Yoga Pose Estimation

Team Name: SSD_M2023_11, Web Wizards
Team Number: 11
Project Title: Pose Estimation for fitness tracking
Project Number: 7
Instructor: Dr. Charu Sharma
Project Repository URL:
https://github.com/MedhaMadhusudhan/PoseEstimationFitness

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Requirements:

1) **Stakeholders:**
   - Sportspersons
   - Athletes
   - Sports Teachers
   - Yoga Instructors
   - Other sports enthusiasts
   +

2) **Requirements in detail:**

ID	Requirement Name	Description	Category (frontend/ backend/ middleware)	Notes	Owner
1	Python	Python will be used as the primary language to code the project in.	backend/ language		open source
2	CV2	Library for computer vision	backend		open source
3	Django	Backend with python	backend		open source
4	MediaPipe	AI library	backend	Used to find the landmarks for calculating the angle.	Open source
5	Bulma	Style Framework	frontend		Open source
6	HTML	Defines the basic structure of the pages	frontend		open source
7	CSS	Basic Styling	frontend		open source
8	Sqllite		Inbuilt database		Open source

3) Workflow of project

Pose Detection and Classification Module:

- Utilizes the Media-Pipe library for pose detection.
- Defines functions to detect pose landmarks, calculate angles between landmarks, and classify yoga poses based on predefined criteria.

Webcam Integration:

- Opens a connection to the webcam using OpenCV (cv2).
- Checks if the webcam is opened successfully; otherwise, it prints an error message and exits.

Web Interface:

- Defines an HTML template (upload_webcam.html) for a simple web interface.
- Provides a button to trigger pose detection using the webcam.
- Offers a button to stop the webcam and redirect to the upload page.

Pose Detection Loop:

- Continuously captures frames from the webcam.
- Performs pose detection and classification on each frame.
- Displays the processed frame with pose landmarks and label in real-time.

Pose Classification:

- Defines specific criteria for classifying yoga poses based on angles between joints.
- Uses predefined pose ranges for various yoga poses.
- Determines the nearest pose and calculates differences from the nearest pose.

Display and Redirect:

- Displays the output frame with pose landmarks and labels in a separate window.

Django Server Handling:

- Manages Django server functionality.
- Uses Django's redirect function to navigate to different pages.

