Technische Hochschule Ingolstadt

Masterarbeit / Master Thesis

Defocus aware object distance estimation with monocular RGB camera

Research Project description:

Monocular distance estimation is a fundamental problem in autonomous driving, robotics, and intelligent transport systems. Most approaches rely deep learning methods that learn depth from appearance alone, without any physical grounding. This thesis explores a different angle: using the camera itself as a depth sensor by exploiting defocus blur. When a camera lens is focused at a certain distance, objects closer or further away appear blurry in a physically predictable way. This information can be exploited to demonstrate distance estimation capability of monocular camera.

Your Tasks:

- Assist in the process of data collection and data labeling.
- Literature review of the monocular distance estimation methods and depth from defocus.
- Development of the deep learning approach for defocus-aware distance estimation.
- Performing ablation studies and evaluation of the proposed method.
- Thesis writing and publishing the results in conference / journal paper.

What you bring with you:

- Studying masters in computer science, electrical engineering, robotics, mechatronics or in a related field.
- Good knowledge and practical experience in computer vision, deep learning.
- Strong programming skills in python, and knowledge of deep learning libraries such as Pytorch.
- Basic knowledge of camera optics is a plus.
- Experience in working with Linux and ROS is a plus.
- Good grades
- Structured, independent and results-oriented way of working.

What we can offer:

- Appropriate remuneration and flexible working hours
- A modern research infrastructure
- A young, dynamic team in an open and collegial working environment

Zeitraum: Ab sofort

Standort: Technische Hochschule Ingolstadt

Betreuung: Prof. Dr. Gordon Elger / Savankumar Bhanderi

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