**COMPUTER VISION**

**TEAM:09**

**TOPIC:** Sign Language Recognition Using

Machine learning

**TEAM DETAIL**

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| **Name** | **USN** | **Roll.no** |
| Sanjana Chillur | 01FE22BCS237 | 311 |
| Apeksha Desai | 01FE22BCS138 | 317 |
| Sindhu | 01FE22BCS216 | 341 |
| Ananya Shetty | 01FE22BCS250 | 335 |

**INTRODUCTION:**

With recent advancements in computer vision and machine learning, there is a growing interest in human-computer interaction methods that facilitate more natural communication. Sign language recognition (SLR) systems aim to bridge the communication gap between individuals who use sign language and those who do not. This project focuses on creating a computer vision-based SLR system that accurately detects and interprets hand signs, thereby providing a seamless way to translate sign language into text or spoken language.

**PROBLEM STATEMENT:**

This project aims to develop a system for sign language recognition that accurately detects and classifies hand signs from a dataset, converting them into text outputs.

Specifically, the project aims to:

* Recognize a set of predefined hand signs used in sign language.
* Provide an accurate translation of gestures to facilitate better communication.

**PROBLEM DESCRIPTION:**

The solution involves using computer vision techniques to detect and classify hand gestures. The project employs a machine learning model pre-trained on sign language datasets to recognize and map each gesture to its corresponding text.

**Key Components and Functionality:**

* **Hand Landmark Detection:** The project uses the MediaPipe library to detect and identify key points on the hand, which serve as references for recognizing gestures.
* **Sign Classification:** A deep learning model trained on sign language data is integrated to classify gestures based on detected landmarks.

**Working Mechanism:**

1. **Dataset Input:** Pre-recorded images from a sign language dataset are used as the input.
2. **Hand Detection:** MediaPipe processes each image in the dataset to detect hand landmarks.
3. **Gesture Interpretation:** The deep learning model analyzes the positions of the detected landmarks and classifies the gestures according to the predefined sign classes.
4. **Output Display:** The recognized sign is output as text, providing a clear representation of the classification result for each input image or frame.

**METHODOLOGY:**

This project uses a combination of MediaPipe for hand tracking and a convolutional neural network (CNN) trained on a public sign language dataset. The pipeline involves:

* Capturing video input through a webcam.
* Using MediaPipe for landmark detection to map 21 key points on the hand.
* Feeding the landmark data to the CNN for classification.
* Displaying the recognized sign as text in real-time.

**CONCLUSION:**

The proposed system provides an intuitive way to translate sign language into text, thus improving communication for sign language users. By leveraging MediaPipe and CNN for accurate detection and classification, this project demonstrates the potential for real-time, contact-free interaction. Future work could involve expanding the vocabulary of recognized signs, enhancing the system’s accuracy in varied lighting conditions, and adapting the model to support different sign languages globally.