SAKHA JUNIOR SCIENCE ACADEMY

RUSSIA

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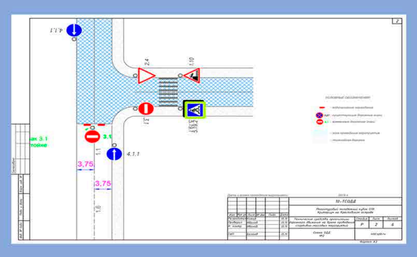
Automation of traffic planning based on neural networks and computer vision

INTRODUCTION

The project creates with the support of “MVS group”, the largest provider of road safety solutions in Russia. Our solution should help the company automate the process of creating the TMP plan.



A Traffic Management Plan is a plan of the carriageway area adapted to the specific traffic flow of road users at a site, with all technical traffic management equipment mapped out. It is a complex and demanding job that requires the utmost attention to detail, an individual approach to each site, and the availability of appropriate intellectual and technical resources.

DISCUSSION

① Finding signs on the general picture of the road

YOLO finds signs in photo

CNN defines the sign

② Determining the depth of a sign in a photo and finding the vehicle coordinate

Determining the depth of a sign in a photo by PyRealSence2 library and finding the vehicle coordinates by gps module.

③ Building a traffic management plan (TMP)

The TMP is drawn by the PyCairo library and then converted into PDF format. All components of the whole program are linked by a linking program, which is implemented as a window program.

METHODS

- Comparative analysis of Neural Networks.

- Study of data sets of traffic signs which are freely available;

- Analysis and selection of the best suited datasets of traffic signs;

- Analysis and selection of the most optimal neural network architecture;

- Creation of own datasets for training CNN and YOLO;

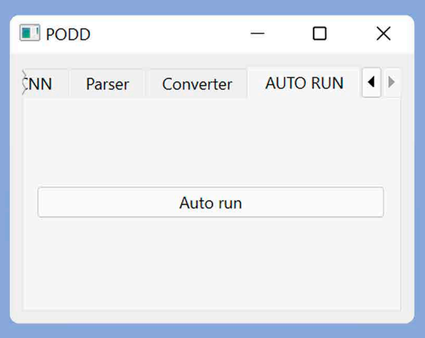
- Creating a parser.

- Neural Networks: CNN, MicronNet, SillNet, YOLO.

- Libraries: TensorFlow, Torch, NumPy, Pandas, Sklearn, Keras, Pyrealsense2, PyQT, PyCairo, OpenCV.

- Camera: Intel realsense D435.

CONCLUSION



In our work, we have found that for efficient and accurate detection of road signs on video and their subsequent synchronization with GPS coordinates, a scheme that uses two neural networks, YOLO and CNN, is suitable.

To improve the accuracy of the detection of the type of road signs, we wrote an additional algorithm improves contrast of the sign itself, making it more distinguishable to the neural network. To train the neural networks, proprietary datasets were created through manual labour.

SITE

CONTACT

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