

Game Informatics with Advanced Computer Players and Machine Learning Methods

Project Leader

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1. Objective

This project is aimed at:

The aim of this project is to open up the world of artificial intelligence through the development of advanced computer players of games. In recent years, thanks to the machine-learning techniques and intensive computational power, very strong computer players have been developed for several games. Indeed, some of these computer players are now stronger than the top human players. However, significant research questions about game informatics still remain, especially regarding multi-player games and imperfect information games. It is expected that the development of artificial intelligence technologies to tackle these issues of games would yield results in problem-solving in real life.

2. Project Outline

To that end, the project will consist of the following phases:

- (a) Use existing techniques to develop computer players that are stronger than normal human players,
- (b) Analyze the experience of the computer players developed in step (a), and so identify the essential features of nontrivial games, and
- (c) Apply the experience and knowledge obtained from steps (a) and (b) to machine learning and other applicable research fields.

3. Expected Performance

In this project, the successful candidate would be expected to:

- (a) Work independently toward developing advanced computer programs,
- (b) Collaborate with other members of the research lab, including the faculty staff, to explore new findings and theories, and
- (c) Manage the data and experiment environments for the project.

4. Required Skills and Knowledge

The successful candidate for this project will have the following knowledge and skills:

- (a) Excellent programming skill in C++, Java, Python, and similar programming languages,
- (b) Experience of applying machine-learning techniques to solve real problems, and
- (c) Mathematical capability to build a theory from new findings.

References

- [1] D. Silver, et al.: Mastering the game of Go without human knowledge. *Nature*, Vol. 550, pp. 354-359, 2017.
- [2] Kiminori Matsuzaki: Systematic Selection of N-tuple Networks with Consideration of Interinfluence for Game 2048. *Proceedings of the 2016 Conference on Technologies and Applications of Artificial Intelligence (TAAI 2016)*, pp. 186-193, 2016.

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