A Synopsis on

ISLConnect

carried out as part of the course,

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ISLConnect

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Problem Definition:

The goal is to develop a solution, either in the form of a mobile app, software, or device, that can accurately convert spoken language into Indian Sign Language (ISL) gestures in real-time. The technology should employ speech recognition, natural language processing (NLP), and computer vision to generate ISL gestures from audio input. The system must account for regional variations in01 ISL, ensure high accuracy in translation, and provide a user-friendly interface that enables seamless communication between hearing individuals and the deaf community..

Scope:

Speech-to-ISL Conversion System:
- Develop a real-time system that recognizes spoken language and converts it to Indian Sign Language (ISL) using speech recognition and NLP.

ISL Gesture Generation:
- Use computer vision to create real-time ISL gestures via 3D avatars or hand models.

Regional ISL Variations:
- Adapt the system for regional variations in ISL, allowing users to choose their regional dialect.

User Interface & Accessibility:
- Build a user-friendly interface for desktop, mobile apps, and public displays, making it accessible for both deaf and hearing users.

Methodology:

1. Data Collection & Preprocessing:
- Collect spoken language and ISL gesture data.
- Preprocess the data for training models, ensuring regional ISL variations are included.

2. Speech Recognition & NLP Integration:
- Developing speech recognition to convert spoken language into text.
- Apply natural language processing (NLP) to interpret the text, extracting meaning and context for accurate ISL translation.

3. ISL Gesture Translation:
- Map spoken phrases to their corresponding ISL gestures, considering grammar and semantics.
- Generate 3D animations or video outputs of ISL gestures using computer vision techniques

4. User Interface (UI) Development:
- Build a user-friendly interface for both mobile and desktop platforms, focusing on accessibility for both deaf and hearing users.
- Include real-time feedback for speech-to-ISL conversion.

5. Regional Adaptation Module:
- Implement functionality to handle regional ISL variations, allowing users to select their preferred regional dialect.

6. Testing & Iteration

Challenges and Shortcomings:

1. **Accuracy in Speech Recognition:**
- Speech recognition systems may struggle with varying accents, dialects, or background noise, leading to errors in transcription, especially in a diverse country like India.

2. **NLP Understanding of ISL Grammar:**
- Indian Sign Language (ISL) has a different grammar structure compared to spoken languages. Accurately translating spoken language into ISL syntax and semantics can be challenging.

3. **Regional ISL Variations:**
- ISL varies across regions, which complicates developing a system that provides accurate translations for all users, potentially requiring multiple models for different regions.

Expected Outcomes:

1. A functional system capable of accurately converting spoken language into Indian Sign Language (ISL) gestures in real time using speech recognition, natural language processing, and computer vision

2. Support for regional variations of ISL, allowing users to select and adapt the translation to their local dialect, ensuring culturally appropriate communication.

3. A simple and accessible user interface for both deaf and hearing users, making the technology easy to use across various devices and platforms (mobile apps, public displays).

Timeline:

4. **Requirement Analysis & Research:** Months 1-2

5. **Technology Selection & Initial Design:** Months 2-3

6. **Data Collection & Preprocessing:** Months 3-4

7. **Speech Recognition & NLP Development:** Months 4-6

8. **ISL Gesture Generation Development:** Months 6-8

9. **User Interface (UI) Development:** Months 8-9

10. **Regional Adaptation & Customization:** Months 9-10

11. **Testing & Evaluation:** Months 10-11

Conclusion:

The development of a real-time speech-to-Indian Sign Language (ISL) translation system has the potential to significantly enhance communication between the deaf and hearing communities. By leveraging speech recognition, natural language processing, and computer vision technologies, this solution will provide real-time ISL gesture translations, bridging the communication gap in public spaces, daily interactions, and digital platforms. Over the course of a year, the project will progress through phases of research, development, and testing, resulting in an accessible, user-friendly tool that adapts to regional variations and facilitates social inclusion for the deaf community. While challenges such as accuracy, regional variation, and resource limitations must be addressed, the successful implementation of this project will improve accessibility and awareness, fostering a more inclusive society.