Face Detaction Models

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Abstract

Testing out diffrent Face detection models and seeing which one of them is best to be used in real time.

1 Introduction

In this report, we undertake a comparative analysis of three prominent face detection frameworks: OpenCV[1], FaceNet[2], and YOLOv8[3]. OpenCV, a versatile and widely-used open-source computer vision library, offers robust face detection capabilities through its pre-trained Haar cascades and DNN modules. FaceNet, developed by Google, is renowned for its deep learning-based approach that excels in accurate face recognition and verification tasks. YOLOv8, the latest iteration in the "You Only Look Once" series, combines the strengths of real-time object detection with enhanced precision and efficiency. By evaluating these frameworks across various performance metrics, we aim to provide a comprehensive understanding of their strengths, weaknesses, and suitability for different face detection applications.

2 Methodology

First we use open-cv HarCascade face detection and write a simple code script to test the the model.
Next we use the Facenet-pytorch GitHub project to test out the face detection.
We also use Yolov8n model(The smallest model) for face detection as well.

3 Results

When comparing the performance of YOLOv8, FaceNet, and OpenCV for multi-face detection, YOLOv8 emerges as the superior choice. YOLOv8 leverages its advanced object detection capabilities to efficiently detect multiple faces in diverse settings, thanks to its real-time processing and improved accuracy in identifying overlapping faces. FaceNet, known for its prowess in face recognition rather than detection, follows with decent multi-face detection capabilities due to its deep learning architecture trained on large-scale datasets. In contrast, OpenCV, although versatile and widely used in computer vision tasks, shows limitations in multi-face detection scenarios due to its reliance on traditional methods like Haar cascades, which may struggle with accuracy and efficiency when faced with multiple faces in complex environments. Thus, for applications requiring robust multi-face detection, YOLOv8 stands out as the optimal choice among these frameworks.

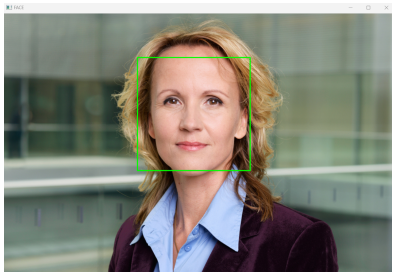

Figure 1: Opencv

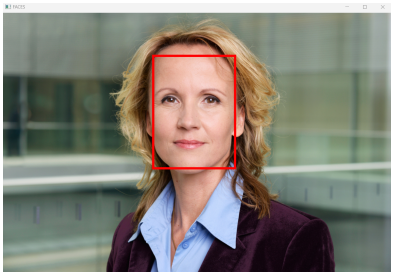

Figure 2: Facenet

Figure 3: Yolov8n

Figure 4: Single person Detection

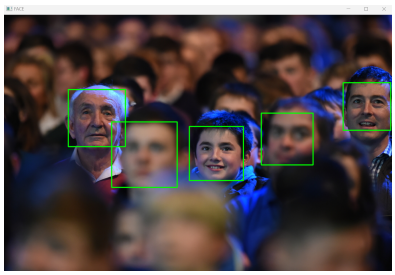

Figure 5: Opencv

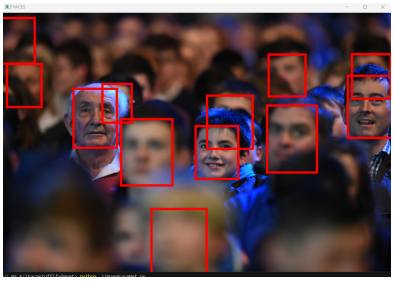

Figure 6: Facenet

Figure 7: Yolov8n

Figure 8: Multiple person Detection

References

[1] Itseez. Open source computer vision library. https://github.com/itseez/opencv, 2015.

[2] Florian Schroff, Dmitry Kalenichenko, and James Philbin. Facenet: A unified embedding for face recognition and clustering. In *Proceedings of the IEEE conference on computer vision and pattern recognition*, pages 815–823, 2015.

[3] Dillon Reis, Jordan Kupec, Jacqueline Hong, and Ahmad Daoudi. Real-time flying object detection with yolov8, 2024.