KIT
Karlsruher Institut für Technologie

Institut für Fahrzeugsystemtechnik
Institutsteil Mobile Arbeitsmaschinen

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MOBIMA
MOBILE ARBEITSMASCHINEN

Masterarbeit

Object detection and action recognition on construction sites

Object detection and action recognition of construction machines' (e.g., excavator) activities are crucial for enhancing the automation level of mobile machines by precepting the working environment and monitoring of operations. However, these tasks of mobile machines on construction sites are significantly challenging due to the complex working environment and collaborations of diverse machines.

This study aims to propose a computer vision-based method to achieve object detection and action recognition of construction machines. To improve the accuracy and reliability of the deep learning-based approaches on construction sites, this study optimally combines dynamic and static information as the input streams to the neural network, achieving high versatility in challenging scenarios. The proposed computer vision-based method will be verified in training and out-of-distribution test data.
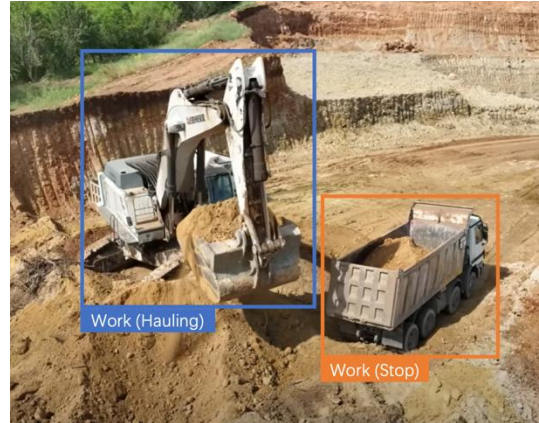
The following steps are planned for the thesis:

- Survey on the topic.
- Dataset conduction considering diverse working conditions on construction sites.
- Construction machines' detection and action recognition with the combination of dynamic and static information as the input streams.
- Computer vision-based customized deep learning neural network design.
- Comprehensive validation of the system via test using out-of-distribution data.
- Documentation & presentation of results.

If you are interested in this project, please feel free to send your application documents (i.e., **cover letter, CV,** and **transcript**) to the email address below. Further discussions on the extension of the topic would be welcome.

Type of work:

- Main emphasis: object detection, action recognition
- Areas: deep learning, computer vision, construction site

Start and duration:

From: March

Duration: 6 months

Requirements:

- Interested in computer vision, deep learning, and mobile machines.
- High degree of independence and motivation.
- Good academic performance and knowledge of German and English.
- Previous knowledge in deep learning, Python, and computer vision.

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[Picture source] Autonomous Control of Redundant Hydraulic Manipulator Using Reinforcement Learning with Action Feedback