DevifyX Machine Learning Assignment

Gesture-Controlled Media Player

OpenCV & Hand Tracking

Assignment Deadline: 7 Days

Assignment Submission Form: `https://forms.gle/UEUafAtyPUEm2ZjbA`

Objective

Design and implement a gesture-controlled media player using OpenCV and hand tracking algorithms. The system should accurately recognize hand gestures via webcam and map them to various media player controls (play, pause, volume, etc.), providing a seamless, touch-free user experience.

Core Features

1. **Real-time Hand Detection:** Utilize OpenCV and a hand tracking model (e.g., MediaPipe) to detect and track one or both hands in real time via webcam.
2. **Gesture Recognition:** Implement at least five distinct hand gestures (e.g., open palm, fist, thumbs up, swipe left/right, finger count) and map each to a media control action.
3. **Play/Pause Control:** Assign a gesture to toggle between play and pause states of the media player.
4. **Volume Adjustment:** Use gestures (e.g., finger count or vertical hand movement) to increase or decrease the volume.
5. **Track Navigation:** Implement gestures to skip to the next or previous track.
6. **Visual Feedback:** Overlay gesture detection results and recognized commands on the video feed for user feedback.
7. **Robust Error Handling:** Ensure the system can handle detection failures gracefully and provide appropriate user notifications.

Bonus Features

- Support for additional gestures (e.g., mute, shuffle, seek).
- Customizable gesture-command mapping via a configuration file or GUI.
- Multi-hand gesture recognition (e.g., two-hand gestures for special commands).

- Integration with popular media players (e.g., VLC, Spotify) through their APIs.
- Logging of gesture usage and system events for analytics.

Technical Requirements

- Python 3.7 or higher.
- OpenCV for image processing and video capture.
- Hand tracking library (e.g., MediaPipe, OpenCV-based custom solution).
- Cross-platform compatibility (Windows, macOS, Linux).
- Clear and well-documented codebase.
- README file with setup instructions and usage guide.

Deliverables

1. Complete source code hosted on a public GitHub repository.
2. README file with:
    - Project overview
    - Setup and installation instructions
    - Usage guide (including supported gestures and their mappings)
    - Demo video (optional but recommended)
3. Any additional configuration files or assets required to run the project.

Use of AI Tools

> You are **permitted and encouraged** to use AI-based coding tools such as **GitHub Copilot**, **ChatGPT**, or similar platforms to assist with code generation, debugging, and documentation. However, the final submission should reflect your own understanding and structure.

Submission

- Submit your GitHub repository link using the following form: `https://forms.gle/UEUafAtyPUEm2ZjbA`
- Ensure your repository is public and accessible.

Evaluation Criteria

1. **Functionality:** Correct implementation of all core features.
2. **Code Quality:** Readability, structure, and documentation.
3. **User Experience:** Responsiveness, feedback, and robustness.
4. **Innovation:** Implementation of bonus features and creative solutions.
5. **Completeness:** Clarity of README, ease of setup, and overall polish.

We look forward to your innovative solutions!
— **DevifyX Team**