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Data Analytics for Renewable Energy Integration

Second ECML PKDD Workshop, DARE 2014
Nancy, France, September 19, 2014
Revised Selected Papers

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Preface

This volume contains the papers presented at DARE 2014: The Second International Workshop on Data Analytics for Renewable Energy Integration, which was held in Nancy, France in September 2014 and hosted by ECML/PKDD (the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases) 2014.

Concerns about climate change, energy security, and dwindling fossil fuel reserves are stimulating ever-increasing interest in the generation, distribution, and management of renewable energy. While a lot of attention has been devoted to generation technologies, an equally important challenge is the integration of energy extracted from renewable resources into existing electricity distribution and transmission systems. Renewable energy resources like wind and solar energy are often spatially distributed and inherently variable, necessitating the use of computing techniques to predict levels of supply and demand, coordinate electricity distribution, and manage the operations of energy storage facilities.

A key element of the solution to this problem is the concept of a “smart grid.” There is no standard definition but a smart grid is broadly perceived as an evolved form of the traditional electricity grid where advanced techniques, such as information and communications technology (ICT), are used extensively to detect, predict, and intelligently respond to events that may affect the supply of electricity.

Data analytics is a science that encompasses data mining, machine learning, and statistical methods, and which focuses on cleaning, transforming, modeling, and extracting actionable information from large, complex datasets. A smart grid generates a large amount of data from its various components, examples of which include renewable energy generators and smart meters; the potential value of this data is huge but exploiting this value will be almost impossible without the use of proper analytics. With the application of systematic analytics on the smart grid’s data, its goal of better economy, efficiency, reliability, and security can be achieved. In other words, data analytics is an essential tool that can help to imbue the smart grid with “smartness.”

In this context, the focus of DARE 2014 is to study and present the use of various data analytics techniques in the different areas of renewable energy integration. While the workshop was held on a relatively small scale it still attracted contributions that spanned a variety of relevant topical areas such as the detection of faults and other events in smart grids, forecasting of energy generation in photovoltaic and wind farms, automated analysis of rooftop PV capacity, and flexibility analysis in energy consumption. This volume will be very useful to researchers, practitioners, and other stakeholders who are seeking to leverage and drive the uptake of renewable energy and smart grid systems.

We are very grateful to the organizers of ECML/PKDD 2014 for hosting DARE 2014, the Program Committee members for their time and assistance, and to Masdar Institute of Science and Technology and MIT for their support to this timely and important workshop. Finally, we would also like to thank the authors for their valuable contributions to DARE 2014.

September 2014

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