**Project Title:**

**Indian Sign Language Detection into English Converter**

**Objective:**

The primary objective of this project is to develop a machine learning-based system that can recognize hand gestures corresponding to **Indian Sign Language (ISL)** and translate them into **readable English.** This initiative aims to assist the **deaf and mute community** by facilitating better communication and promoting inclusivity in educational and everyday settings.

**Methodology:**

The project uses **computer vision and machine learning techniques** to detect and classify ISL gestures. The steps followed include:

1. **Dataset Creation:**  
   A custom dataset was built consisting of images of both **single-hand and double-hand ISL gestures**, manually collected under varied lighting and positioning conditions.
2. **Preprocessing:**  
   Captured images were processed to remove background noise and improve consistency using techniques like resizing, grayscale conversion, and normalization.
3. **Model Training:**  
   Two separate **Random Forest classifiers** were trained:
   * One for single-hand gestures
   * One for double-hand gestures  
     The models were trained using extracted features from the gesture images to achieve accurate classification.
4. **Real-time Detection:**  
   A webcam-based interface captures live input, classifies the gesture using the appropriate model, and displays the output in English.

**Key Findings:**

* The system can accurately recognize basic ISL gestures in **real-time** using only a standard webcam.
* The **Random Forest models** achieved good performance with low latency, making the solution feasible for low-resource devices.
* English outputs adds a **regional accessibility advantage**, catering to a wider demographic.

**Proposed Solution:**

The solution offers a **low-cost, scalable, and easy-to-use prototype** that translates ISL gestures into readable text. This tool can serve as both a **communication aid** and an **educational resource**. It lays the groundwork for future developments such as:

* Expanding the ISL vocabulary
* Integrating speech/text-to-sign animation
* Deploying on mobile platforms using lightweight ML models

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