

Special session for 2017 IEEE Symposium on Adaptive Dynamic Programming and Reinforcement Learning (IEEE ADPRL'17) Learning and Adaptation in Cyber-Physical Systems

Learning and adaptation are playing an important role in many engineering and science fields, including control engineering, artificial intelligence, and even economy. It has been shown for many control design approaches that, despite stability, robustness and certain levels of performance, it is preferable to incorporate learning and adaptation into control strategies. In this respect, some bio-inspired methods, e.g. reinforcement learning and approximate dynamic programming, provide essential tools to solve various optimization and control problems, such as optimal control and nonzero-sum games. This has stimulated recent research interests and developments on learning and adaptation. However, there are still some critical challenges in the application of such learning and adaptation methods to solve academic and industrial problems, for instance,

- the curse of dimensionality,
- optimization in dynamic environments,
- convergence and performance analysis,
- online implementation.

On the other hand, some emerging technologies such as

- deep learning
- multi-agent systems,

also provide a potential opportunity to further tackle these challenges. The objective of this special session is to present the latest research results on relevant topics of bio-inspired learning and adaptation and to promote the awareness of the related research methodologies.

Scope and relevance of the session

This session aims at providing a specific opportunity to review the state-of-the-art of this recently emerging and cross-disciplinary field, i.e. bio-inspired learning and adaptation. It will bring together researchers in the relevant areas to discuss the latest progress, new research methodologies and potential research topics. All original papers related to learning and adaptation and their application for optimization, control are welcome. The potential topics of interest include but are not limited to:

- Bio-inspired or Neuro-inspired learning and adaptation.
- Online/offline policy iteration algorithm.
- Hierarchical and deep learning.
- Advanced adaptation for optimization and control.
- Learning and planning for large-scale/networked systems.
- Learning based optimal control and observer design.
- Robust and H-infinity control via adaptive and learning methods.
- Game theory via adaptive and learning methods.
- Multi-agent learning and optimization.
- Applications of novel adaptive methods and learning for dynamic problems in engineering and science.

Organizers

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