IEEE Transactions on Industrial Informatics

CALL FOR PAPERS

for Special Section on

Deep learning and data analytics to support the smart grid operation with renewable energy

Theme: In smart grid operation, the data exchange between grid components and data-driven solutions will help to enable optimized bi-directional power flow between utility grid and prosumers with renewable energy. The end user prosumers may be industrial, commercial or even residential, including electric vehicle (EVs)/plug-in hybrid EVs. The transport sector along with building energy demand holds promise in achieving overall optimization of the energy systems. Uncertainties in renewable power generation and complexities in grid integrated operation introduce challenges, which need to be further investigated. This evolving set of grid component data base can be exploited to develop data driven solutions, combining machine learning/deep learning and data analytics. Data gathering devices such as smart meters and phasor measurement units (PMUs) continue to be deployed into the grid. Useful information from this data can be extracted for grid operators using advanced data analysis tools. In recent years, big data and deep learning have been much talked about to bring in the solutions to meet the challenges in evolving smart grid. The deep learning solutions identify patterns and extract features, making an important tool for big data analysis. The concept of machine learning can be towards analyzing data rather than modelling specific problems, leading to adaptable and more generic methods and require less expert knowledge. Development of tools or techniques applied as data analytics for energy applications, such as demand response, demand-side management, predictive maintenance, improved situational awareness in the context of renewable energy management will be important to investigate. Such tools can serve as the "brain" in the smart grid and can be used to predict renewable energy generation, understand behaviour of consumer demand pattern, overall management dealing with issues like, fault detection, control, operation and stability. Prediction and decision making models that improve every aspect of renewable energy and integration into the grid draws high importance in the submission of manuscript for this special issue.

This special section will focus on (but not limited to) the following topics:

***Grid planning, operation and management:*-Big data analytics, Machine learning, and Deep learning based**

- Algorithms for demand-supply side for the energy economy for the improvement in renewable resources integration, asset optimization, outage management, participation of customers, electric vehicle network integration into the grid network., aggregation of energy resources (renewables) and flexible demand response, energy policies to determine appropriate spinning reserve and storage requirements, optimal location, size of renewable resources in network.
- Algorithms that establish synergy between energy consumption of smart buildings with smart grid.
- Algorithms to understand building energy patterns and quantify its flexibility, manage imbalance in demand-supply due to high share of renewable energy integration in network.
- Automated predictive maintenance.
- Automation in design for improved flexibility in future grid operation.

Decision making and control:-

Algorithms to aggregate electric vehicle or distributed energy resources to adjust power generation from renewables,Real time data driven tools for model, decision making and control related issues in electric grid with hybrid energy resources.

Grid data analytic tools:-

Data collection and processing for power/energy data, including smart meters, PMUs for better visibility of the grid., Machine learning, deep learning and data visualization techniques for the smart grid and energy internet for efficient network management, anomaly detection etc, Real time power grid situational awareness and visualization of data,Algorithms with IoT sensors and devices to optimize the cost and energy resources balance, monitoring equipment status, supervision of the smart grid across application interfaces,Cloud for energy security and resilience,Leveraging AL and ML techniques for grid operation under increasing uncertainty

Future generation data analytics:-

Cyber secured power grid:- Machine learning, deep learning based-

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Submissions to this Special Section must represent original material that has been neither submitted to, nor published in, any other journal. Regular manuscript length is 8 pages.

Note: The recommended papers for the section are subject to final approval by the Editor-in-Chief. Some papers may be published outside the special section, at the EIC discretion.

Timetable:

Deadline for manuscript submissions	**July 30, 2020**
Expected publication date (tentative)	December 2020

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