



SPECIAL SESSION XV

Application of Machine Learning in Power Systems

ORGANIZED AND CHAIRED BY

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In the last decades, electric power systems are facing significant changes. Specifically, nowadays generation is leading the operation paradigm of power systems, since the penetration of Renewable Energy Sources (RES) leads to generation profiles that cannot be controlled. Therefore, new solutions and technologies are needed to improve the planning and operation phase of the power systems, with the related growing complexity. Furthermore, the increasing fluctuations due to the high penetration of RES, may affect security and stability. In this context, in recent years, electricity markets are evolving, to fully optimize the use of interconnectors, national surpluses and deficits, providing more resilience against supply and demand disturbances.

In this framework, power system efficiency, power quality and renewable generation need for improvements both in the planning and the operation phase. In recent years, Machine Learning (ML) based approaches turn out to be effective in many engineering fields thanks to their ability in handling big data. The energy sector is one among the fields in which research activities are starting to exploit the abilities of ML. Data-driven models, based on ML, data science, and Deep Learning (DL) techniques may result to be extremely useful for predictive modeling of energy generation and consumption, load requirements and performance efficiency on renewable energy related projects.

This Special Issue aims at providing a comprehensive coverage on state-of-the-art methods based on ML, data science, and DL applications in the energy sector. Authors are requested to submit papers on (but not limited to) the following topics:

- **ML and DL forecasting algorithms for power generation from RES**
- **ML and DL models to mitigate RES induced fluctuations in power generation**
- **ML and DL predictive models for load requirements and Demand Side optimization (e.g., programmable loads)**
- **Applications of ML, Internet of Things (IoT) and big data for energy efficiency**
- **Electricity market price prediction using ML and DL**
- **ML and DL for energy market participation**
- **ML and DL models to optimally manage Battery Energy Storage Systems**
- **ML and DL for long term planning problems (e.g., future installations).**