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A Project Report

On

“AI Tool/Mobile App for Indian Sign Language (ISL) Generator: Conversion of Audio-Visual Content in English/Hindi to ISL and Vice Versa”

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1. INTRODUCTION

In today's digital era, accessibility remains a crucial challenge, especially for the deaf and hard-of-hearing community in India.Indian Sign Language (ISL) serves as their primary means of communication. However, access to audio-visual content remains limited due to the lack of effective translation tools.This project aims to bridge this communication gap by developing an AI-powered tool or mobile application capable of converting audio-visual content in English/Hindi to ISL and vice versa. The tool will utilize Natural Language Processing (NLP), Computer Vision, and Machine Learning techniques to facilitate real-time sign language translation, enhancing accessibility and inclusivity.

Significance of the Project:

With millions of individuals relying on sign language, there is a strong demand for an AI-powered system that can effectively translate between English/Hindi and ISL.The lack of ISL support in mainstream applications hinders access to education, employment, and daily communication for the deaf community. This project will empower users by enabling seamless interactions through an intelligent sign language generator.

General Introduction:

Indian Sign Language (ISL) is the primary mode of communication for the deaf and hard-of-hearing community in India. However, there is a significant gap in accessibility to audio-visual content for this community. This project aims to bridge this gap by developing an AI-powered tool or mobile app that can convert audio-visual content in English/Hindi to ISL and vice versa. This will enable seamless communication and access to information for the deaf community.

Introduction to the Domain:

The domain of this project lies at the intersection of Natural Language Processing (NLP), Computer Vision, and Machine Learning. The tool will leverage AI to interpret spoken or written language (English/Hindi) and translate it into ISL gestures, and vice versa. This will involve speech-to-text conversion, text-to-sign language translation, and gesture-to-text/speech conversion.

2. LITERATURE REVIEW

Existing Methods:

Advantages:

1. Sign Language Recognition (SLR) Systems: Existing SLR systems use deep learning models like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) to recognize sign language gestures.
2. Speech-to-Text Conversion: Tools like Google Speech-to-Text API provide accurate real-time transcription of spoken language.
3. Text-to-Sign Language Translation: Some systems use rule-based approaches to convert text into sign language animations.
4. Gesture-to-Text Conversion: Advanced systems use motion sensors and computer vision to interpret gestures into text or speech.

Limitations:

1. Lack of ISL Support: Most existing tools focus on American Sign Language (ASL) or British

Sign Language (BSL), with limited support for ISL.

2. Accuracy Issues: Gesture recognition systems often struggle with accuracy due to variations in sign language gestures.

3. Real-Time Processing: Many systems fail to provide real-time translation, which is crucial for effective communication.

4. Limited Vocabulary: Existing tools often have a limited vocabulary, making them unsuitable for complex conversations.

5. Hardware Dependency: Some systems require specialized hardware, making them inaccessible to the general public.

3. OBJECTIVES

The primary objectives of this project are:

1. Develop an AI-powered tool for ISL translation: Convert audio-visual content in English/Hindi to ISL gestures in real-time.

2. Enable bidirectional translation: Facilitate both text/speech-to-sign and sign-to-text/speech conversion for effective communication.

3. Improve real-time processing accuracy: Utilize deep learning models, such as BiLSTM and Transformers, to enhance recognition accuracy.

4. Ensure accessibility and scalability: Develop a user-friendly mobile or web-based application with cloud-based storage for continuous improvements.

5. Integrate NLP and Computer Vision: Leverage AI techniques to enhance linguistic understanding and gesture interpretation.

6. Develop an ISL dataset: Create a robust dataset with labeled ISL gestures to train and fine-tune AI models.

1. To develop an AI-powered tool that can convert audio-visual content in English/Hindi to ISL in real-time.
2. To create a system that can translate ISL gestures into English/Hindi text or speech.
3. To ensure the tool is user-friendly and accessible on mobile devices.
4. To build a comprehensive ISL vocabulary database to support accurate translations.

