ASL to All Languages

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Abstract

An AI-driven solution translating ASL fingerspelling into text and voice using advanced computer vision techniques. Leveraging MobileNet, the system achieves 99.5% accuracy and offers a real-time, user-friendly platform for educators and the communit

Introduction

Communication is the cornerstone of human interaction, enabling us to share thoughts, emotions, and knowledge. For millions of deaf individuals, sign language is the primary means of interaction. However, the gap between those who are proficient in sign language and those who are not often leads to misunderstandings and exclusion. This project uses an AI-powered system that leverages the latest computer vision technologies to process ASL finger-spelling gestures and convert them into text, ensuring inclusivity and accessibility.

Literature reviews

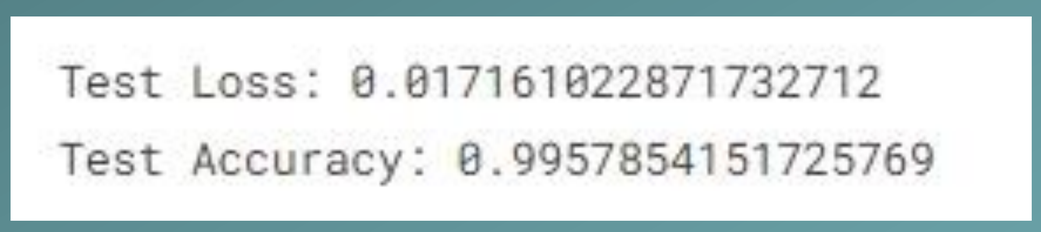
The literature review highlights key advancements in sign language recognition:

- Studies utilizing Convolutional Neural Networks (CNNs) for static and dynamic gesture recognition.
- Integration of models like VGG16, ResNet50, and MobileNet achieving accuracies up to 99.9%.
- Addressing challenges such as signer variability, lighting conditions, and occlusion.
- Emphasis on diverse datasets like ASL, BSL, and custom-built collections, showcasing the importance of preprocessing and optimization

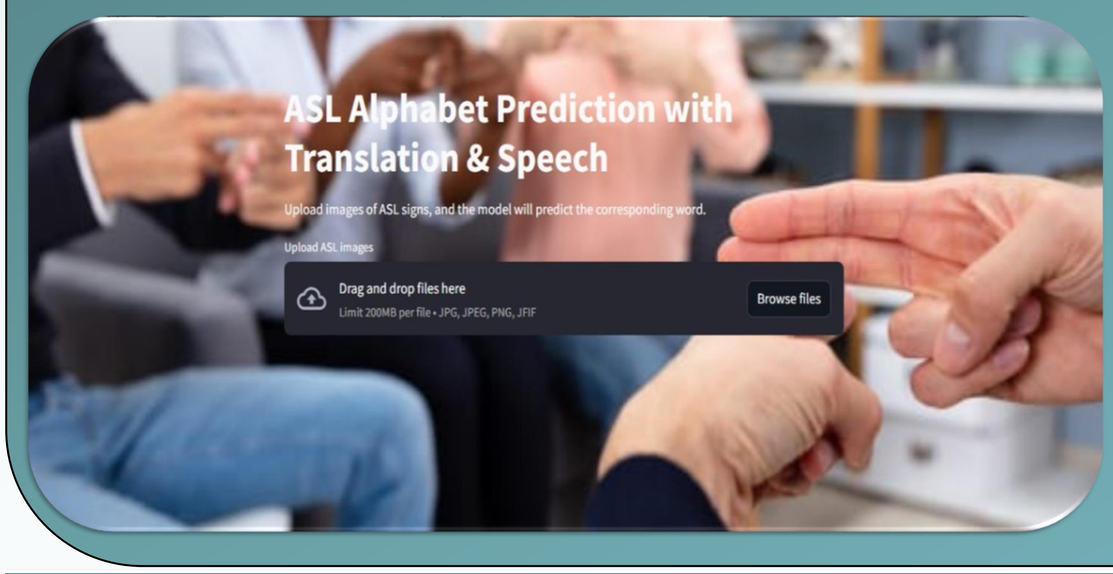
Project design

Dataset:

- 87000 images from kaggle
- 29 classes (A-Z) and (space,nothing,delete)
- 3000 images for each class



- Model Processing: Implements multiple deep learning models, including MobileNet, which achieves 99.58% accuracy due to its lightweight architecture and efficiency



- Platform: Offers a user-friendly web interface for seamless interaction

Conclusion

This project explores advanced deep learning models to enhance ASL recognition, with MobileNet emerging as the optimal choice due to its high accuracy (99.5%) and efficiency in resource-limited environments. Its lightweight architecture ensures real-time performance, making it ideal for deployment

Future work

- Multilingual Support: Expand the platform to include additional sign languages.
- Advanced Features: Integrate features like text-to-speech and speech-to-text for broader communication.
- Sectors Expansion: Extend the application to healthcare, education, and public service.