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A Unified Webcam Proctoring Solution on Edge

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Abstract : A boom in video conferencing generated millions of hours of video data daily to be analyzed. However, such enormous data pose certain scalability issues to be analyzed efficiently, let alone do it in real-time, as online conferences can involve hundreds of people and can last for hours. This paper proposes an efficient online proctoring solution that can analyze the online conferences real-time on edge devices such as Android, iOS, and desktops. Since the computation can be done upfront on the devices where online conferences take place, it can scale well without requiring intensive resources such as GPU servers and complex cloud infrastructure. According to the linear models, face orientation does indeed impact the perceived eye openness. Also, the proposed z score facial landmark standardization was proven to be functional in detecting face orientation and contributed to classifying eye blinks with single eyelid distance computation while achieving a better f1 score and accuracy than the Eye Aspect Ratio (EAR) threshold method. Last but not least, the authors implemented the solution natively in the MediaPipe framework and open-sourced it along with the reproducible experimental results on GitHub. The solution provides face orientation, eye blink, facial activity, and translation detections out of the box and is highly customizable and extensible.

Keywords : android, desktop, edge computing, blink, face orientation, facial activity and translation, MediaPipe, open source, real-time, video conference, web, iOS, Z score facial landmark standardization
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