ETH
Eidgenössische Technische Hochschule Zürich
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Distributed Computing

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Design of a River Waste Quantification System

One of the most crucial aspects affecting the pollution of rivers worldwide is the lack of a reliable and widespread pollution measuring system. Current approaches measure the plastic and material concentration at some fixed points alongside a river, and extrapolate based on population data to get a world-wide estimate, ranging between 0.8 to 4 million metric tons of plastic per year. The goal of this project is to design a system that can autonomously and continuously collect and process data from rivers (e.g., using GIS or camera systems with a deep learning approach), to provide a real-time monitoring system for quantifying the pollution in rivers worldwide.

In detail, the contributions of this project are focused on the design and implementation of neural network architectures for detection and classification of waste on a low-power device. This includes first understanding at a conceptual level what are the requirements of this system (such as computational and power boundaries). Understand which of the components do not fulfill these requirements for scaling our current system. Investigate computer vision techniques such as knowledge distillation, compression and alike for efficient neural networks, which solves the identified problems. Implementation on low-power computation device (e.g. Nvidia family) that allows for data transfer to a centralized database. Testing and validation of the prototype and if time permits, investigate how the data can be streamed and collected in a centralized database for improving these models in the future.

The proposed concept will be developed as part of the ARC, and will have the possibility to be tested at several locations around the world for validating the technology, and providing the working concept. This project is jointly hosted by the Distributed Computing Group and the Robotic Systems Lab.

Requirements:
Programming experience in Python/C++ Knowledge in Deep Learning, implementation experience with TensorFlow or PyTorch and computer vision tools such as OpenCV is an advantage. Strong self-motivation.

Interested? Please contact us for more details!

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