Research Exhibition in Mathematics and Computer Sciences (REMACS 6.0)/
ISBN: 978-629-97440-5-4

IN-CAR CHILD ABANDONMENT DETECTION

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ABSTRACT - This abstract presents a method for child detection in car interiors using a Single-Shot Detector (SSD). The objective is to automatically identify the presence of a child within a car for enhanced safety and welfare. The SSD framework, a state-of-the-art object detection algorithm, is trained on a dataset containing annotated images of car interiors with and without children. The model learns to recognize and localize the specific features associated with a child's presence. Images or video frames of the car interior are processed by the trained SSD model to detect and localize child instances accurately. The system offers real-time detection, accurate localization, and potential integration with existing car monitoring systems or applications. Evaluation involves benchmarking performance on various car interior images and assessing detection accuracy. The proposed system aims to contribute to child safety by preventing incidents associated with leaving children unattended in vehicles. It provides a robust and reliable solution for automatically detecting child presence in cars, mitigating risks like vehicular heatstroke, and promoting child welfare.

Keywords: Single-Shot Detector (SSD), child detection

1. INTRODUCTION

The objectives of this study are to develop a deep learning model using Single-Shot Detector (SSD) for detecting children and adults in a car, and to evaluate the performance of the developed model. The aim is to create an effective and accurate system that can identify the presence of children and adults in car seats, thereby addressing the issue of child abandonment in vehicles. The model will be trained and tested using appropriate datasets, and its performance will be assessed based on detection accuracy and reliability. Object recognition, a deep learning and post-processing technique, is essential for this project. Object recognition models can be designed to detect and recognize multiple objects, making them adaptable for different applications. This includes identifying human features in images and videos, which has become feasible with advancements in deep learning and one-shot learning approaches.

2. METHODOLOGY

The study's approach consists of three main phases. In the first phase, training pictures were obtained to simulate child abandonment in a car, considering different scenarios such as backgrounds, lighting conditions, and passenger groups. The second phase involved using a deep learning identification model based on the MobileNetV2 architecture and implementing a custom Single-Shot Detector (SSD) using Keras Sequential Model. This model can detect objects in images through a single encounter with a convolutional network, preserving spatial configuration and extracting semantic meaning. The final phase focused on creating a model for detecting in-car child abandonment using the MobileNetV2 model on a dataset prepared using TensorFlow object identification. The MobileNetV2 model was chosen for its efficiency and suitability for resource-constrained systems.

3. RESULTS AND DISCUSSION

The results that can be obtained from the system encompass various aspects of its performance. Firstly, the detection accuracy of the system can be measured, indicating how well it can correctly identify and classify children and adults in car seats. Precision and recall metrics will further provide insights into the system's ability to minimize false positives and false negatives. Evaluating the system's performance across different scenarios, including varying lighting conditions, backgrounds, and passenger postures, will help identify any limitations or challenges. Additionally, assessing the system's real-time processing speed will determine its efficiency in handling live video feeds from the webcam. Comparative analysis with existing methods or models for occupant detection can highlight the system's strengths and areas for improvement. Overall, these results will contribute to understanding the effectiveness, accuracy, and practical applicability of the system in enhancing child safety in vehicles.

4. NOVELTY OF RESEARCH / PRODUCT

The novelty of incorporating Single-Shot Detector (SSD) and MobileNetV2 in this study lies in the specific advantages for child detection in cars. The use of SSD brings efficiency and accuracy to the system by enabling real-time object detection in a single pass, making it ideal for promptly identifying children in car seats. This real-time capability is crucial for preventing child abandonment incidents. Additionally, the choice of MobileNetV2 as the neural network architecture introduces novelty by offering a lightweight and efficient model that maintains high accuracy. MobileNetV2's suitability for resource-constrained systems ensures that the developed model can be implemented in practical scenarios, such as in-car detection systems, without compromising detection performance. Overall, the combination of SSD and MobileNetV2 enhances the research's novelty by providing a real-time, accurate, and efficient solution for detecting children in car seats, thereby contributing to child safety and addressing the issue of child abandonment.

5. CONCLUSION

In conclusion, the research focuses on developing a deep learning model using SSD and MobileNetV2 to detect children in car seats, addressing the issue of child abandonment. The novelty lies in their real-time capabilities, efficiency, and suitability for resource-constrained systems. The study emphasizes comprehensive datasets, practical implementation, and evaluation metrics. The outcomes have the potential to enhance child safety by providing an effective and efficient system to prevent child abandonment incidents.

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