
CAPSTONE PROJECT

SLEEP DROWSINESS IN DRIVING

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OUTLINE

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PROBLEM STATEMENT

- The project aims at detecting drowsiness while driving to alert the driver at the right time to prevent any mishappening. The project uses a CNN model to predict whether a person feels drowsy or not based on whether the eyes are closed or open. The project's main objective was to limit the number of trainable parameters of the CNN model to under 250K so that the system can be deployed on edge or computationally less efficient devices. The project has a direct application in the automobile industry, makes drive safer, and reduces the death toll caused by drowsy driving.

PROPOSED SOLUTION

One proposed solution to address sleep drowsiness in driving is to promote better sleep hygiene and awareness among drivers. Additionally, implementing technologies such as drowsiness detection systems in vehicles can provide real-time alerts to drivers when signs of drowsiness are detected, allowing them to take necessary breaks or corrective actions to prevent accidents.

Moreover, encouraging the use of public transportation or ridesharing services when drivers feel too tired to operate a vehicle can also help mitigate the risks associated with driving while drowsy.

SYSTEM APPROACH

- **1. Education and Awareness:** Implementing educational campaigns to raise awareness about the dangers of driving while drowsy, highlighting the importance of adequate sleep and the warning signs of drowsiness.
- **2. Regulation and Policy:** Enforcing regulations that limit driving hours for professional drivers, mandating rest breaks, and incentivizing companies to prioritize employee well-being by discouraging overtime work that can lead to sleep deprivation.
- **3. Technology Integration:** Incorporating advanced driver assistance systems (ADAS) into vehicles, such as lane departure warning systems, driver monitoring systems, and fatigue detection systems, to alert drivers when they exhibit signs of drowsiness and encourage them to take breaks.

SYSTEM APPROACH – CONT....

- **4. Infrastructure Support:** Providing rest areas, designated nap zones, and amenities along highways to facilitate safe rest breaks for drivers during long journeys.
- **5. Behavioral Interventions:** Offering cognitive behavioral therapy for individuals prone to sleep disorders or irregular sleep patterns, as well as promoting healthy sleep habits through workplace wellness programs and community initiatives.
- **6. Research and Data Analysis:** Conducting research to better understand the causes and consequences of sleep drowsiness in driving, identifying high-risk groups, and evaluating the effectiveness of interventions through data analysis and monitoring systems.
- By adopting a systemic approach that combines education, regulation, technology, infrastructure, behavioral interventions, and ongoing research, society can address the complex issue of sleep drowsiness in driving and work towards improving road safety for all.

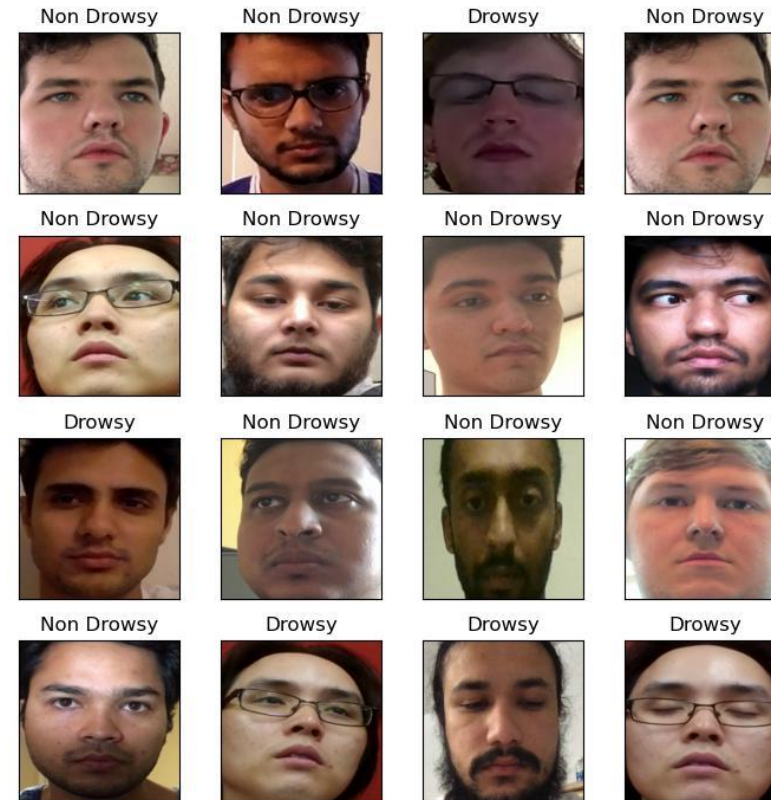
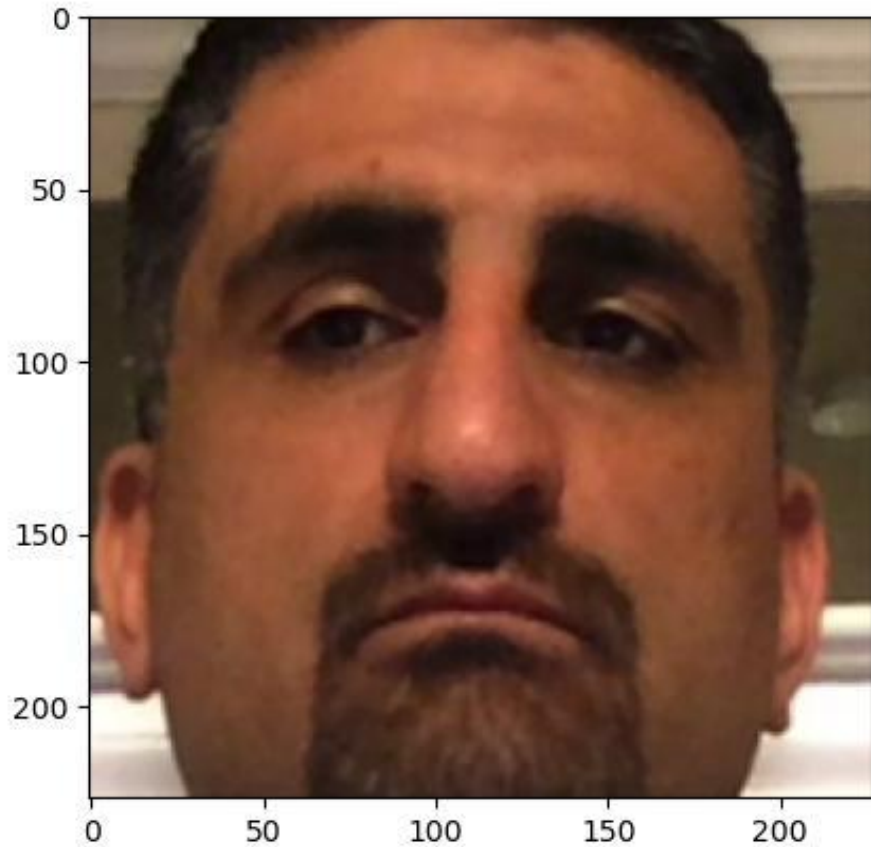
ALGORITHM & DEPLOYMENT

