Joint Model- and Data-driven Approaches for Safe and Trustworthy Robotics and Autonomous Systems (Code: 7y8u9)

Goal:

Modern robotics and autonomous systems have evolved into complex architectures with multiple and interrelated components, enabled by model-based and/or data-driven technologies. Recent advances in high-level autonomy of such systems in complex tasks (e.g., perception, scene understanding, and decision-making) are enabled by combining data-driven approaches (i.e., Deep Learning) with model-based methods. Real world deployment requires that the autonomous systems must ensure trustworthiness in many safety-critical applications such as autonomous driving. However, new issues arise when dealing with the safety and trustworthiness of systems containing both model- and data-driven components, especially due to the non-transparency and unexplainable nature of data-driven approaches. Although lots of efforts have been devoted to model-based and data-driven approaches to enable high autonomy, it is still an open question how to develop resilient robotics and autonomous systems that achieve both high intelligence and trustworthiness.

This special session aims to bring together recent advances in the research and practice of intelligent, safe, and trustworthy robotics and autonomous systems. It focuses on various aspects in combining the strength of model-based and data-driven methodologies such as deep learning, reinforcement learning, data-driven decision-making and control, as well as safe and trustworthy AI, etc., to enable more autonomous and trustworthy applications such as perception, decision-making, planning, and control.

Topics:

The topics include, but are not limited to:

- Design of robotics and autonomous systems with model- and data-driven components
- Deep-learning-based robust perception and scene understanding
- Behavior prediction in interactive and complex scenarios
- Data-driven decision making in complex and uncertain environments
- Data-driven control of robotics and autonomous systems
- Robust localization and mapping
- Safe AI technologies for robotics and autonomous systems
- Formal methods for machine learning-enabled components
- Trustworthiness principles and verification
- Runtime safety assurance of model- and data-driven autonomous systems
- Safe reinforcement learning and multi-agent reinforcement learning
- Human-robot or multi-robot collaboration

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