

IEEE PES Subcommittee on Big Data & Analytics

Chair: Prof. Le Xie, Texas A&M University

Vice Chair: Dr. Yannan Sun, Oncor Electric Delivery

Secretary: Dr. Hung-Ming Chou, Dominion Energy

8/7/2019, 3-5 PM



Agenda

- Introduction
- Approval of minutes from 2018 meetings
- Announcements
- Subcommittee sponsored activities for the past year
- Proposed panel ideas for 2020 GM
- New proposed initiatives
- Future activities

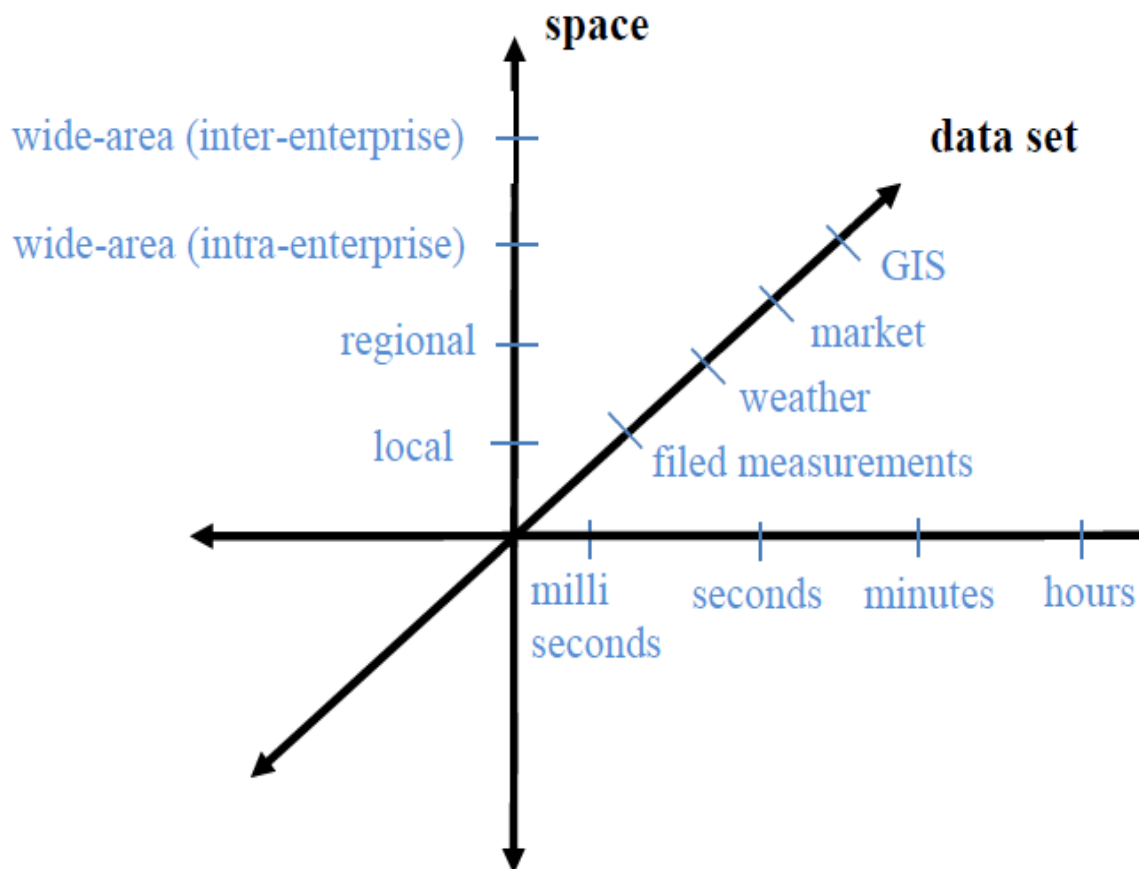


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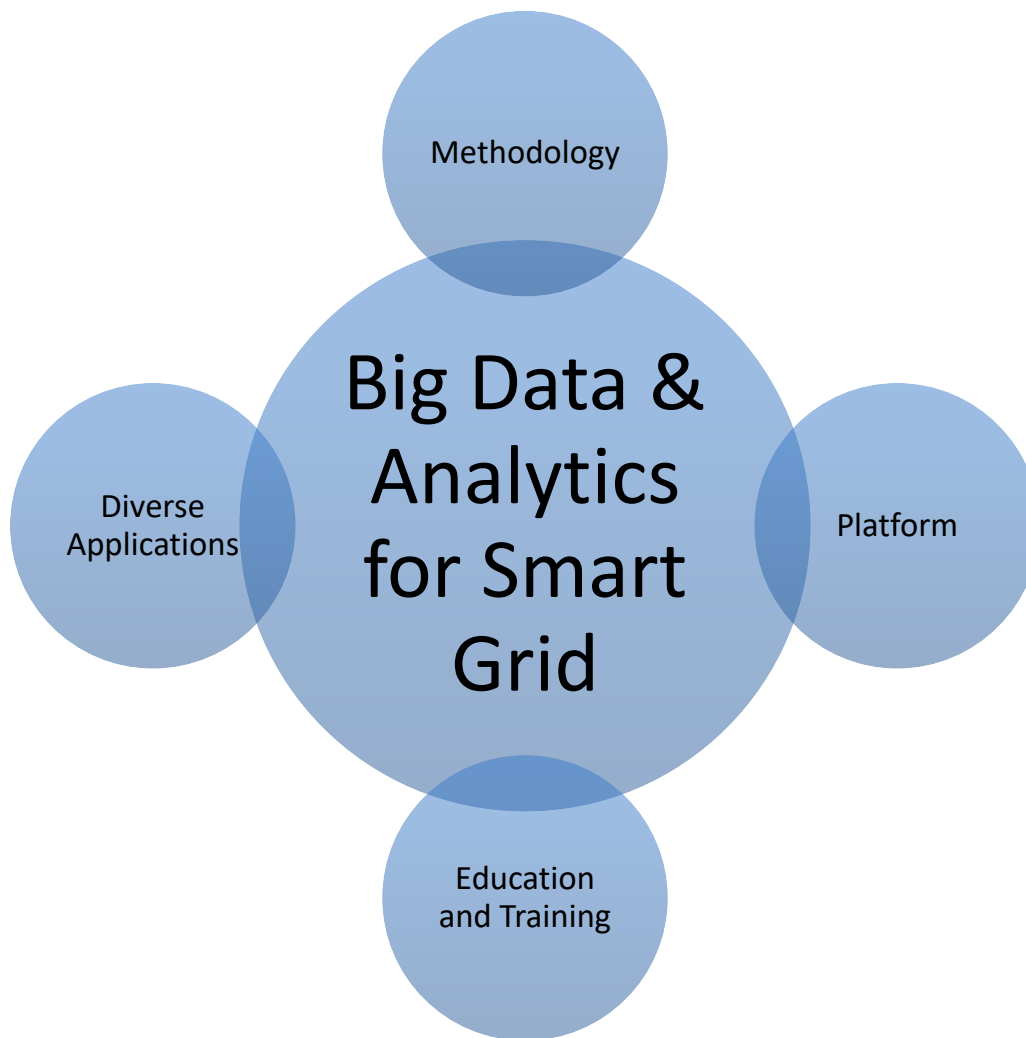


Big Data & Analytics Subcommittee: A Focal Point of Talents and Resources



What is the value proposition of big data in power grid?

Value Proposition



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Minutes from 2018 meetings

1. Introduction

Le Xie introduced the subcommittee and reviewed the meeting agenda

2. Approval of minutes from the 2017 meeting

Ning Zhou moved, Nanneng Yu seconded. Members voted in favor of approving the 2017 meeting minutes

3. Announcements/summary

- Papers statistics: total paper submitted: 44, accepted: 19. Transaction paper: 3
- Call nomination of Vice chair / TPCP
- Activities from last year
 - IEEE utility big data workshop
 - NSF workshop on real-time learning and decision making
 - NSF workshop on data analytics for grid resiliency
 - Panel session in IEEE T&D
 - EPRI tutorial
 - Webinar series
- Subcommittee website is established and is linked with AMPS (<http://sites.ieee.org/pes-bdaps/>)
- Report from WG/TF
 - Big data application in power distribution system TF
 - Identify all the use cases
 - Interact with utility in IEEE T&D and DistribuTech
 - Short course in DOE and EPRI
 - Text book on big data application in power system
 - Big data webinar series TF
 - Try to find the time that works best for global audience (15K audience)
 - 2017-2018: more on industry side
 - 201802019: more on methodology
 - Data access WG
 - Combine available data sources (Transmission, Distribution, behind-the meter, other related data)
 - A website is created and linked to the subcommittee website (<https://bigdata.seas.gwu.edu>)
 - Special issues, Liaisons, papers
- Panel session chairs provided updates on the BDA sponsored panels at 2018 PES GM:
 - **Super session: Data science and data quality as applied to power system** (Session chair: Nanneng Yu, Le Xie)
 - 6 speakers (from vender, industry, national lab, and academia)
 - 1300 people viewing from Facebook