- To deploy an algorithm steps:
- 1. ****Algorithm Development****: Develop the algorithm using machine learning techniques or rule-based systems to analyze driving behavior data and identify signs of drowsiness.
- 2. ****Sensor Integration****: Integrate sensors into the vehicle to collect relevant data such as steering wheel movements, vehicle speed, lane deviation, and eye movements. These sensors could include cameras, accelerometers, gyroscopes, and infrared sensors.
- 3. ****Real-time Data Processing****: Implement real-time data processing software to continuously analyze the sensor data and detect patterns indicative of drowsiness. This could involve running the algorithm on an onboard computer or a connected device.
- 4. ****Alert System****: Design an alert system to notify the driver when drowsiness is detected. Alerts can be visual, auditory, or tactile, such as vibrating the steering wheel or seat, sounding an alarm, or displaying a warning message on the dashboard.
- 5. ****Driver Feedback****: Provide feedback to the driver to encourage them to take corrective action, such as taking a break, opening windows for fresh air, or consuming caffeine.

ALGORITHM & DEPLOYMENT –CONT....

- **6. **Integration with Vehicle Systems**:** Integrate the drowsiness detection system with other vehicle systems, such as adaptive cruise control or lane-keeping assist, to enhance safety and assist the driver in maintaining control of the vehicle.
- **7. **Testing and Validation**:** Thoroughly test the system under various driving conditions and scenarios to ensure its reliability and effectiveness. Validate its performance against real-world data and scenarios.
- **8. **Regulatory Compliance**:** Ensure that the system complies with relevant safety regulations and standards for automotive applications.
- **9. **User Training and Education**:** Provide training and education to users (drivers) on the purpose and operation of the drowsiness detection system, including its limitations and how to respond to alerts appropriately.
- **10. **Maintenance and Updates**:** Implement a system for monitoring the performance of the drowsiness detection system over time, performing maintenance as needed, and updating the software to address any issues or improve performance based on feedback and new research.

RESULT



CONCLUSION

- Driver Drowsiness is a significant reason for thousands of road accidents all over the world. Driver drowsiness detection is a car safety technology that helps prevent accidents caused by the driver getting drowsy. The project aims at providing a solution of Driver Drowsiness Detection using CNN and image processing. The project aimed at optimizing the model to limit the number of parameters under 250k for easy deployment on edge devices. This deployment is possible through the Cainvas Platform by making use of their compiler called deepC. Thus effectively bringing AI out on edge — in actual and physical real-world use cases.

FUTURE SCOPE

- The system can be made more accurate using various other parameters such as State of the Car, Detecting Foreign Substances on Face etc.
- An application can be developed where it can alert or prevent the user from sleeping.
- It can be used to develop an IOT device that can be installed in the car to detect driver's drowsiness.
- Similar models and techniques can be used for various other uses such as Netflix, Hotstar and other streaming service platforms can detect whether the person is sleeping and stop the video accordingly.

REFERENCES

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THANK YOU