**PROBLEM STATEMENT DETAILS :-**

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| Problem Statement id  | SIH1716 |
| Problem Statement Title  | Indian Sign Language (ISL) to Text/Speech Translation |
| Description  | Create a solution that translates Indian Sign Language (ISL) into text and speech in real-time, facilitating communication for the deaf and hard-of-hearing community with the hearing world. The application should be capable of recognizing and interpreting a comprehensive library of ISL signs and gestures, and then provide accurate text and speech output in multiple Indian languages. |
| Organisation  | Ministry of Social Justice and Empowerment |
| Department  |  Indian Sign Language Research and Training Centre (ISLRTC) |
| Category  | Software |
| Theme  | Miscellaneous |
| Dataset Link  | Null  |

**Project Proposal**

1. Title of the Project:

Indian Sign Language (ISL) to Text/Speech Translation

 2. Introduction:

India has a massive deaf and hard-of-listening to populace that relies on Indian Sign Language (ISL) for verbal exchange. However, maximum human beings are not gifted in ISL, growing a vast verbal exchange barrier among ISL customers and the relaxation of society. This mission proposes the improvement of a system which can automatically translate Indian Sign Language gestures into textual content and speech, making communique greater reachable for the deaf community.

 3. Objective:

The goal of this venture is to layout and increase a actual-time gadget that may:

- Recognize ISL gestures the usage of computer vision techniques.

- Translate those gestures into text.

- Convert the text into speech for auditory communication.

 4. Problem Statement:

Sign language users face daily demanding situations while interacting with those who do not recognize ISL. Existing communique methods which include writing or typing are bulky and gradual. An automated machine that translates ISL into text and speech can bridge this hole, allowing for extra seamless verbal exchange between signers and non-signers.

 5. Scope of the Project:

- ISL Dataset: The machine might be educated on a dataset of ISL gestures.

- Gesture Recognition: The gadget will utilize gadget getting to know models and laptop vision techniques (consisting of Convolutional Neural Networks) to understand hand gestures in actual time.

- Translation Module: The diagnosed gestures could be mapped to corresponding phrases or terms in textual content shape.

- Text-to-Speech Module: The textual content output will be converted into speech using present textual content-to-speech (TTS) engines, enabling auditory communique.

 6. Methodology:

* Data Collection:
	+ Collection or use of present datasets containing ISL gestures and their corresponding textual content translations.
	+ The dataset will include a range of ISL gestures for normally used words and terms.
* Preprocessing:
	+ Preprocessing of video frames or snap shots to normalize hand gestures, making sure consistency throughout distinctive customers.
* Gesture Recognition:
	+ - - Development of a gesture popularity version the use of a deep studying approach, such as CNNs or RNNs, to pick out hand movements and shapes from input films or photographs.
	+ Use of real-time video processing libraries (e.G., OpenCV) for gesture detection.
* Translation to Text:
	+ Implementing a translation set of rules that converts diagnosed gestures into corresponding text.
* Text-to-Speech Conversion:
	+ Integration of a textual content-to-speech engine to transform the diagnosed textual content into speech.
* System Testing:
	+ Testing the gadget with actual customers to assess accuracy and performance.
	+ Feedback might be accrued to enhance the device’s usability.

7. Technologies to be Used :

- Programming Languages: Python, TensorFlow, Keras, OpenCV.

- Frameworks: Machine Learning frameworks along with TensorFlow and Keras for version development.

- Text-to-Speech API: Google Text-to-Speech (TTS) API or every other appropriate TTS engine.

- Hardware: Standard webcam or Kinect for capturing gestures in real-time.

 8. Expected Outcome

- A practical prototype that can translate ISL gestures into each text and speech in actual time.

- Improved conversation among ISL users and non-signers.

- Potential future improvements for multi-lingual assist or extra ISL symptoms.

 9. Challenges

- Variability in signing pace and fashion throughout individuals.

- Complex sentences related to more than one gestures may require advanced algorithms for accurate reputation.

- Ensuring actual-time processing pace without compromising accuracy.

10. Conclusion

This project aims to interrupt down conversation limitations between the listening to and deaf groups with the aid of using superior device mastering and natural language processing strategies to translate Indian Sign Language into textual content and speech. The machine’s actual-time capability will make it a valuable device for diverse sectors inclusive of education, public offerings, and healthcare.

11. References

- Papers on sign language reputation using deep mastering.

- Text-to-Speech API documentation.

- Existing ISL datasets.

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