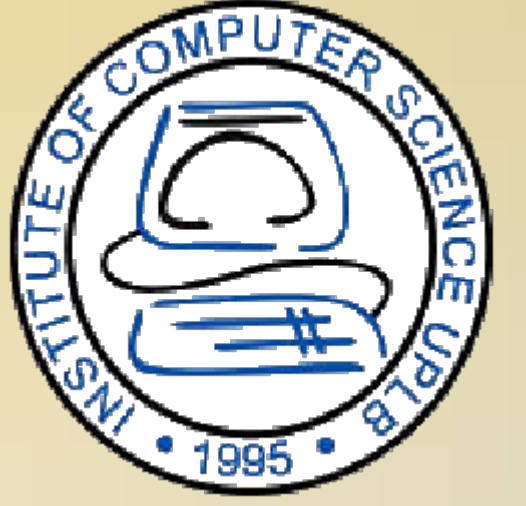


SIGN ME UP

An Android Sign Language Translator Using A Convolutional Neural Network

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and Jaime M. Samaniego



ABSTRACT

Sign language, although widely used by both the deaf and hearing community, is still a challenge for other people. **SIGN ME UP** is an Android application which is designed to translate sign language even offline. It uses a CNN for translating sign language to text and a series of reference images for translating text to sign language.

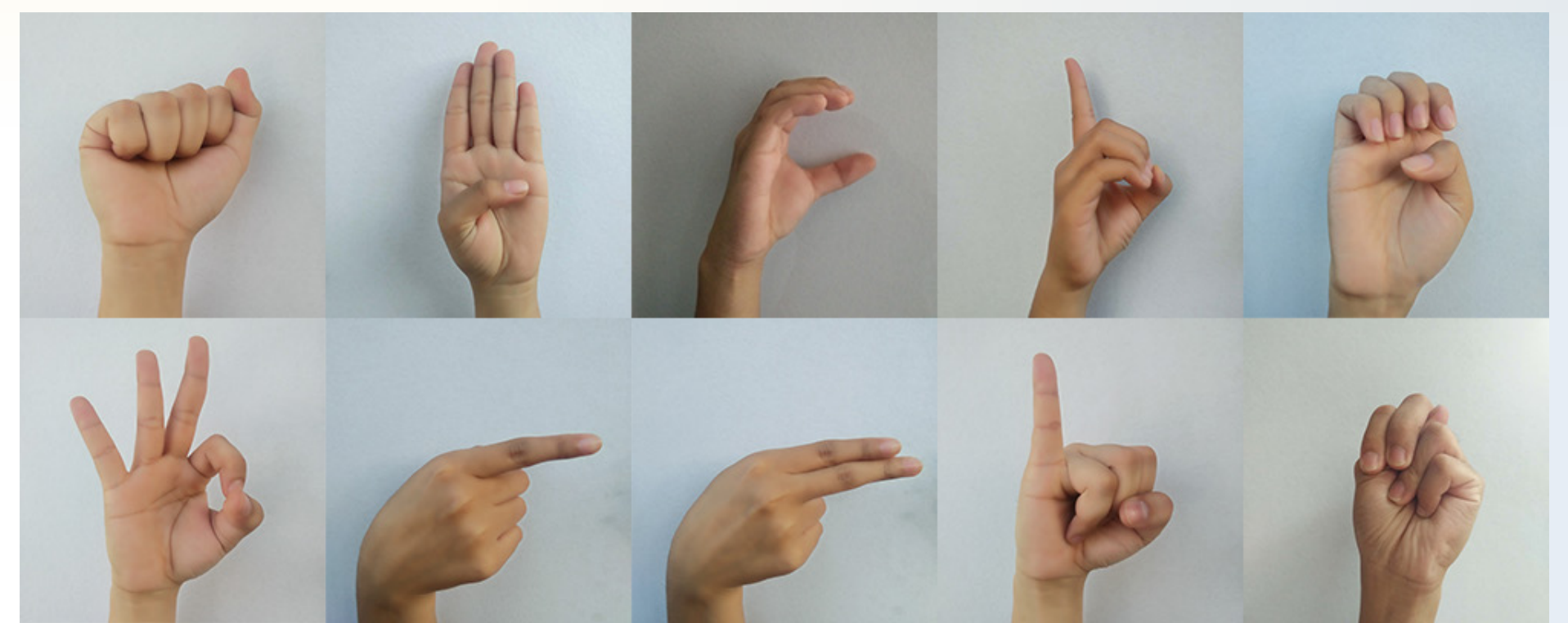
Through retraining the Inception-v3 model, it gained the highest and lowest confidence levels of **97.82%** and **27.11%** respectively, affected by similar gestures. An average of **60.03%** confidence level was obtained for all gestures while averages of **81.94%** and **97.42%** for the top-1 and top-5 accuracies were obtained.



