Machine Learning Methods for Positioning and Navigation in Demanding Environments

Scope and aims

Positioning and navigation plays a significant role in a wide range of fields such as aerospace, defense, and transportation. Requirements on positioning and navigation are becoming stricter in areas such as reliability, accuracy, integrability, and safety to enable better location-based services. In many complex environments, it is still a demanding task to generate real-time valid location information and perform the desired navigation. For instance, small delivery services by unmanned aerial vehicles carrying products from a warehouse to a destination still present many technical challenges such as having to travel along a trajectory near tall buildings and operating in severe meteorological conditions such as strong wind, heavy rain or snow.

This Special Section seeks the state of the art of theories, methodologies, software and hardware design for positioning and navigation especially related to aerial and space vehicles which operate in demanding environments. Machine learning has been applied to a variety of fields with remarkable success. Due to the use of machine learning, significant advances have been made in positioning and navigation. For instance, Mars rovers Spirit, Opportunity and Curiosity have used a machine learning based navigation and driving system for self-driving on Mars surface. This special section focuses on the application of machine learning methods in positioning and navigation. In particular, those techniques suited to aerial and space navigation are the emphasis such as deep learning and reinforcement learning. Centralized and distributed federated learning schemes are of interest, particularly in the context of preserving privacy.

Topics of interest

This special section focuses on machine learning methods for positioning and navigation with particular emphasis on:

- Supervised, semi-supervised and unsupervised learning for positioning and navigation
- Centralized and federated learning for positioning and navigation
- Deep and reinforcement learning for positioning and navigation in harsh environments
- Learning-enhanced data fusion for positioning and navigation in challenging environments
- Modelling and system identification in navigation
- Interference detection, classification and mitigation for positioning and navigation
- Navigation for urban air mobility / advanced air mobility / EVTOLs
- Experimental testbeds

Important dates

Manuscript due: June 30, 2022
First round review completed: August 20, 2022
Revised manuscript due: September 20, 2022
Second round review completed: November 10, 2022
Final manuscript due: November 30, 2022
Publication date: February 2023

The prospective authors need to submit their manuscripts via https://mc.manuscriptcentral.com/taes and select Navigation Systems as the technical area and the category Special Section: Machine Learning Methods for Positioning and Navigation in Demanding Environments.

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