility for managers to login.
2	SKPL-F-02	The system provides facilities for managing data processing manager.
3	SKPL-F-03	The system provides facilities for managing process data book.
4	SKPL-F-04	The system provides the facility mengekstraks text recognition for text in the image.
5	SKPL-F-05	System provides braille conversion facilities.

F. Analysis needs functional nin

Analysis of non-functional requirements intended that an application built to be used in accordance with the needs of the application users find the information needed. As for the non-functional requirements to run this application include hardware requirements, software requirements and system users who will use the application.

1. Hardware Requirements Analysis

Hardware analysis is an analytical process more emphasis on aspects of the utilization of hardware that has been held in SLBN district. Cirebon. Here are the specifications of the hardware in SLBN district. Cirebon that can be seen in table 2

Table 2

No.	Hardware	Specification
1	*processor*	Intel Core i3-4030
2	*RAM*	2GB
3	*Hard drive*	500 GB
4	monitor	1366 x 768
5	Scanner	Resolution 300 dpi
6	Modem	Speed of 5 Mbps

Hardware needs to be used in SLBN district. Cirebon can be seen in Table 3.

Table 3

No.	Hardware	Specification
1	*processor*	1.9 GHz Intel Core i3-4030U
2	*RAM*	2 GB
3	*Hard drive*	10GB
4	monitor	1366 x 768
5	Scanner	Resolution 300 dpi
6	Modem	Speed of 5 Mbps

After analyzing the existing hardware in SLBN districts. Cirebon, hardware specifications in SLBN district. Cirebon / do not meet the hardware requirements.

2. Software Requirements Analysis

Here is the software that has been used in the district SLBN Cirebon.Spesifikasi dibuthkan software to run applications that can be seen in tble 4:

Table 4

No.	Software	Specification
1	Operating system	Windows 7,8.1, 10

Dibuthkan software specifications to run the application can be seen in Table 5:

Table 5

No.	Software	Specification
1	Operating system	Windows 7,8.1, 10

After analyzing the software used in SLBN ang districts. Cirebon, specification software used has memenuhu specifications required.

3. User analysis

Analysis of system users for the purpose of knowing who the actors involved in running the system. Here are the characteristics of the system shown by Table 6.

