

2020-12-08

Project

Anomaly Detection Techniques for Cyclist Curb Recognition

Description:

Anomaly detection is a technique to identify data points within a dataset that deviate significantly from the overall pattern of the dataset. For example, fraud detection and intrusion detection. There are many methods that can be used for anomaly detection, such as clustering, autoencoder and distance-based methods.

Main Tasks:

- State-of-the-art research regarding the algorithms which can be used for anomaly detection, talk about the theory and which algorithms you choose for this work and why?
- A state-of-the-art review about the related papers about road surface (bumps, potholes, obstacles) and talk about what have been achieved and which algorithms do they use.
- Select two methods from the researched papers. — **make an appointment with me to discuss which one should be used.**
- Implement autoencoder and these two selected methods to distinguish crossing a curb from normal cycling (could include obstacles on the road).
- Make your own measurement and plan it before the measurement. – **make an appointment with me to discuss this plan.**
 - connect a button to an ESP and Smartphone, press the button to receive the annotation (timestamp which is synchronized with NTP server) when crossing a curb.
 - Record a video about the surface of the road.
- Collect data sets, ride a bike for a specific distance, record the curb crossed (cross up, cross down, lower curb, higher curb) with their heights on the road. The path should not only include higher curbs but also shallow curbs, such as 1cm, 2cm.
- Analyze and compare the performance of these two or three methods.

Requirements/ Qualification:

- Basic knowledge regarding machine learning, deep learning, and data mining
- Programming skills, Python, TensorFlow, Keras

Supervisor / Contact:

Name: Dandan Liu

E-Mail-Address: dandan.liu@comtec.eecs.uni-kassel.de

We have a lecture about anomaly detection, on 23th. May. You are welcome to join.