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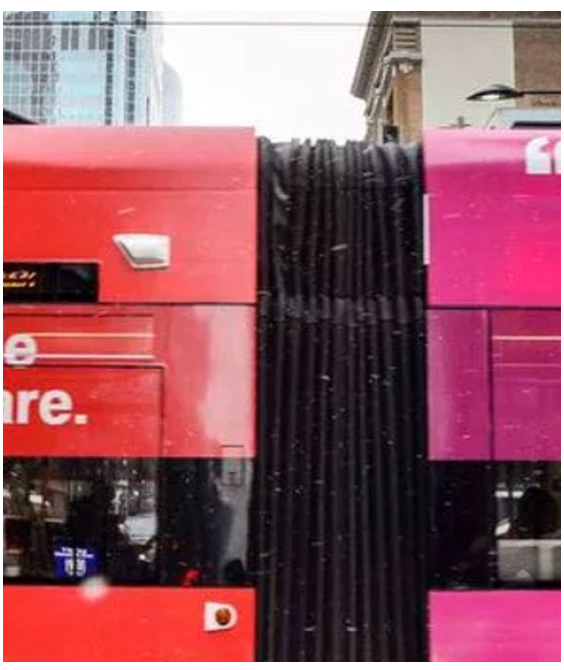
Fare Evasion in Public Transit



Project Goals

Business Problem:
Toronto Transit – Fare Evasion

According to **TTC's Audit, Risk and Compliance report** (2019), fare evasion on streetcars costs $25M annually.

Sheyld AI completed a project using deep learning computer vision techniques to count the number of people present in a video feed. As a result of this solution, the TTC would be able to compare this estimate to the fare collected for the day, prioritize resources and control costs.

Solution Design

Deep Learning Architectures

Object detection is a task that focuses on locating and classifying objects in an image. Unlike other traditional machine learning techniques, deep learning is better suited for this task, as it is able to identify complex patterns in this type of unstructured data.

We compared three object identification algorithms, including:

- **Sliding window image classifier**
- **YOLOv3**
- **Mask R-CNN**

Finally, we determined the benefits and trade-offs of each approach by using performance metrics such as **mean-average-precision (mAP)**.

Outcomes

Excellent Results

As a result of the analysis, we recommend the use of mask R-CNN with transfer learning for this application. We were able to achieve a mAP of 77%.

The reason we want to use Mask R-CNN over YOLO is that the former has the added benefit that could be used for density mapping, a method used for counting or estimating the number of people on the streetcar.

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