Performance study on transporting large scale dataset

Description

We are looking for students who are passionate about cloud computing, robotics, and real-time systems to join our team and work on cloud robotics. Cloud robotics is a revolutionary technology that overcomes the limitations of on-board hardware and computational constraints by separating all sensing, computation, and memory into a cloud-based system. This architecture greatly improves the flexibility and scalability of robotic applications, as well as their real-time performance on massive computational tasks.

However, with the increasing complexity of robotic applications, the amount of data that needs to be processed at once also increases. For instance, in autonomous driving, there is a massive transmission of lidar and camera data during perception. The performance of the network, particularly transport latency, which is the time taken to transport data between the robot and cloud server, has a significant impact on the real-time performance of the robot.

Tasks

As a thesis student, you have the opportunity to collaborate with our team in investigating the various factors that affect network performance in cloud robotics. Your task will be to establish a cloud platform for processing lidar or camera data and design a data transportation architecture for big data using middlewares like Robot Operating System (ROS).

To achieve this, you will benchmark different data transport technologies on various middlewares and identify suitable benchmarking tools to measure network latency, throughput, and other parameters. You will then design and conduct experiments for the autonomous driving scenario, collecting and analyzing data to evaluate the performance of each transport technology and middleware. This will provide you with a comprehensive understanding of state-of-the-art large-scale dataset transporting technology.

This project will help you develop a robust knowledge base in middleware that can be applied in autonomous driving or cloud robotics, as well as provide you with practical experience in establishing a cloud robotic architecture. Our team is enthusiastic about working with you on this exciting project.

Technische Universität München

TUM School of Computation, Information and Technology

Lehrstuhl für Robotik, Künstliche Intelligenz und Echtzeitsysteme

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Supervisor:
Prof. Dr.-Ing. Alois Knoll

Advisor:
Long Wen, M.Sc.

Research project:
MANNHEIM-CeCaS

Type:
BA/MA

Research area:
cloud-native architectures, robotic, cloud computing, autonomous driving.

Programming language:
Java

Required skills:
Programming skills in Java (must have); Python or C++(nice to have); Experience with ROS (nice to have).

Language:
English

For more information please contact us:

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