Final Project

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Objective:
The goal of this project is to develop a real-time hand gesture recognition system using MediaPipe, an open-source library developed by Google, and OpenCV. The system should be capable of detecting various hand gestures, including thumbs up, thumbs down, and two thumbs up/down, and display corresponding emojis on the screen. Additionally, a green tint should be applied to the background for two thumbs up gestures, and a red tint for two thumbs down gestures.

Development Process:

1. Setup:
   - Installed necessary libraries: `cv2`, `mediapipe`, `numpy`.
   - Initialized the MediaPipe Hands model and necessary utilities.

2. Hand Gesture Detection Functions:
   - Implemented functions to check for one and two thumbs up or down gestures based on the landmarks of hand keypoints provided by MediaPipe.
   - The `is_thumbs_up` and `is_thumbs_down` functions determine if a single thumb up or down gesture is detected.
   - The `are_two_thumbs_up` and `are_two_thumbs_down` functions iterate through all detected hands to identify two thumbs up or down gestures.

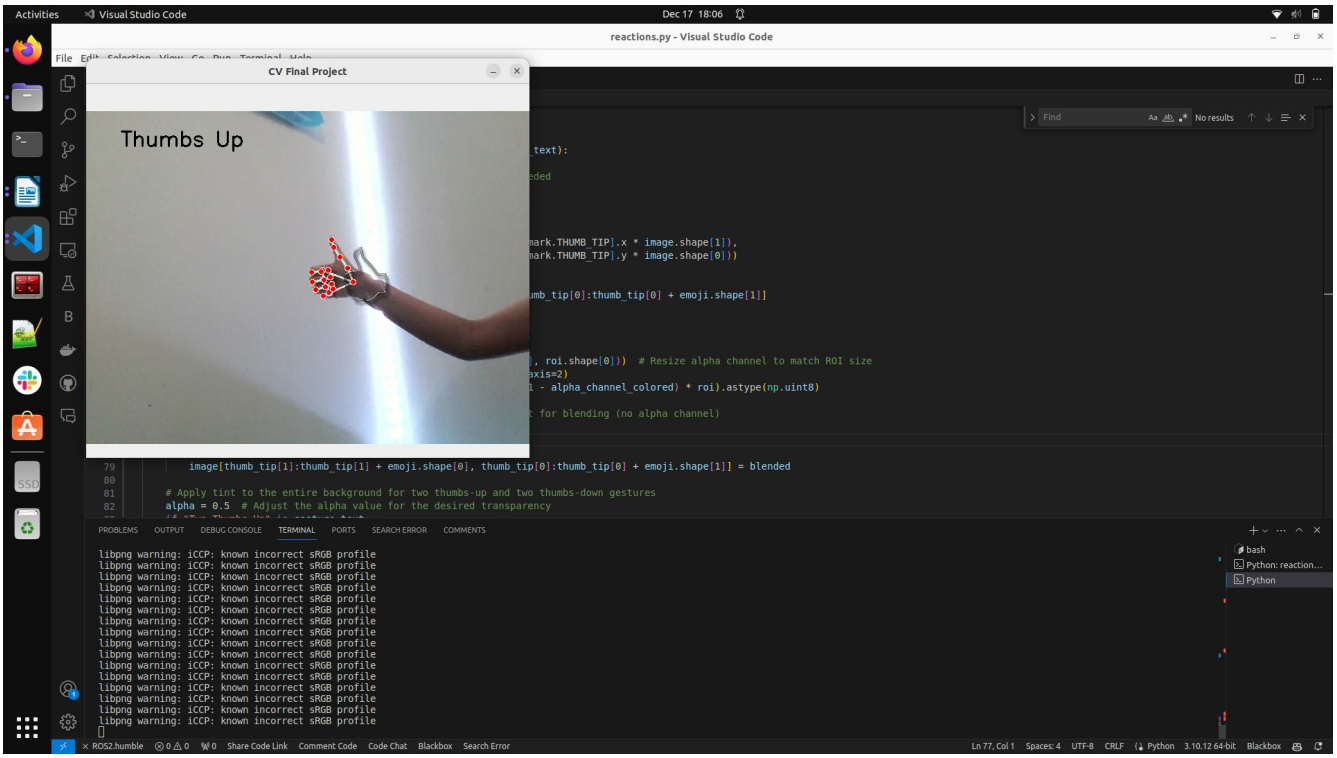
3. Emoji Display Function:
   - Created the `display_emoji` function to overlay emojis on the image based on detected hand gestures.
   - The function reads emoji images, resizes them, and blends them with the image using alpha channels for transparency.
   - Applied tint to the entire background for two thumbs up or down gestures.