Table 6

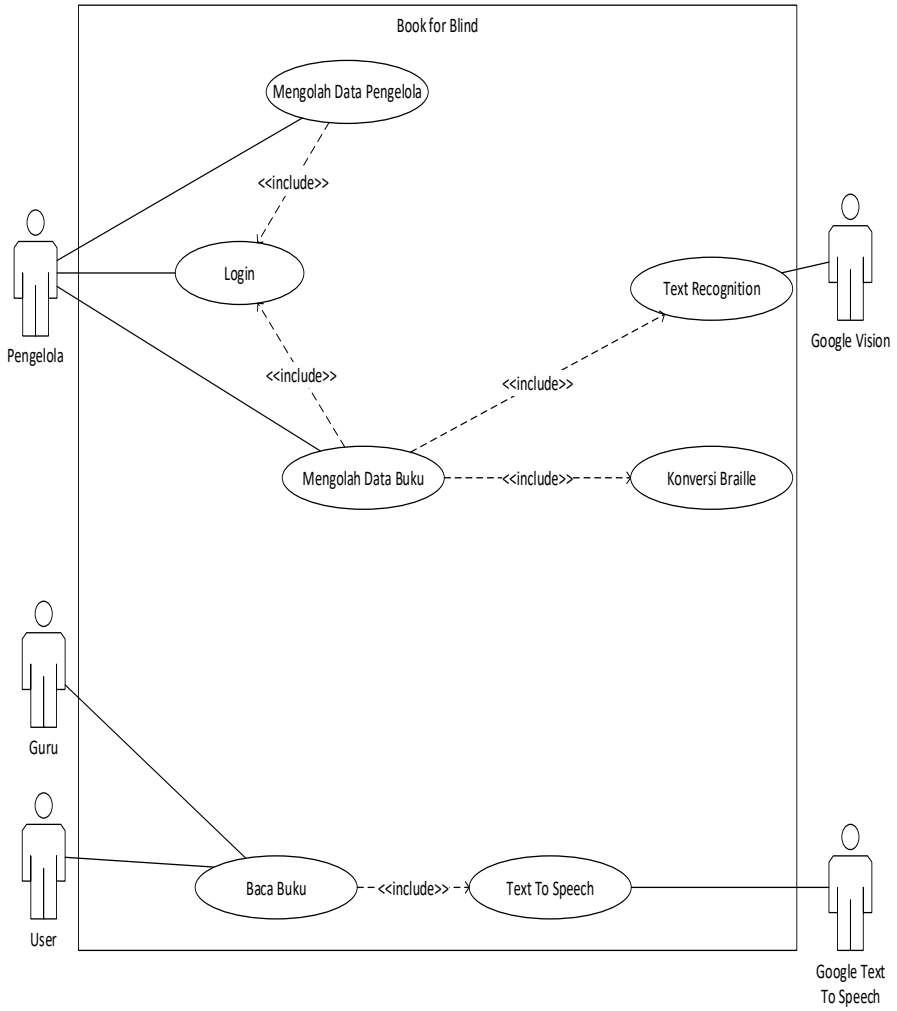
No.	users	Age	Access rights	Experience
1	Manager	At least 20 years	Access, manage the data book ..	Proficient use Koomputer.
2	Teacher	At least 20 years	Accessing the data book that has managed manager	Already once and can use application in the smartphone operating system Android
3	student	At least 14 years	Accessing the data book that has managed manager	Do you already use and can application in the smartphone operating system Android

G. Analysis of functional requirements

Systems analysis discusses some general description of the system. Namely the need for delivery of the Use Case.

1. Use Case Diagram

Use Case Diagram describes an interaction between one or more actors with the system being designed. Roughly use case is used to determine the function of what is inside a system and who is entitled to use these functions. Use Case consists of three parts, namely the identification of actors, identification of use cases and use case scenarios. Use Case Diagram Analysis on a system that will bibangun can be seen in Figure 9.



Picture 9

H. System implementation

As for some discussion of implementation of among others the implementation of hardware, software and interfaces.

A. Hardware Implementation Testing

In Book For Blind application development testing hardware used can be seen in Table 7 below:

Table 7

No.	Hardware	Specification
1	*processor*	Intel Core i3-4030
2	*RAM*	2GB
3	*Hard drive*	500 GB
4	monitor	1366 x 768
5	Scanner	Resolution 300 dpi
6	Modem	Speed of 5 Mbps

B. Implementation of Software Testing

In Book For Blind application development testing software used can be seen in the table 8 below.

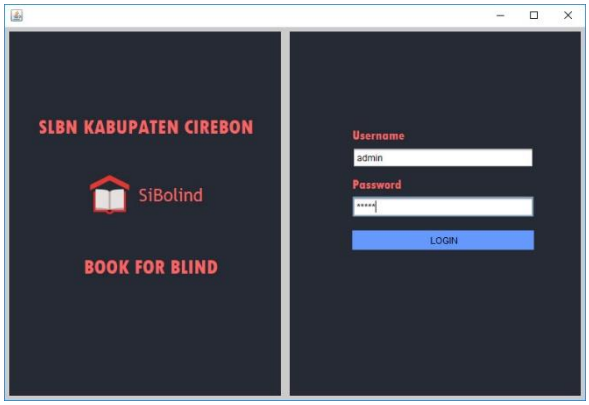
Table 8

No.	Software	Specification
1	Operating system	Windows 10 64-bit
2	*Android Development Tools*	Bundle v22.6.2-1085508
3	*Java Development Kit*	JDK version 8
4	Netbeans IDE	Netbeans IDE 8.2
5	Android Studio IDE	Android Studio 3.0.1