OBJECTIVES

This study intends to fulfill the following:

1. translate user-captured **sign language to text** using a retrained convolutional neural network called Inception-v3 model;
2. translate user-inputted **text to sign language** using a series of image definitions; and
3. translate sign language regardless of the hand's orientation or size.



Sample Data

METHODOLOGY



All images were taken from random respondents in the **University of the Philippines Los Baños**. There is a total of 31 gestures for sign language to text. The definitions are: the alphabet, yes, no, that, hi/hello, and okay/good job. There is a total of 2,480 data with 80 images per gesture.

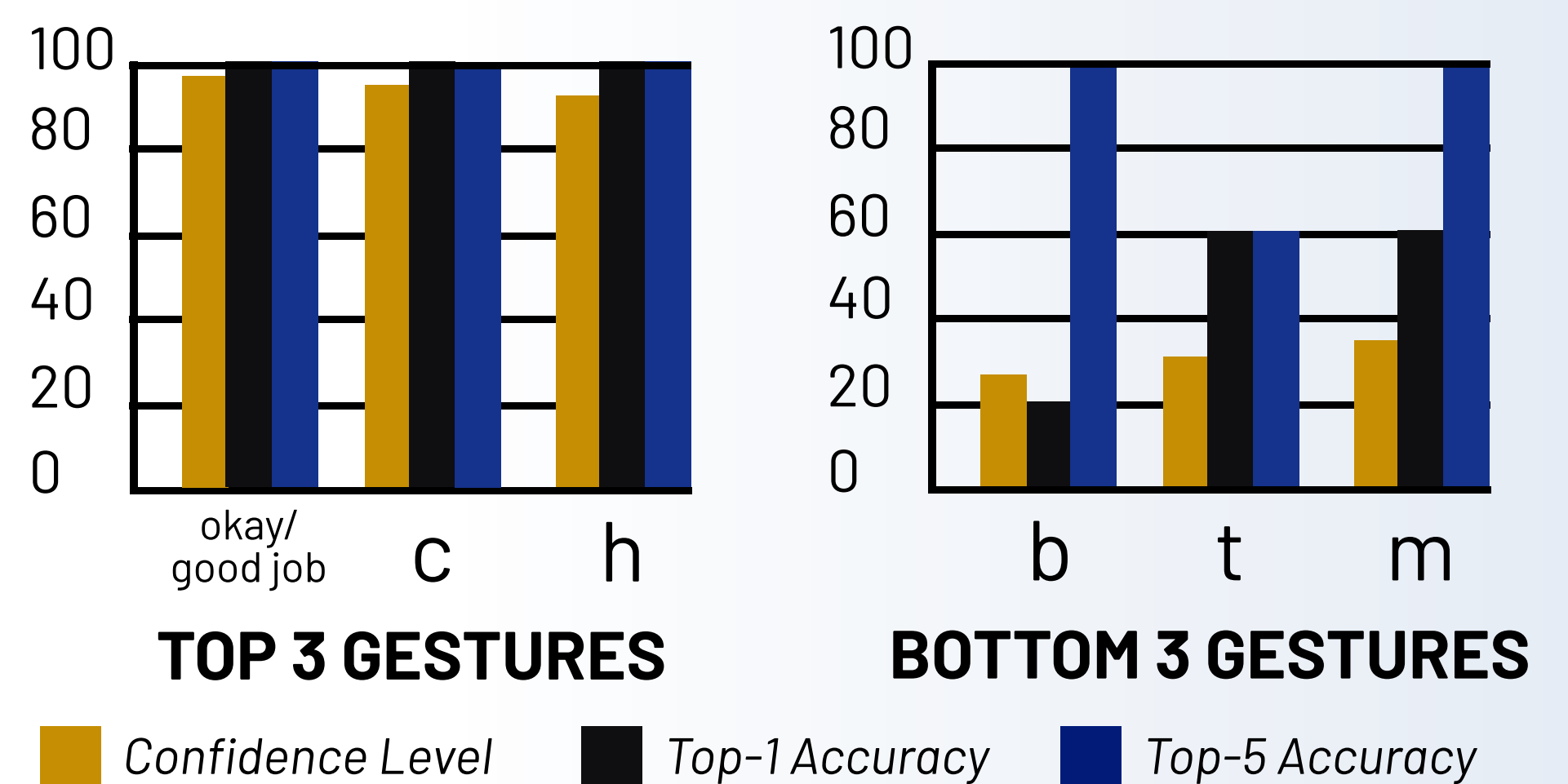


Using the data gathered, the CNN model called **Inception-v3** was retrained to fit the hand gestures data set. Out of the 80 images per gesture available, 75 images were used for training and the remaining 5 were used for testing. **TensorFlow** was used for the implementation.



