CR3A: Cloud Robotics Algorithms Allocation Analysis
Project proposal

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1 Goals

Robotic systems have brought significant improvements in different aspects of human life over the past decades. Despite the development of robotics, it is infeasible to develop a universal robot with limitless abilities due to memory limitation, response time and so on.

Cloud Robotics describes a new approach to robotics that takes advantage of the Cloud as a resource for massively parallel computation and real-time sharing of vast data resources [1]. By combining the respective advantages of cloud computing, fog computing [2] and robotic clusters, robotic agents can work cooperatively, not only by sharing their processing resources but also with the support of remote cloud servers and intermediate servers (fog computing), making them more intelligent, efficient and knowledgeable.

With this project, we want to evaluate differences in terms of memory and execution time of different computing methods for robotics tasks, concerning several demanding algorithms such as face recognition, object detection, localization, mapping and so on.

2 Workplan

The project has the following tasks:

1. Introduction to cloud robotics (3 weeks);

2. Study the requirements for the application and explore some of the existing codes (4 weeks);

3. Implement the codes on robots, server, and cloud and analyze their outcomes (6 weeks);

4. Write the project's report (2 weeks).

3 Technical and Academic Requirements

It is desirable that the student has grades above 13 on the following courses: Estruturas de Dados, Probabilidades e Estatística, Inteligência Artificial.

4 Expected Results

- Provide metrics regarding time and memory needs for some robotic tasks to be performed on robots, fog and cloud servers;

- Source code and documentation of all code developed;

- Project report.

References

[1] B. Kehoe, S. Patil, P. Abbeel and K. Goldberg, "A Survey of Research on Cloud Robotics and Automation," in IEEE Transactions on Automation Science and Engineering, vol. 12, no. 2, pp. 398–409, April 2015.

[2] Flavio Bonomi, Rodolfo Milito, Jiang Zhu, and Sateesh Addepalli, "Fog computing and its role in the internet of things," in Proceedings of the first edition of the MCC workshop on Mobile Cloud Computing (MCC12), Association for Computing Machinery, New York, NY, USA, 13–16, 2012.