

Driver Drowsiness Detection using Machine Learning and Deep Learning

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Abstract: Traffic accidents remain a leading cause of death globally, with the World Health Organization reporting approximately one million fatalities annually. Drowsy driving significantly contributes to these accidents, dramatically increasing crash risks. This research addresses this critical issue by proposing a driver drowsiness detection system that leverages facial recognition technology and machine learning. The system continuously analyses a driver's facial features to identify signs of fatigue. Specifically, it tracks eye movements, and yawning patterns, all of which can become indicative of drowsiness. The system is trained on a comprehensive dataset encompassing a wide range of mouth aspect ratio, eye aspect ratio etc for both scenarios of drowsy and alert. This training utilizes a Random Forest algorithm, allowing the system to accurately classify the driver's state in real-time. Upon detecting drowsiness, the system initiates a multi-pronged approach to warn the driver. Audible alerts are issued to alert the driver awake. Additionally, a message can be sent to a pre-designated mobile number, potentially alerting a passenger, or reminding the driver to pull over at a safe location if they are still conscious. This redundancy ensures the driver receives a timely warning, even if they might not immediately perceive the audible alerts.

Keywords: Facial Reorganization, 68 Facial Landmarks, Aspect Ratios of eyes and mouth, Computer Vision

REFERENCES

- [1]. Magan, E., Sesmero, M. P., Alonso-Weber, J. M., & Sanchis, A. (2022). Driver drowsiness detection by applying deep learning techniques to sequences of images. *Applied Sciences*, 12(3), 1145.
- [2]. Hasan, M. M., Watling, C. N., & Larue, G. S. (2022). Physiological signal-based drowsiness detection using machine learning: Singular and hybrid signal approaches. *Journal of safety research*, 80, 215-225.
- [3]. Altameem, A., Kumar, A., Poonia, R. C., Kumar, S., & Saudagar, A. K. J. (2021). Early identification and detection of driver drowsiness by hybrid machine learning. *IEEE Access*, 9, 162805-162819.
- [4]. Jabbar, R., Shinoy, M., Kharbeche, M., Al-Khalifa, K., Krichen, M., & Barkaoui, K. (2020, February). Driver drowsiness detection model using convolutional neural networks techniques for android application. In 2020 IEEE International Conference on Informatics, IoT, and Enabling Technologies (ICIoT) (pp. 237-242). IEEE.
- [5]. Gwak, J., Hirao, A., & Shino, M. (2020). An investigation of early detection of driver drowsiness using ensemble machine learning based on hybrid sensing. *Applied Sciences*, 10(8), 2890.
- [6]. Phan, A. C., Nguyen, N. H. Q., Trieu, T. N., & Phan, T. C. (2021). An efficient approach for detecting driver drowsiness based on deep learning. *Applied Sciences*, 11(18), 8441.
- [7]. Bakker, B., Zabłocki, B., Baker, A., Riethmeister, V., Marx, B., Iyer, G., ... & Ahlström, C. (2021). A multi-stage, multi-feature machine learning approach to detect driver sleepiness in naturalistic road driving conditions. *IEEE Transactions on Intelligent Transportation Systems*, 23(5), 4791-4800.
- [8]. Ahmed, M., Masood, S., Ahmad, M., & Abd El-Latif, A. A. (2021). Intelligent driver drowsiness detection for traffic safety. *IEEE transactions on intelligent transportation systems*, 23(10), 19743-19752.