Android Studio was used for the development of the application. It has three functionalities: sign language to text, text to sign language, and show vocabulary. For text to sign language, 50 gestures are available. The additional definitions are: numbers 0-9, LOL, you, I love you, I hate you, thank you, halt/stop, gotcha/later, equal/equality, and really/question.

RESULTS



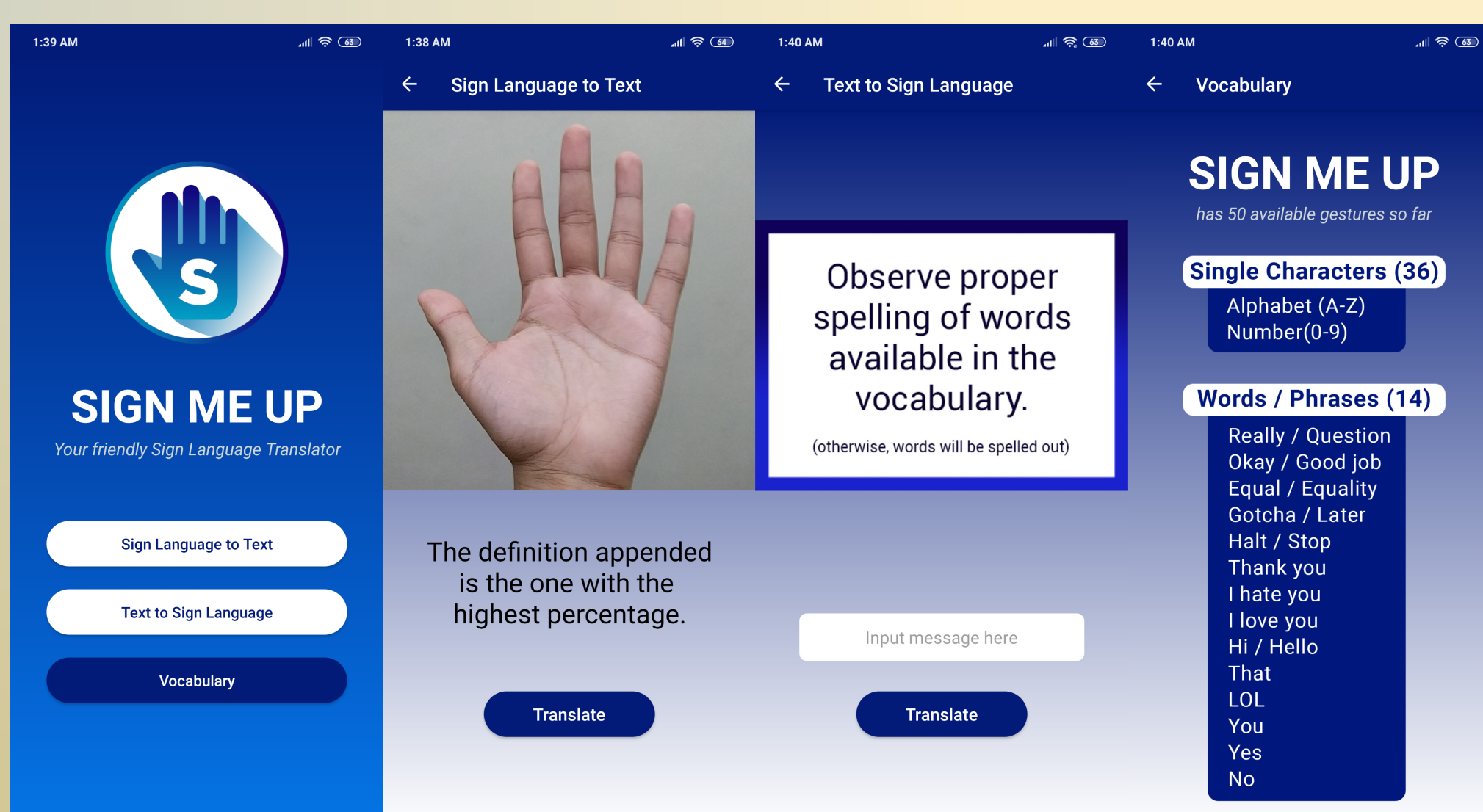
The results were measured and evaluated with the following metrics: the confidence level, top-1 accuracy, and top-5 accuracy. The model gained a highest confidence level of **97.82%** for the gesture okay/good job and a lowest confidence level of **27.11%** for the gesture b. This is because okay/good job is the most unique gesture available and the confidence level of b is divided by the gestures similar to it. The model gained an average confidence level of **60.03%**, an average top-1 accuracy of **81.94%** and an average top-5 accuracy of **97.42%**.

CONCLUSION

SIGN ME UP is able to translate sign language to text and vice-versa. However, it is still not ready for public use. The training data should be increased to improve the accuracy and the data should also include images with noisy background.



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SIGN ME UP User Interface