RailVID: A Dataset for Rail Environment Semantic

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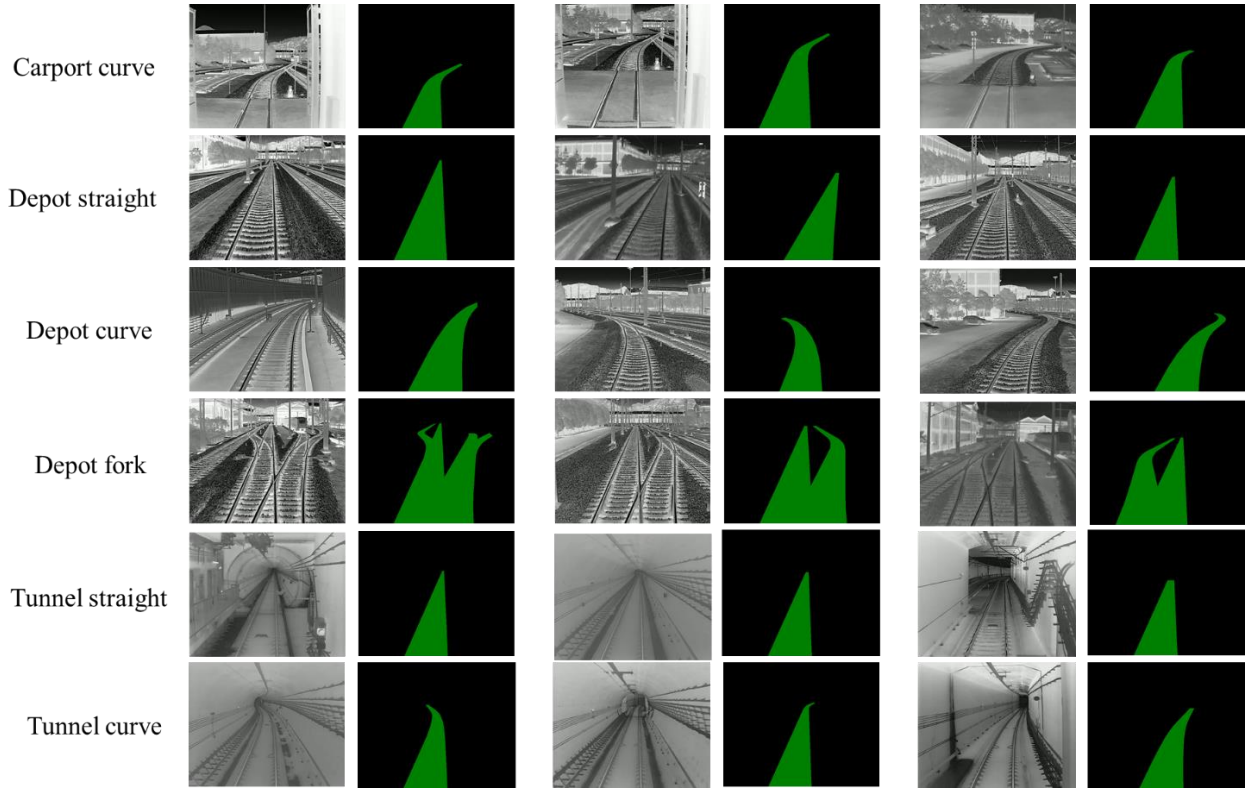
HAO YUAN is studying in Soochow University, majoring in traffic information and control engineering.
His research interests lie in the field of machine vision in artificial intelligence, mainly semantic segmentation and object detection.

Contributions of our paper

1. We propose a new rail transit dataset for semantic segmentation and object detection. This dataset includes 1071 infrared images, which makes up for the lack of diversity in traditional datasets;
2. We propose a real-time semantic segmentation method for rail transit by combining infrared thermal imaging and semantic segmentation based on deep learning.

Dataset

This dataset is collected from Suzhou Rail Transit Line 1 in Jiangsu Province, China. We use the AT615X infrared thermal instrument from InfiRay to collect data, with the highest resolution up to 640*512, and 10 fps real-time images can be output at this resolution. Through the program we develop, the sensor data can be transmitted to the database in real-time, in order to realize data analysis and storage.

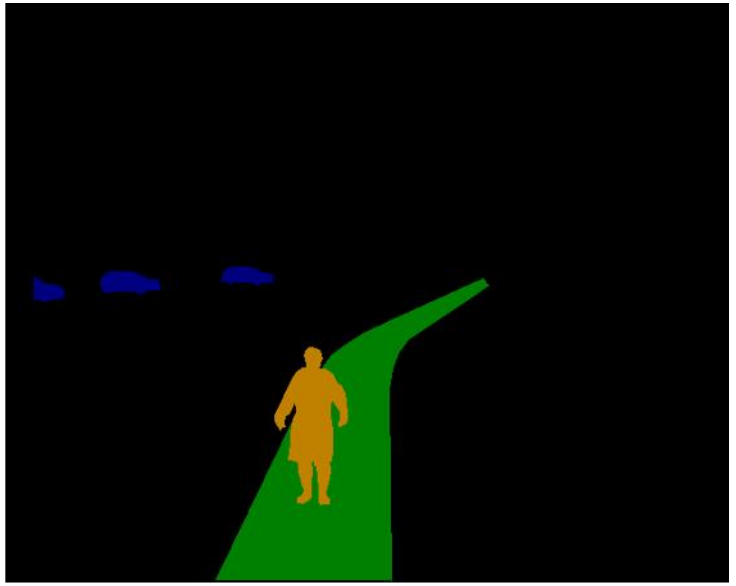


Example from RailVID

Data annotation

Due to the particularity of railway environment and the characteristics of noise and low definition of infrared imaging, we focus on the simple track area, people, and cars around the track area.

