

# AI Coach for Gym

Team 8

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# Overview

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# Task Description

A computer vision model that can categorize wall-sit exercise into correct and incorrect.

# Demo

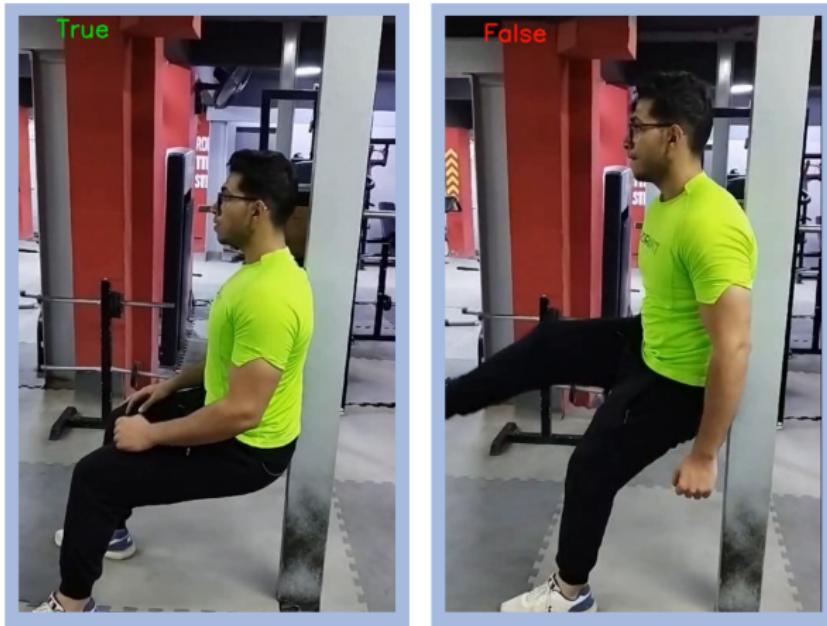


Figure: Demo

Github Repository – Demo Video

# Contribution

- Two models have been built
  - The first was based on the landmark data.
  - The second was based on the angles that were extracted from the landmarks.(used)
- Some of the data were made by us.
- Data was passed to MediaPipe for Landmark Detection to extract keypoints (body joint locations)
- Angles between relevant joints were calculated based on the detected landmarks.
- The trained model was used for categorization on real-time video data, and also video data

# Data

- The dataset used to train the model consists of 42 images.
- Most of the data is from Google Images, the rest of the data were made by us.
- Images format is BGR.
- The dataset is categorized into two folders: "Correct" and "Incorrect."



Figure: Correct and Incorrect data

# Data

During training:

- Images format is converted to RGB.
- Each image is converted into 10 images by doing several data augmentation techniques (flipping, zooming).

# Project Architecture

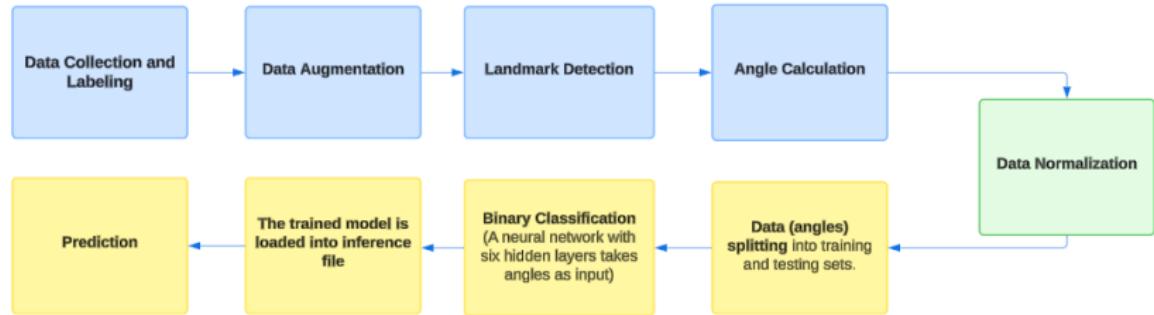


Figure: Project Architecture

# Methods

- Integrates MediaPipe's pose library to detect landmarks corresponding to body joints.
- Hyperparameters:
  - optimizer: adam
  - Loss Function: binary cross-entropy
  - Metric: Accuracy
  - Epochs: 150
  - Early Stopping: is used to prevent overfitting.

# Methods: Layers

- Input Layer: Takes a flattened array of 20 angles (representing joint angles) as input.
- Hidden Layers:
  - Six dense layers with 512 units each using "ReLU" activation function.
  - Dropout layer with a rate of 0.25 is included to prevent overfitting
- Output Layer: Has one neuron with a sigmoid activation function.

# Results

The measure is accuracy

- The model achieves 99.9% accuracy on the training data.
- The model achieves 98.9% accuracy on the test data.

# Thank you