

Title: Enhancing Real-Time Face and Eye Detection Using OpenCV and HAAR Cascades

Project Description

Statement of the Problem:

In the realm of computer vision, real-time face and eye detection plays a pivotal role, particularly in areas such as security systems, user interface control, and augmented reality. Despite advancements, achieving high accuracy and performance in diverse conditions remains a challenge due to variations in lighting, face orientations, and occlusions.

Idea of the Approach Used to Solve the Problem:

This project employs the OpenCV library and HAAR cascades to develop an efficient and real-time face and eye detection system. By leveraging the HAAR cascade classifiers for frontal face and eye detection, the system can identify and highlight faces and eyes in live video feeds. The approach focuses on optimizing detection performance without compromising on processing speed, ensuring it is suitable for real-time applications.

Brief Description of Possible Demos/Experimental Results:

A live demo showcasing the real-time detection of faces and eyes in various conditions, including different lighting environments and face orientations.

Performance metrics, such as detection accuracy and processing time, compared across different scenarios to demonstrate the system's robustness and efficiency.

Resources

OpenCV Library:

Utilized for image processing and implementing the HAAR cascade classifiers.
HAAR Cascade Classifiers: Pre-trained XML files for detecting frontal faces and eyes, crucial for the detection algorithm.

Links to Codes:

The code utilizes OpenCV for Python and includes custom scripts for real-time face and eye detection in live video feeds.

<https://github.com/akshaybhatia10/ComputerVision-Projects/tree/master/FaceEyeDetection>

References:

- Viola, P., & Jones, M. J. (2001). "Rapid Object Detection using a Boosted Cascade of Simple Features". Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition.
- Bradski, G., & Kaehler, A. (2008). "Learning OpenCV: Computer Vision with the OpenCV Library". O'Reilly Media.
- Lienhart, R., & Maydt, J. (2002). "An Extended Set of HAAR-like Features for Rapid Object Detection". IEEE ICIP.