Group Project Proposal
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Deep Learning
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Deep Learning-Based ASL Fingerspelling Recognition System for Enhanced Communication and Accessibility

Introduction

The American Sign Language (ASL) is the primary communication mode for the deaf or hard of hearing individuals in the United States. A significant part of ASL communication is fingerspelling, which employs 26 distinct hand configurations to represent the letters of the alphabet. To bridge the communication gap between the hearing and deaf or hard of hearing communities, this proposal focuses on developing a deep learning-based ASL fingerspelling recognition system that accurately interprets hand gestures into written text, promoting accessibility and inclusivity across various communities in the United States.

Objectives

1. Develop a Deep Learning model that accurately recognizes images of ASL fingerspelling gestures outputs a character and produces text with those characters.
2. Develop a Character-level Language Transformer trained on an independent data.
3. Fuse the two models to provide ASL fingerspelling from a sequence of images to meaningful sentence, a meaningful end-to-end model.

Methodology

Phase 1: Data Source and Preprocessing

- Use a dataset **ASL Fingerspelling Images (RGB & Depth)** from Kaggle.
- Preprocess the data to ensure consistency, normalize images, and augment the dataset to improve model generalization.

Phase 2: Model Development

- Use Convolutional Neural Network (CNN) to identify fingerspelling gestures from images.
- Employ a character level language model as a transformer-based model to take a sequence of characters and turn them into a sentence.

Phase 3: System Integration

- Integrate the CNN and character level language model for seamless interpretation of ASL fingerspelling.

Conclusion

Developing a deep learning-based ASL fingerspelling recognition system has the potential to improve the way we communicate and interact with the deaf and hard of hearing community. By breaking down communication barriers, we can foster a more inclusive society that values diversity and promotes equal opportunities for all.