4. METHODOLOGY :

Design Procedure:

1. **Data Collection:** Collect a large dataset of ISL gestures, including videos and annotations.
2. **Preprocessing:** Clean and preprocess the data to remove noise and standardize the format.
3. **Model Development:**
   - -Use CNNs for gesture recognition.
   - -Implement NLP models for text-to-sign and sign-to-text translation.
   - -Integrate speech-to-text and text-to-speech APIs for audio conversion.
4. **Training:** Train the models on the collected dataset using supervised learning techniques.
5. **Testing and Validation:** Test the system with real-world data and validate its accuracy.
6. **Deployment**: Deploy the tool as a mobile app or web-based platform.

Hardware and Software Used:

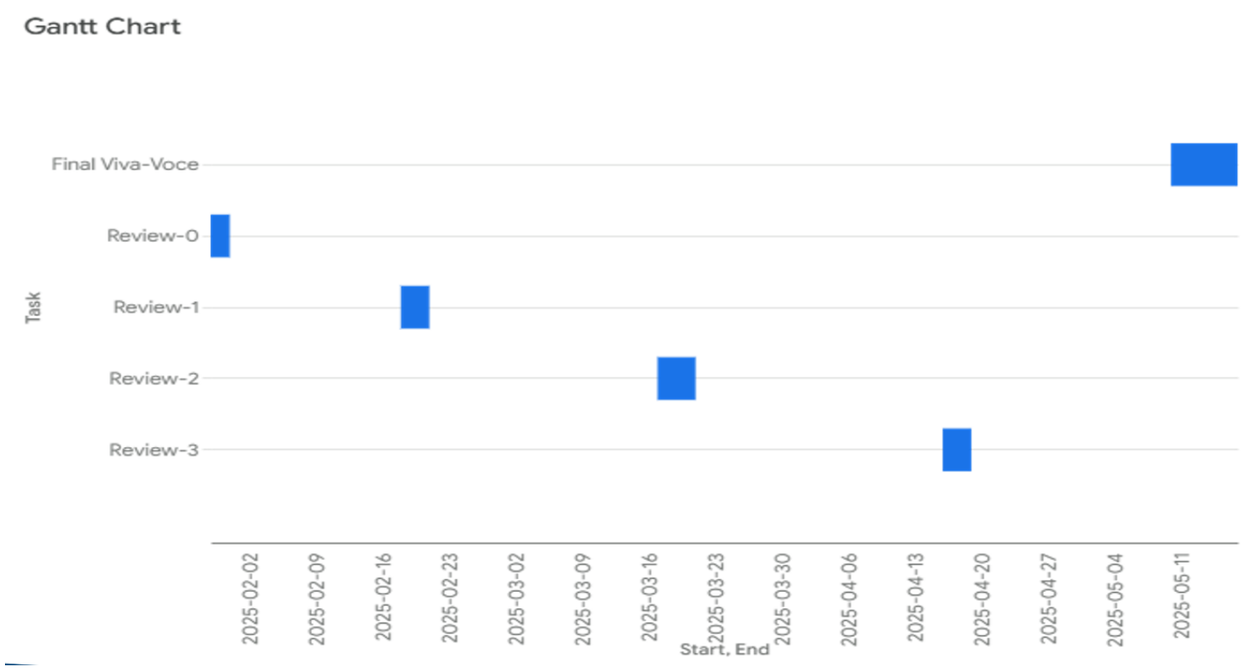
1. **Hardware:** High-performance GPUs for training, cameras for gesture capture.

2.Software: Python, TensorFlow, PyTorch, OpenCV, Google Speech-to-Text API, Android/iOS SDKs.

5. OUTCOMES :

1. A fully functional AI tool/mobile app that can convert audio-visual content in English/Hindi to ISL and vice versa.
2. Real-time translation capabilities with high accuracy.
3. A user-friendly interface accessible to the deaf and hard-of-hearing community.
4. A comprehensive ISL vocabulary database for future enhancements.

6. TIMELINE OF THE PROJECT/ PROJECT EXECUTION PLAN :



7. CONCLUSION :

This project aims to create an innovative solution to improve communication accessibility for the deaf and hard-of-hearing community in India. By leveraging AI and machine learning, the tool will provide real-time translation between English/Hindi and ISL, bridging the communication gap and empowering the community.

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