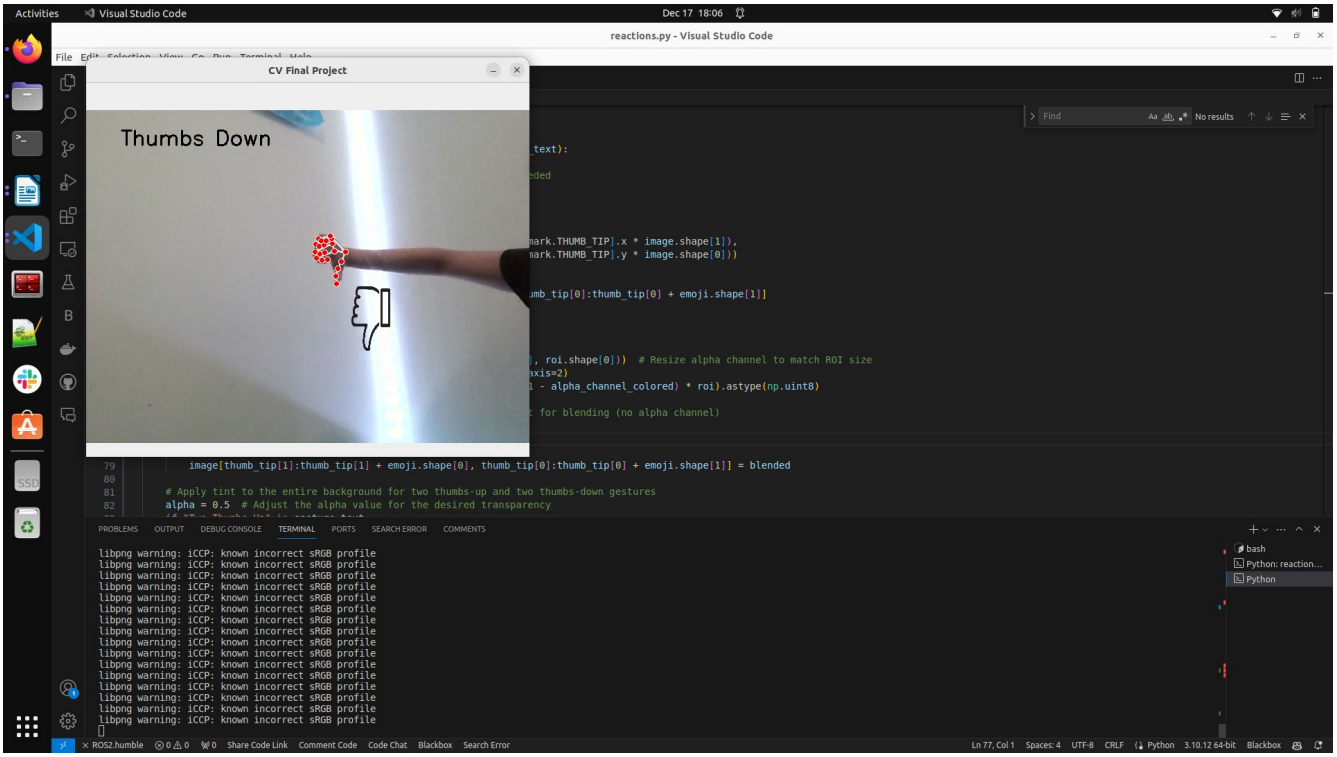
4. Integration:
   - Integrated hand gesture detection and emoji display functions into a real-time video capture loop.
   - Utilized OpenCV to capture video frames from the camera and processed them using MediaPipe for hand gesture recognition.
   - Displayed hand landmarks and connections on the video feed.
   - Displayed corresponding emojis and applied tints for specific gestures.

5. Testing and Debugging:
   - Continuously tested the system with various hand gestures to ensure accurate detection.
   - Addressed issues such as alpha channel blending, tinting, and transparency.

6. Final Adjustments:
   - Adjusted alpha values for transparency in emoji blending and background tinting.
- Modified code to display two emojis for two thumbs up and down gestures.

Results :


Activities
Visual Studio Code
Dec 17 18:06
reactions.py - Visual Studio Code
CV Final Project
Thumbs Up
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
SEARCH ERROR
COMMENTS
libpng warning: iCCP: known incorrect sRGB profile


Activities
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reactions.py - Visual Studio Code
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Conclusion:

The developed hand gesture recognition system successfully detects and displays emojis for thumbs up, thumbs down, and two thumbs up/down gestures. It uses the power of MediaPipe for accurate hand landmark detection and OpenCV for real-time video processing. The system is flexible and can be extended to recognize additional gestures by modifying the detection functions. The integration of emojis and background tints enhances the visual feedback, making it an engaging and interactive application.

References:

- MediaPipe Documentation: https://mediapipe.dev/
- OpenCV Documentation: https://docs.opencv.org/