# EE 304: Digital Signal Processing

# SIGN LANGUAGE RECOGNITION

**OUR TEAM**

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# SIGN LANGUAGE RECOGNITION

- **Sign language recognition** involves converting sign language gestures into text or speech.

- We're implementing **ASL translation** using **landmark detection,** converting ASL gestures into text by analyzing hand movements through detected landmark points.

- This **dataset** includes diverse hand orientations, lighting conditions, and backgrounds. We compiled a dataset of **36 hand gestures**, each with **150 samples**, captured using a webcam.



image source

# ARCHITECTURE
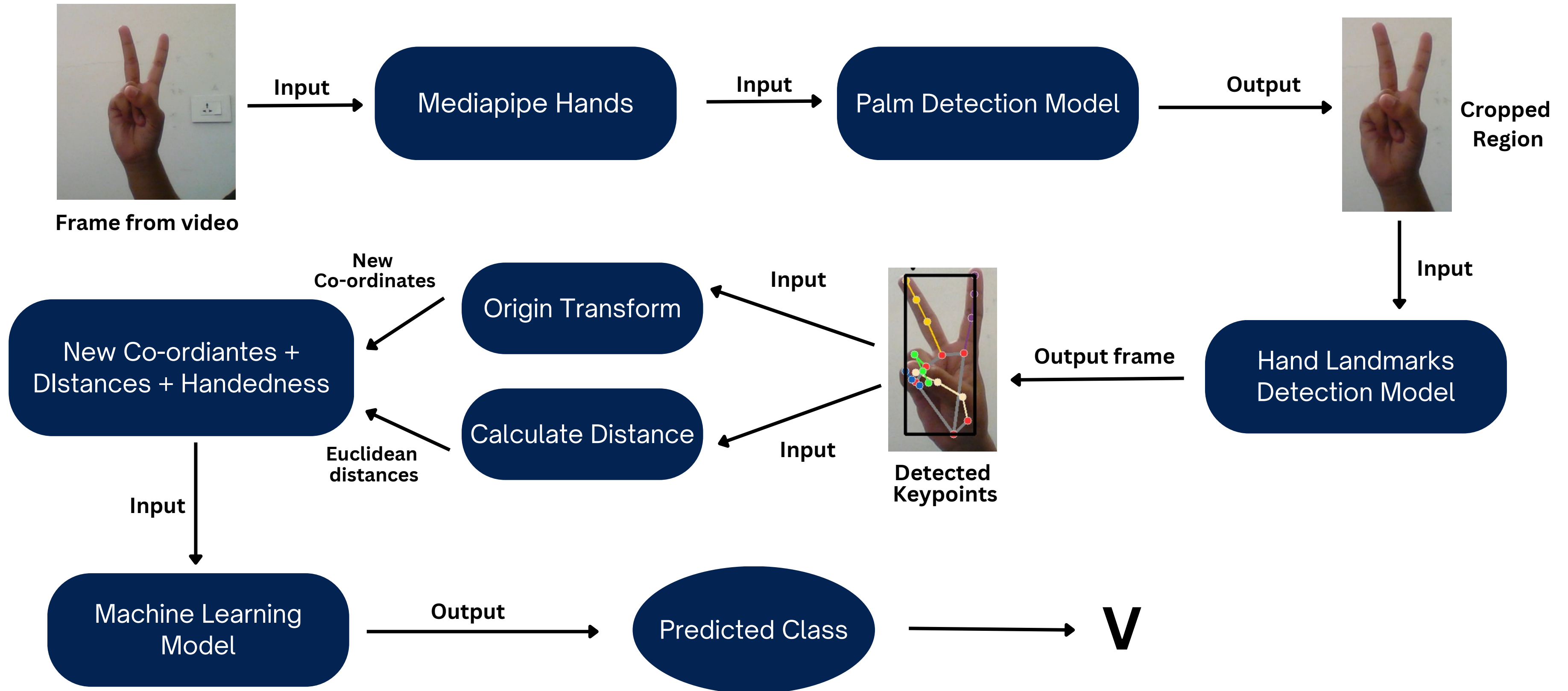
# METHODOLOGY

**Dataset Creation & Preprocessing:**
- Collected a dataset of 36 alphanumeric sign language gestures, comprising 150 images each, totaling 5,400 data points.
- Utilized webcam images, extracting hand landmarks and preprocessing for consistency.

