

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. Summary

Braille is a writing system that has been commonly used by visually impaired people to read and write. As time goes by and as technology advances, researchers think of ways on how can they help bridge the gap between the normal and the visually impaired people. Because of that, the Optical Braille Recognition (OBR) is born. The OBR is a series of process that aims to convert Braille characters to normal texts. There are many algorithms that are available today that can convert Braille to normal texts but there are certain limitations that need to be considered. First, the image skews should be corrected to preserve the original data. Second, Grade 2 Braille characters should be recognized. Last but not the least, the ability to differentiate the depressions from the protrusions is required to recognize it correctly. As a response, the proponents developed a system that aims to solve those problems and produced superior results with only minimal errors. Through intensive research, researchers are now continually finding ways to improve those algorithms to help the visually impaired people, as well as normal people in exchanging information rapidly.

B. Conclusions

The proponents conclude that the deletion of back side dots is valuable in recognizing the Braille characters correctly. Also, correcting the image skews will be beneficial to preserve the data in the scanned image. The problem of recognizing Grade 2 Braille characters was also solved by modifying the pattern generation algorithm. The strength of the system is recognizing inputs that have Braille dots in

excellent condition and have protrusion Braille dots that are significantly apart from depression Braille dots. The proponents were able to modify the existing segmentation and recognition approaches to accurately and correctly translate scanned Grade 2 Braille documents into English text. They were also able to create a stand alone application that interprets a double sided and Grade 2 Braille document and they were able to improve the de-skewing process of the scanned image. Overall, the accuracy of the proposed algorithms is tested and thus achieved the desired results with minimal problems.

C. Recommendations

In this study, the proponents only developed a system that would recognize Grade 2 Braille characters on a double sided Braille scanned image and correct image skews.

The following recommendations are for further improvement of the study:

- One area of improvement is instead of using a scanner, try using a camera in capturing the Braille document.
- Another area of improvement is the ability to solve the problem with scanned Braille documents that contain foreign objects aside from the Braille document itself (example: dusts, hair strands, pen mark etc).
- Moreover, the recommended system should recognize complete sentences including punctuation marks and other symbols.
- Another improvement is instead of using English Braille documents, use Filipino Braille documents or other languages as source.

- Another improvement is by using a musical Braille instead of using alphabetic Braille.
- By changing (increase/decrease) the resolution (dpi) of the scanner is another way of improving the study.
- The ability to solve the problem with de-skewing the image for more than 5.5 degrees.
- The ability to solve the recognition of the dots which are very close with each other.
- The system should recognize other image formats (256 or 16 color BITMAP, GIF, PNG etc.) as image inputs.
- The system should be able to recognize and translate a whole Braille document. The system should also recognize and translate front and back sides of the whole document.
- The system should be integrated to a text to speech translator software to further help the visually impaired.
- The system should be able to accept Braille documents that are written manually (using a stylus and a slate).
- Finally, the system should be able to improve the detection of the back side dots due to poor back side deletion that the proponents encountered in constructing the system.