RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM

Field: Energy, Processes

Subfield: Electrical engineering, applied mathematics, smart grid

Title: Big data based forecasts for the electric power system

ParisTech School: MINES ParisTech | PSL

Advisor(s) Name: Andrea Michiorri,
Advisor(s) Email: andrea.michiorri@mines-paristech.fr
Research group/Lab: *PERSEE*
Lab location: *Sophia Antipolis*
(Lab/Advisor website): http://www.mines-paristech.eu/Research-valorization/Fields-of-Research/Energy-and-processes/PERSEE-Centre-for-processes-renewable-energies-and-energy-systems/

Short description of possible research topics for a PhD:
Context: This research is based on the following considerations: 1) Energy forecasts are used for decision making by system's actors. 2) They are partially correlated, and this can be used to improve their precision. 3) Data sources increase in terms of size, variety and quality.
Objectives: The objectives of this research are: A) to develop forecast models for the state of the electric power system (production, consumption, prices) with attention to extreme and rare events. B) To integrate alternative data sources such as climate models or natural language processing.
Methodology: The research will be organized according to the following plan: i) preparation (bibliographic research, learning tools and datasets, with attention to open data). ii) A second phase regarding the development of the forecast models (point A). iii) A third phase for the evaluation of the models.

Required background of the student: Applied mathematics, informatics, machine learning

A list of 5 (max.) representative publications of the group:
1. Andrea Michiorri, Huu-Minh Nguyen, et al., "Forecasting for dynamic line rating", Renewable and Sustainable Energy Reviews, 2015/12/31, Vol 52, pp 1713-1730
2. Andrea Michiorri, Philip C Taylor, "Forecasting real-time ratings for electricity distribution networks using weather forecast data", Electricity Distribution-Part 1, 2009. CIRED 2009. 20th International Conference and Exhibition on
3. Arthur Bossavy, Robin Girard, Andrea Michiorri, Georges Kariniotakis, "The impact of available data history on the performance of photovoltaic generation forecasting models", Electricity Distribution (CIRED 2013), 22nd International Conference and Exhibition on
4. Romain Dupin, Andrea Michiorri, Georges Kariniotakis, "Dynamic Line Rating Forecasting and Evaluation", EWEA Technology Workshop, Wind Power Forecasting 2015