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YAWNING DETECTION USING VIDEO CLASSIFICATION

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Introduction. This conference thesis is dedicated to exploring yawning detection within a drowsiness monitoring system, employing a 3D classification model trained on images of drivers' faces. Currently operating as a non-real time solution, our research pivots towards the imperative goal of transforming it into a real-time framework. Yawning's significance as an indicator of drowsiness underscores the need for instantaneous detection, particularly in dynamic environments such as driving [1]. The utilization of a 3D classification model provides a foundation for nuanced facial expression analysis, and our subsequent efforts focus on adapting this system to deliver real-time alerts, advancing the practical application of this technology for enhanced driver safety.

Main part. This study is centered around the creation and utilization of a meticulously annotated video dataset. The original dataset is YAWDD [2] for the purpose of yawning detection. The initial dataset consists of videos, with each frame meticulously labeled as either depicting yawning or not-yawning. From this labeled video dataset, a secondary dataset is generated, comprising more than 1000 samples. Each sample is crafted as a sequence of 9 images, extracted at a regular interval of 0.33 seconds (3 frames per second) from the video frames.

The images within these samples exclusively capture the faces of drivers, precision-extracted through a face detection model. This strategic choice allows for a focused analysis on facial expressions, particularly relevant for yawning detection. The subsequent step involves employing this dataset to train a 3D classification model. The model is trained to categorize actions within the frames, specifically differentiating between yawning and not-yawning instances. The binary classification model encapsulates the culmination of meticulous dataset preparation and showcases the potential for accurately discerning crucial indicators of drowsiness in real-world scenarios.

Conclusion. In conclusion, this research represents a significant advancement in accurate yawning detection within the context of drowsiness monitoring. The focus of this study has been on constructing a 3D classification model trained on facial images extracted at a 0.33-second interval from video frames, with an emphasis on distinguishing between yawning and non-yawning instances.

However, it's crucial to acknowledge a current limitation of the developed system – a delay of approximately 1.5 seconds for yawning detection. While the current implementation falls short of real-time requirements, it lays a robust foundation for further refinement and optimization. The efficacy demonstrated in distinguishing yawning behaviors positions this work as a promising starting point for the development of an effective real-time yawning detection system, ultimately contributing to advancements in driver safety and drowsiness monitoring technologies.

References:

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