GABOR RAUL-EMANUEL, SOFTWARE ENGINEERING, 258-1

TINYYOLO USAGE AND MODEL INTEGRATION IN FRONTEND

SWOT ANALYSIS

Strengths

- TinyYOLO versions of YOLO, designed for real-time applications, offer a smaller size, enabling faster object detection at higher frame rates, making them an ideal choice for scenarios with limited resources.
- The smaller arhitecture of TinyYOLO requires less memory and computational power. This makes it more accessible for deployment.
- By performing model inference on the client side, the application minimizes the strain on backend servers, contributing to efficient resource utilization.
- Quick iteration during development is a strength, allowing developers to make changes locally, facilitating a faster development cycle.

Weaknesses

- TinyYOLO's inability to effectively recognize small objects is a natural flaw that may limit its usability in use applications where precise characteristics are critical.
- TinyYOLO's semantic comprehension limitations, which are shared by many object detection models, might be viewed as a core flaw that affects its capacity to perceive complicated visual settings.
- Depending on the complexity of the YOLOv5 model and the processing capability of client devices, latency difficulties may arise during the inference process, particularly for users with less capable hardware.
- If the application becomes popular, there may be worries regarding the scalability of client-side inference. The strategy may become less practical as the number of users grows, potentially affecting performance.

Opportunities

- TinyYOLO's efficiency makes it a good choice for integration with edge devices like cameras, drones, and IoT devices, which require a lightweight model.
- TinyYOLO may find use in applications that target low-power devices and prioritize energy efficiency.
- The frontend integration improves responsiveness by allowing users to engage with the application faster and more seamlessly.
- Integrating the trained model into the frontend enables for real-time user feedback, which improves the user experience by responding immediately to picture inputs.

Threats

- In the continuously growing area of computer vision and object recognition, utilizing a less accurate model such as TinyYOLO may place your application at a competitive disadvantage when compared to alternatives that use more accurate and recent models.
- TinyYOLO doesn't eliminate the risk of poor model performance resulting from low-quality training data. The model may have difficulty properly generalizing if the training data doesn't adequately represent the range of traffic sign environments.
- The model's vulnerability to exploitation increases when the client side exposes it, allowing malicious individuals to manipulate it, potentially leading to compromised findings or incorrect predictions.
- The integrity of the road sign detection system might be affected by unauthorized modifications made to the model's processing or the way results are presented because of a client-side code vulnerability.