**Image Processing & Landmark Detection:**
- Employed MediaPipe Hands and OpenCV for precise hand landmark detection.
- Processed images to RGB format, extracting x and y coordinates for feature extraction.

**Labeling & Data Serialization:**
- Assigned labels based on gesture directories, organizing data.
- Serialized processed data into a pickle file for efficient storage and retrieval.

**Model Training & Evaluation:**
- Utilized Random Forest classifier for training and testing, employing traditional ML techniques.
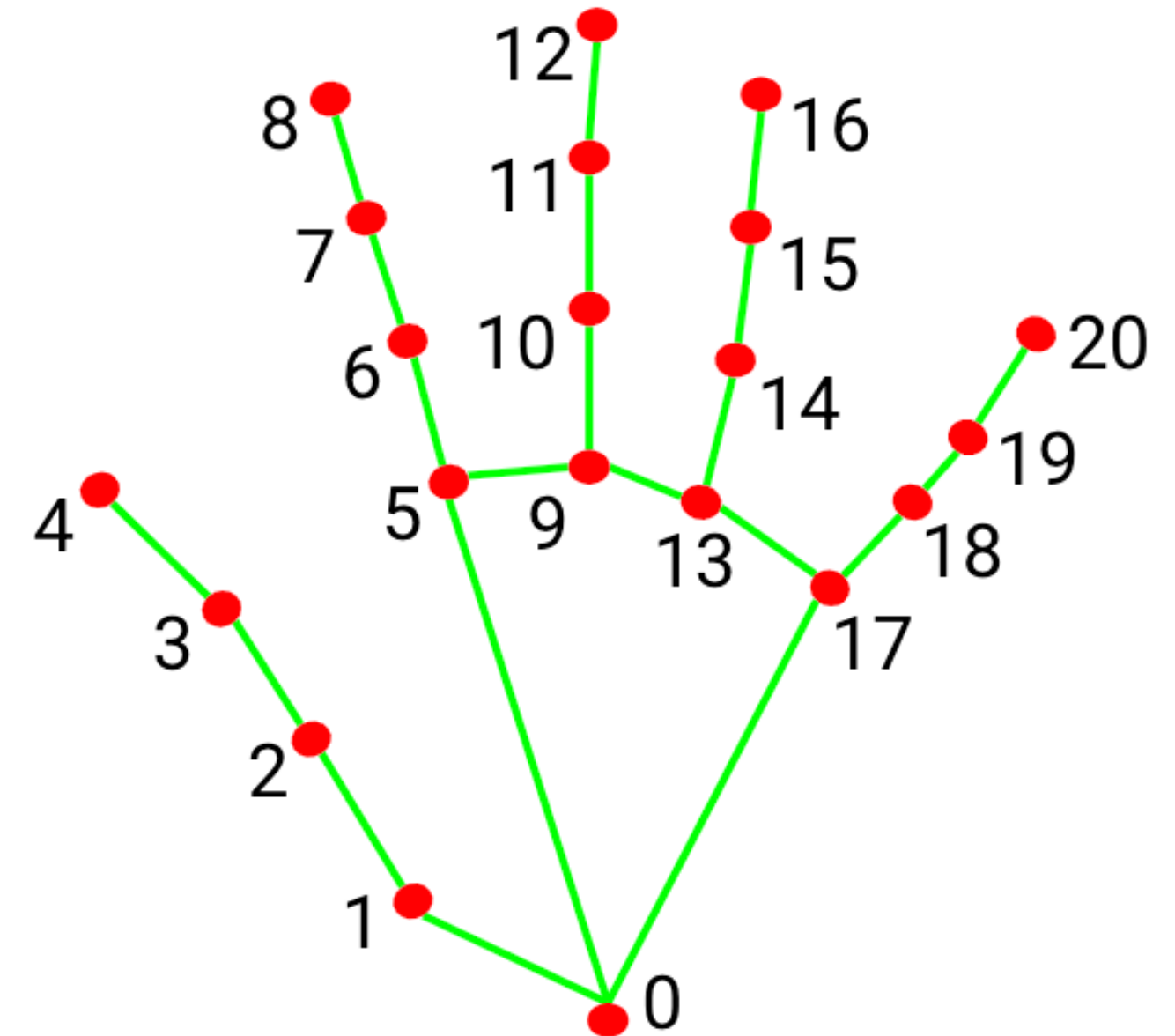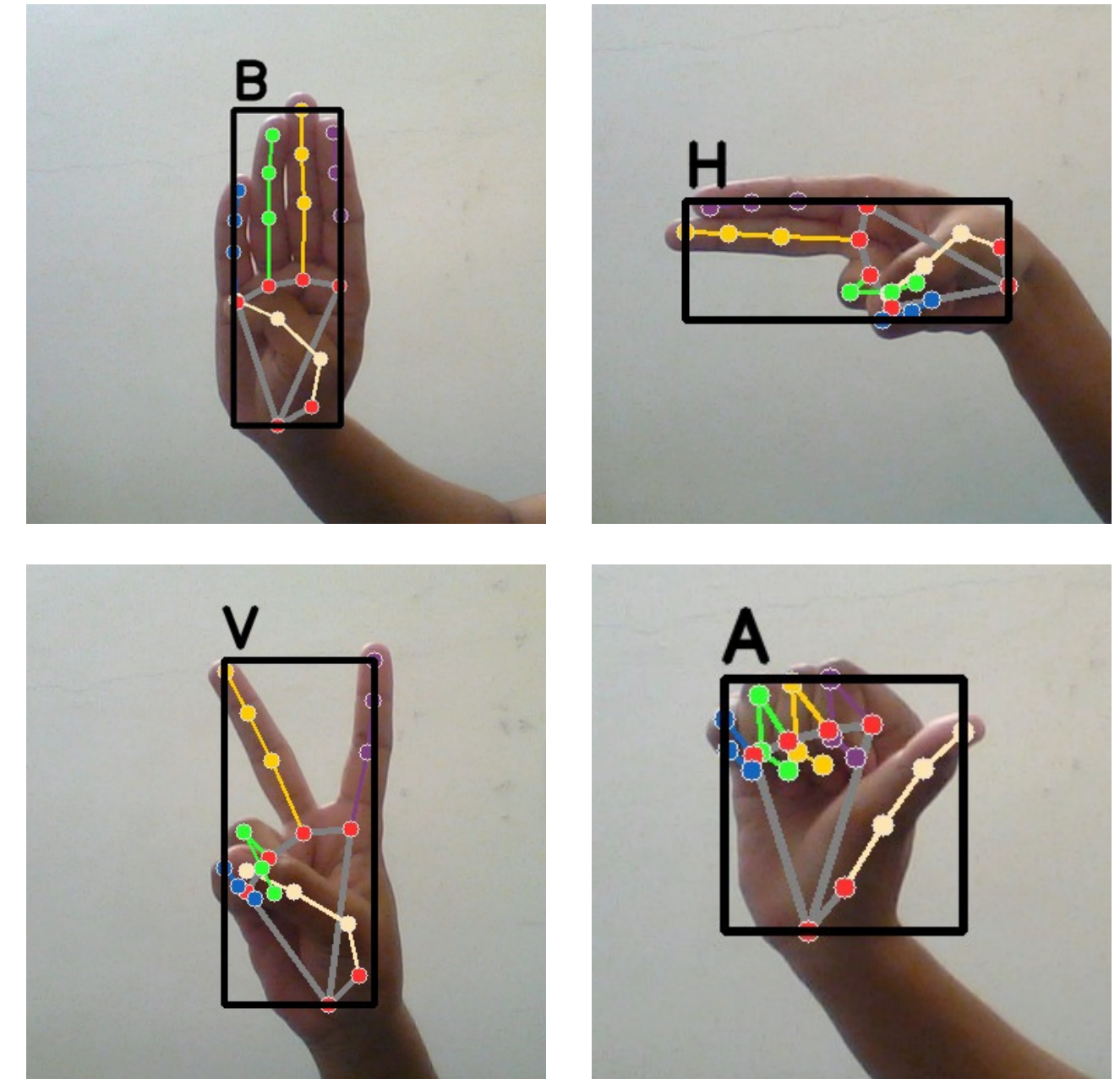- Extracted relevant features from landmark data, assessing model performance using accuracy metrics.



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# RESULTS & CONCLUSION

- **Landmark detection** using **OpenCV** and **MediaPipe** facilitated accurate identification of hand gestures.

- We employed a Random Forest classifier for training and testing, leveraging traditional machine learning.

- Our **Validation Accuracy** was approx. **93%** which was very promising, indicating that the Random Forest classifier demonstrated robustness in recognizing sign language gestures.

**Github Link :** https://github.com/apurva-1403/Sign-Language-Recognition



Our Results

**Thank You :)**

Research paper source: https://ieeexplore.ieee.org/document/9908995