- **Panel session: Big data analytics for emerging power sensors and internet-of-things** (Session chair: Hamed Mohsenian-Rad, Emma Stewart)
- **Panel session: Big data analytics focus on end-use customers in power distribution systems** (Session chair: Nanneng Yu, Haiwang Zhong)
- **Panel session: Big data analytics for flexible electricity networks, markets and prosumers** (Session chair: Ran Li, Tao Hong)
 - About 80 people attend
- **Panel session: Best practices in sharing big data in power systems** (Session chair: Ning Zhou, Hamed Mohsenian-Rad)
- **Panel session: Smart meters: from consumer behavior to planning** (Session chair: Ram Rajagopal)
- **Panel session: High performance computing and big data analytics for large scale power system planning problems** (Session chair: Dimitri Panageorgiou, Yingzhong Gu)

4. Proposed 2019 GM panel session

- Panel for predictive analytics for renewable
- Panel for Data analytics tool for sensing stability in the network
- Panel for Smart meter analysis to detect energy theft & load behavior
- Panel for Data governance & data usage & Asset health
- Panel for Framework of big data: how to apply different application using the data
- Panel for Reliability of big data& probability reliability analysis
- Edwin Liu suggest to have Data-enabled AI application. Combine the effort of Big data subcommittees and ISAP (Intelligent system application to power system). Use IoT & AI to advance power grid operation and planning
- Panel for Scenario constrained big data analytics for optimization
- Panel for Big data application for system protection
- The final panel submission will be determined via voting among the subcommittee members.

5. New Initiative

- [Le]: We are relatively young subcommittee. We want a thoughtful growth and try to attract talent. The key is to be able to substantiate the efforts.
- For proposed TF, Presentation is given on: Weather analytics with power grid
- For proposed TF, Presentation is given on: Probability analysis for power system reliability

6. Future activities

- Currently the BDA core team consists of Chair, Vice-chair, Secretary, TF leaderships, and IEEE Big Data liaison, the core team will met bi-weekly or quarterly for subcommittee activities.
- Tutorial of big data application in distribution system

