PROJECT SUMMARY

Overview:

BD Spokes: SPOKE: SOUTH: Collaborative: Smart Grids Big Data, Mladen Kezunovic, Texas A&M University.

The Smart Grids Big Data (SGBD) comes from many domains (generation, transmission and distribution, customers, operations, services and markets), as well as other seemingly unrelated yet actually synergistically intertwined domains such as other energy commodity markets, environment and weather. The significance of SGBD is in the diversity of its sources, growth rate, and spatiotemporal characteristics. The SGBD Spoke will build an action-oriented organization focused on developing the fundamental framework for BD integration and knowledge extraction. The mission of the SGBD Spoke is to complement, strengthen, and serve the South BD HUB priority areas, particularly the Industrial Big Data priorities related to Power Generation and Distribution and Renewable Energy. The Spoke's overarching objective is to work with the South BD Hub on creating a stakeholder community capable of converting BD in smart grids, which are ubiquitous but largely unexploited for its transformational operational potential, into new knowledge and solutions offering major improvements in smart grid operation (e.g., power generation and distribution; renewable energy) and smart grid user necessities (critical infrastructures, smart cities, transportation, etc.). The SGBD Spoke will serve as a catalyst for organizing and sharing data sets and related data services among a larger set of stakeholders from multiple domains, a very important role that the South BD Hub will be leading. The SGBD Spoke will also manage an open source exchange organization that will work with the South BD Hub leaders to make open data and open software available to other Spokes and Hubs interested in the smart grid domain through a 200-member partnership of stakeholders from universities, NSF centers, industry, federal labs, and various international organizations. This will enable the South BD Hub to meet the societal grand challenge of creating technological solutions that can fulfill the economic potential inherent in BD analytics in the utility industry, expected to reach an annual value of close to $4 billion by 2020.

Intellectual Merit :

Achieving knowledge extraction from Smart Grids BD will result in the advancement of fundamental sciences in multiple disciplinary domains related to BD analytics. It will also increase our knowledge of merged data and extraction of critical knowledge from the physical systems, thereby helping us better understand the flow of energy in the smart grids, and how this understanding can be translated into solutions and practices that prevent emergencies, improve asset management, and increase energy efficiency. It will also provide a more illuminated and nuanced understanding of behavioral analytics that address the human interface with smart electricity systems, a domain of transformational significance as smart grid devices become ubiquitous and human behavioral patterns become an increasingly important variable in the SG operational equation.

Broader Impacts :

It is within this Smart Grid Big Data domain that the Spoke will provide services to the South BD Hub, and by extension broader impacts to all funded Hubs. This will be done through enabling BD analytics aimed at improving essential services of the electricity systems, hence benefiting the society and public at large. The Spoke organizational infrastructure will enable the development and assessment of BD education and training programs derived from the core capacities and expertise of the SGBD partners, and create a diverse community of BD stakeholders interested in advancing Big Data Science in multiple domains.

Keywords: big data, data analytics, data sciences, smart grid, smart city, electricity system

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