C. *implementation interface*

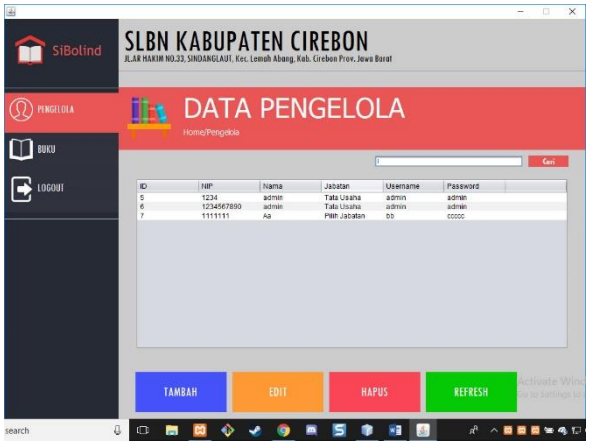
Implementation of the interface is the application of the design. Implementation of interface design system that has been implemented into a display.

Login



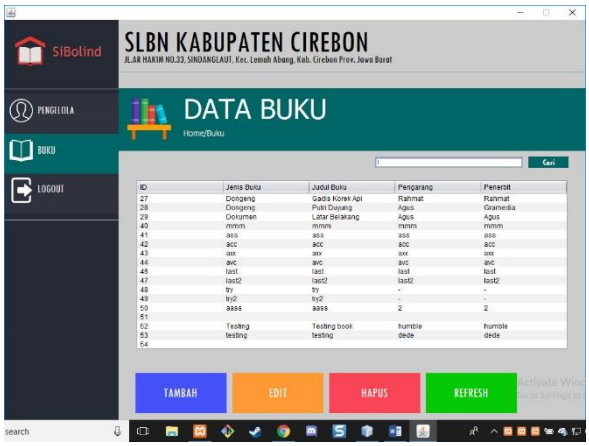
Picture 10

menu business



Picture 11

menu Books



Picture 12

I. testing Systems

Testing the system aims to find errors or deficiencies in the software being tested.

A. Alpha testing

Alpha testing is done using black-box method that focuses on the functional requirements of the software.

B. Beta testing

Beta testing is testing conducted in order to determine the extent to which the quality of the system and determine whether the system has been built in accordance with the original purpose of the construction of the system.

Table 9

No.	Question					result
1	Does the existence of this application allows you to read a regular book?					80.0%
	SS	S	RR	TS	STS	
	0	3	0	0	0	
2	Does the existence of this application allows you to search for a book to read?					80,0%
	SS	S	RR	TS	STS	
	0	3	0	0	0	
3	Does the existence of braille reading feature allows you to read a book that has been in recogniti and converted into braille?					53,3%
	SS	S	RR	TS	STS	
	0	0	2	1	0	
4	Does this application can help in the learning process of students?					80,0%
	SS	S	RR	TS	STS	
	0	3	0	0	0	
5	Is the application easy to use?					73,3%
	SS	S	RR	TS	STS	
	0	2	1	0	0	

Based on the results of beta testing, it can be deduced that facilitate user applications built on SLBN district. Cirebon to read the usual books and looking for a book to read. To read braille feature is still not easy for users. This application is also quite easy to use.

V. CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations obtained from the results of this study are:

A. Conclusion

With the implementation of feature recognition, text to speech and braille conversion feature that can help students tunantetra to get reading material, reading a regular book ang not available in Braille and help teachers to convert a regular book into Braille.

B. Suggestion

For application development in the next time period there are some suggestions that can be done include the use of firearms or other libraries to perform text recognition because Google cloud vision must use a credit card and paid. And develop a tool or method to read the conversion result braillenya letter. so it can be easier for users to read the conversion result.

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