American Sign Language (ASL) Fingerspelling Detection

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Abstract

Approximately 70 million people around the world are deaf-mute. While translation services have become easily accessible for about 100 languages, sign language is still an area that has not been explored. Our goal is to detect & translate the letters of American Sign Language (ASL) in real-time.

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2 Introduction

2.1 Background

According to the Communication Service for the Deaf (CSD) [1], there are 360 million deaf people worldwide. Another report by the World Health Organization (WHO) [2] bumps up the number to 466 million people suffering from disabling hearing loss. Future projections estimate 630 million people by 2030 and over 900 million people by 2050. But even in this age of technology and communication, we are yet to see a universal translation system that helps bridge the gap between people that can and cannot speak. The goal of this project is to detect and accurately translate the letters in American Sign Language (ASL).

2.2 Scope & Limitations

The bottom line is that there is no universal sign language. For instance, the British Sign Language (BSL) differs by a great margin from the American Sign Language (ASL). Generally speaking, a person in the US can understand spoken English in the UK but this is not the case with sign language.

It is interesting to note that there are more than 200 sign languages that are used across the world. However, if an accurate model was developed to recognize a sign language, in our case, ASL, the same methodology could be applied to recognize other sign languages. Perhaps the major limitation is classifying each sign from the sheer corpus of signs in ASL (TODO: add a reference showing why it's a sheer corpus). However, since our focus is classifying the alphabets alone, our range is limited to 24 alphabets since we exclude the alphabets J & Z since these require motion.

3 Literature Survey

3.1 Population Statistics

A combined study in [3] estimates there were more than 250,000 deaf people and as many as 500,000 people who used ASL in 1972. Over the years, this number has been on the rise.

The Survey of Income and Program Participation (SIPP) collects data for the US population. From the research of Ross E. Mitchell [3] in the year 2006, fewer than 1 in 20 Americans or 10,000,000 people suffered from hard of hearing and close to 1,000,000 were classified as functionally deaf.