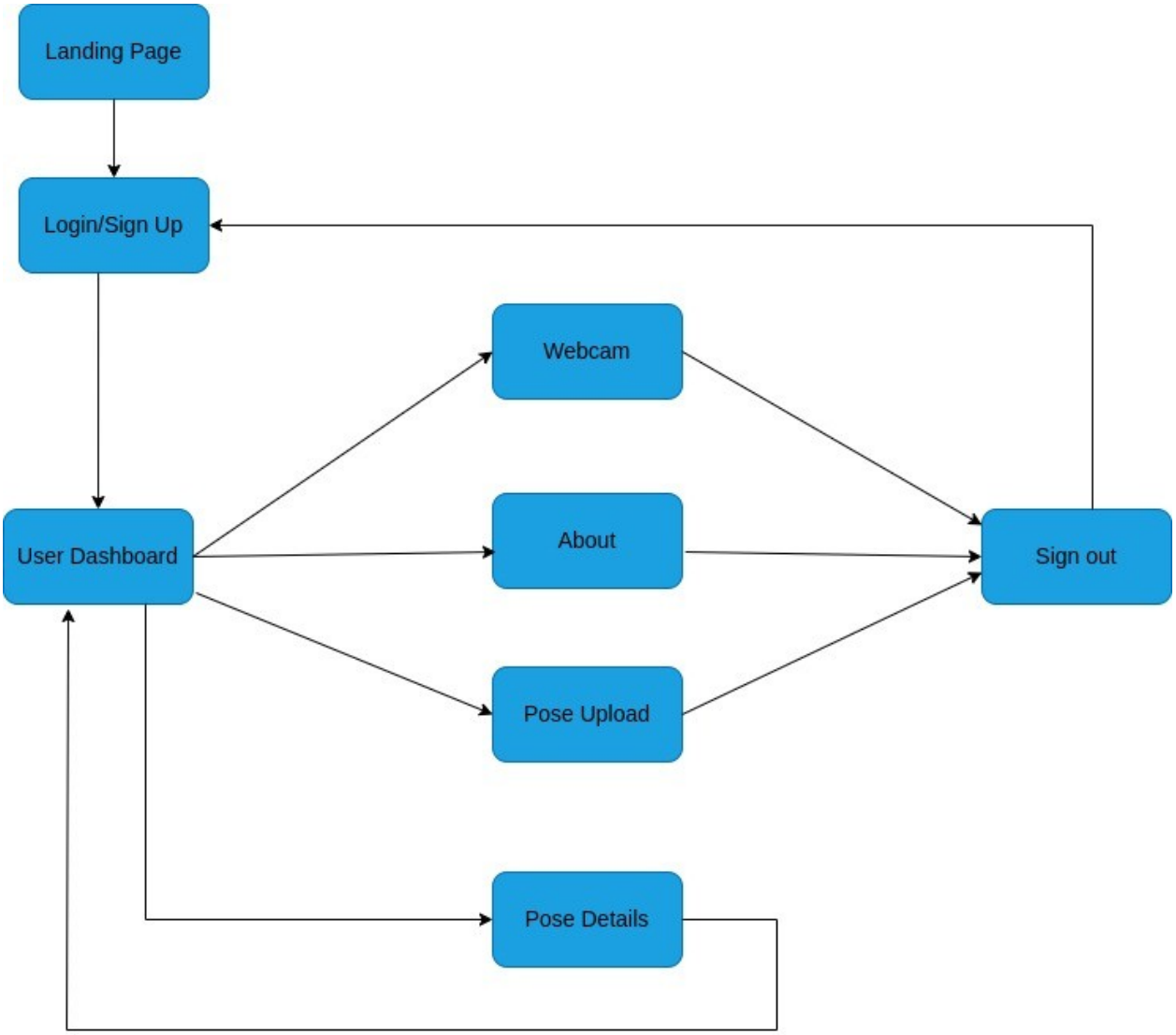
Project Termination:

- Properly releases the webcam and closes OpenCV windows when the pose detection loop is terminated.

Overall Flow:

- The user accesses the web interface to trigger pose detection using the webcam.
- The webcam continuously captures frames, and the pose detection module processes each frame in real-time.
- The detected poses are classified and displayed on the web interface.
- The user can stop the webcam and return to the upload page.

4) Flow chart:


Landing Page
Login/Sign Up
Webcam
User Dashboard
About
Sign out
Pose Upload
Pose Details

5) Use Cases:

Yoga Training and Correction:

- **Use Case:** Individuals practicing yoga can use the system to receive real-time feedback on their yoga poses.
- **How:** The system can help users ensure they are maintaining the correct posture and alignment during yoga sessions, providing visual feedback on their poses and suggesting corrections.

Fitness Tracking and Analysis:

- **Use Case:** Fitness enthusiasts and athletes can utilize the system for tracking their yoga routines.
- **How:** The system can record and analyze sessions, providing insights into the consistency and accuracy of poses over time. Users can track their progress and make adjustments to improve their form.

Remote Yoga Classes:

- **Use Case:** Instructors conducting virtual or remote yoga classes can use the system to monitor and provide feedback to participants.
- **How:** The system can assist instructors in assessing the participants' poses, ensuring they follow the correct form, and offering guidance for improvements in real-time.

Interactive Learning Platforms:

- **Use Case:** Educational platforms focused on yoga and fitness can integrate this system for interactive and engaging learning experiences.
- **How:** Learners can use the system to visually understand and practice yoga poses, receiving instant feedback on their form and alignment.