Original data

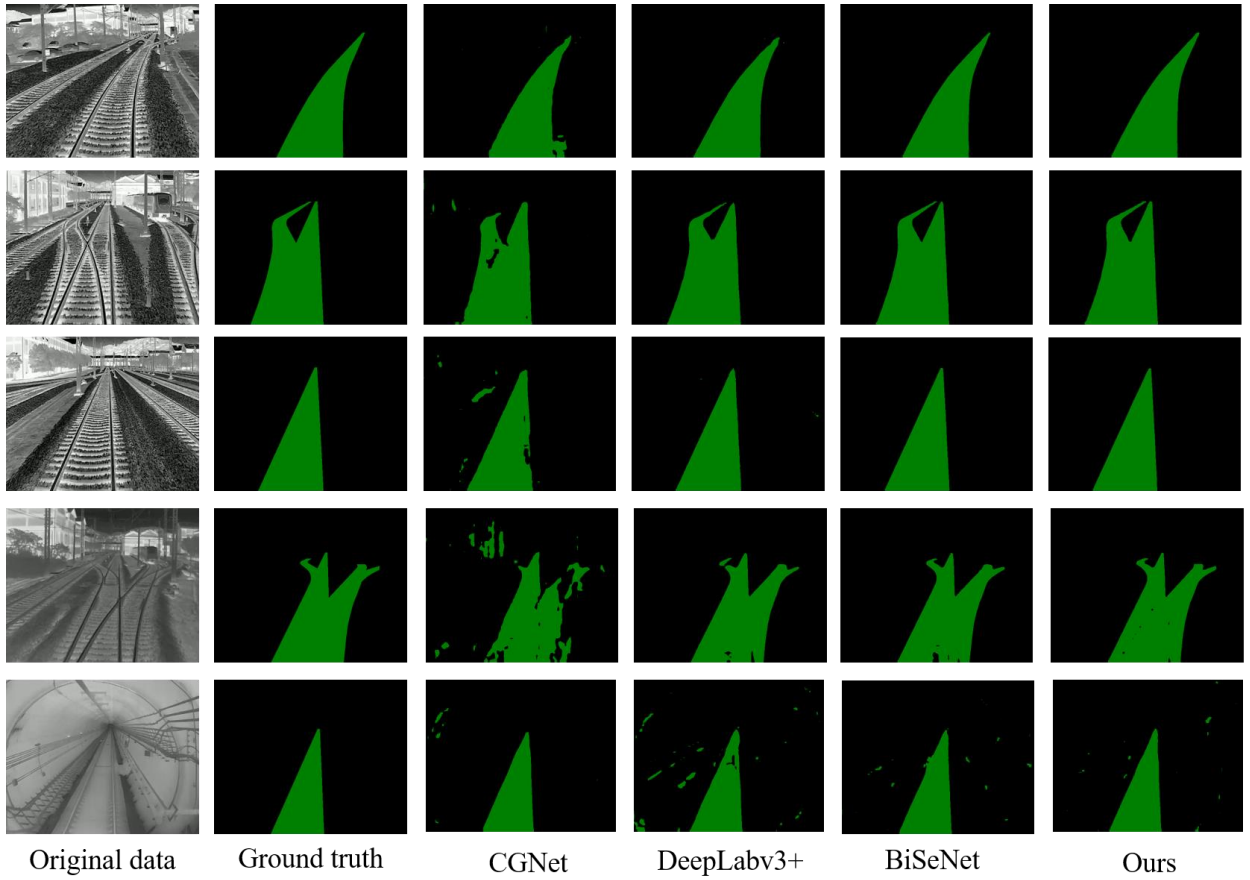


Label image

Example of track area and surrounding obstacles

Evalution

Keeping in mind the requirement of infrared image noise, low resolution, lack of color features, and real-time performance of the rail transit, we propose an improved BiSeNet, which is based on BiSeNet.



Comparison of effects of different semantic segmentation methods.

Compare with other methods

Comparsion of performance between different methods.

Network	PA/%	mPA/%	mIoU/%	FPS/$f \cdot s^{-1}$
CGNet	60.33	51.17	59.24	53.0
DeepLabv3+	76.12	74.03	75.29	12.0
BiSeNet	78.01	76.54	77.57	45.2
ours	84.45	82.36	82.94	40.0

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