Autonomous Intelligent Systems

2 units (selection)

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Target〉 As effective design methods of autonomous intelligent systems, the reinforcement learning algorithms have received much attention that allow the systems to obtain appropriate decision policies by trial and error even in environments with delayed rewards. This class provides the basic concepts and theories concerning the algorithms as well as their application techniques.

Outline〉 While top-down approaches to intelligent systems design problems have exposed various limitations, bottom up approaches have been proposed and studied that allow intelligent systems to improve their own performance autonomously and incrementally during the course of interactions with the environments. This class covers those bottom-up approaches mainly focused upon the reinforcement learning algorithms.

Style〉 Lecture

Keyword〉 ***autonomous agents, emergent systems design, reinforcement learning, robotics, multi-agent systems***

Fundamental Lecture〉 "**Intelligent Systems**"(0.5), "**Optimization Theory**"(0.5)

Relational Lecture〉 "**Advanced Machine Translation**"(0.5), "**Language Modeling**"(0.5), "**Natural Language Understanding**"(0.5)

Goal〉 Recently, bottom-up approaches to the intelligent systems designs problems have been proposed based on various reinforcement learning algorithms. This class aims at the understanding of the theory of the algorithms as well as their potentials and limitations through the applications to small-scale systems design problems.

Schedule〉

1. Introduction
2. Reinforcement learning: basic concepts (1)
3. Reinforcement learning: basic concepts (2)
4. Basic reinforcement learning algorithms (1)
5. Basic reinforcement learning algorithms (2)
6. Basic reinforcement learning algorithms (3)
7. Reinforcement learning considering application to real-world tasks (1)
8. Reinforcement learning considering application to real-world tasks (2)
9. Reinforcement learning based on evolution strategies
10. Reinforcement learning based on evolutionary computation
11. Reinforcement learning based on genetic programming
12. Reinforcement learning and robotics (1)
13. Reinforcement learning and robotics (2)
14. Reinforcement learning and multi-agent systems (1)
15. Reinforcement learning and multi-agent systems (2)

Evaluation Criteria〉 Attendance (30%), report (70%)

Textbook〉 To be introduced in the class.

Reference〉 To be introduced in the class.

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216704

Student〉 Able to be taken by only specified class(es)

Contact〉

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Note〉

◇ 講義に関連する資料は Web(u-Learning システム) を用いて配信する.
◇ 授業を受ける際には，2 時間の授業時間毎に 2 時間の予習と 2 時間の復習をしたうえで授業を受けることが，授業の理解と単位取得のために必要である.
◇ 授業計画 1~ 15 に関しては，期末レポートにより達成度評価を行なう.