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Announcement

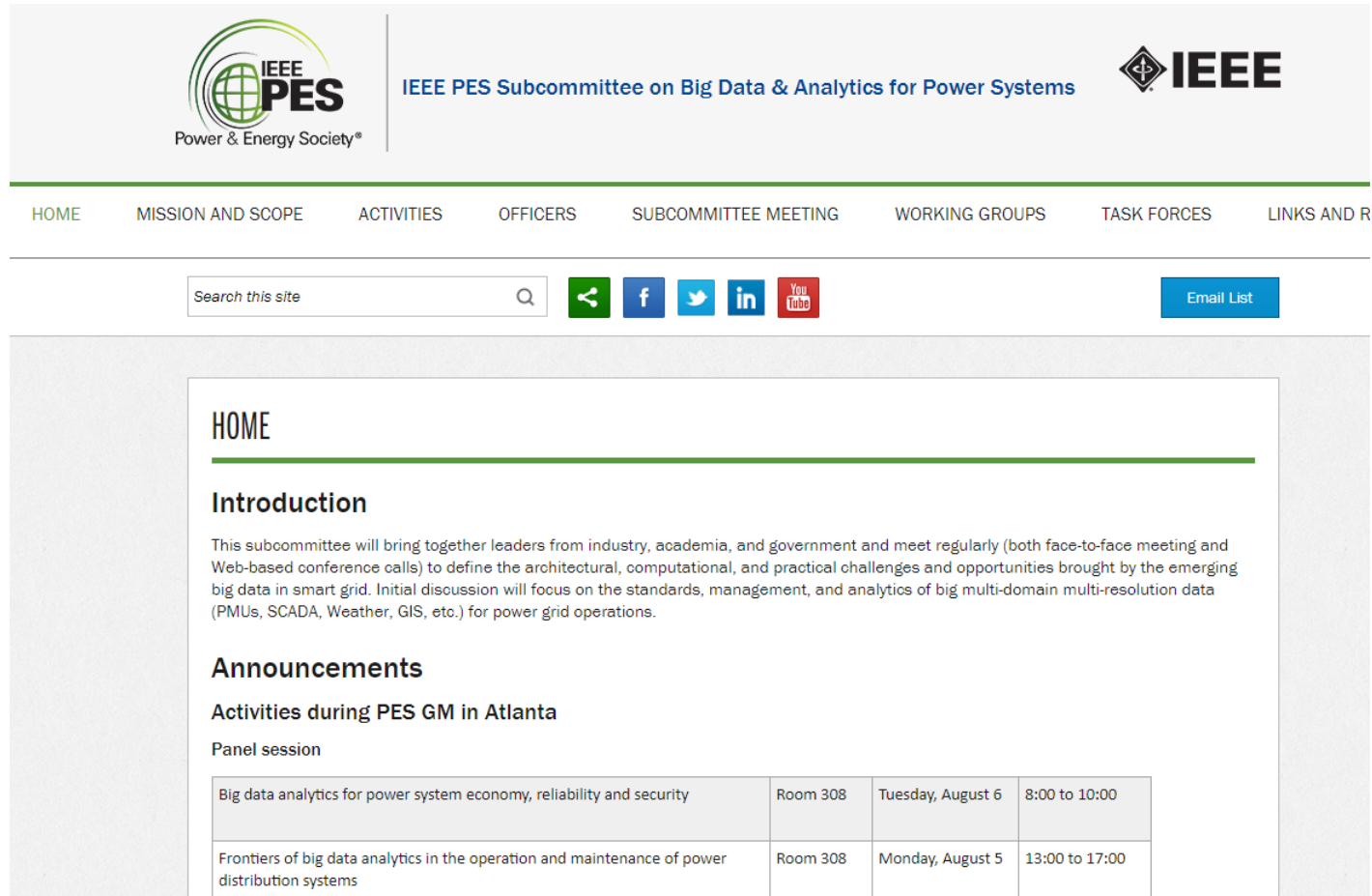
- 2019 Papers for PES GM
 - Total paper submitted: 40
 - Accepted: 20
 - Transaction paper: 4
- Thanks for all the reviewers. All the authors have received detailed review comments and suggestions

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Website Established and linked with AMPS



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IEEE PES Subcommittee on Big Data & Analytics for Power Systems

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Introduction

This subcommittee will bring together leaders from industry, academia, and government and meet regularly (both face-to-face meeting and Web-based conference calls) to define the architectural, computational, and practical challenges and opportunities brought by the emerging big data in smart grid. Initial discussion will focus on the standards, management, and analytics of big multi-domain multi-resolution data (PMUs, SCADA, Weather, GIS, etc.) for power grid operations.

Announcements

Activities during PES GM in Atlanta

Panel session

Big data analytics for power system economy, reliability and security	Room 308	Tuesday, August 6	8:00 to 10:00
Frontiers of big data analytics in the operation and maintenance of power distribution systems	Room 308	Monday, August 5	13:00 to 17:00

<http://sites.ieee.org/pes-bdaps/>

Report from Working Group/ TF meeting

- Big data application in power distribution system TF
- Big data webinar series TF
- Data access WG

Big data application in power distribution system TF -1

- Organize a workshop in IEEE Smart Grid Comm Conf 2018, "Data, Analytics, and Synchrophasors for Transparent Distribution Networks", Aalto, Denmark, Oct 2018.
- Deliver an IEEE lecture on "Big Data Analytics for Data Analysis for Fault Detection in Power Distribution Systems", IEEE Chapter Tallahassee, USA, Feb 2019.
- Deliver a tutorial on "Big Data Analytics for PV Integration" for power engineers in the Malta College of Arts, Science and Technology (MCAST), Malta, Sep 2019.
- Will organize a workshop in IEEE Smart Grid Comm Conf 2019, "Synchrophasors Data Analytics for Power Distribution Networks", Beijing, China, Oct 2019.
- Serve as a co-editor for the IEEE PES Transactions on the smart grid for the special issue on "Theory and Application of PMUs in Power Distribution Systems".
- Review and process webinars proposed by BDA Subcommittee in the PES New Product Development Webinars Committee.
- Working on the second edition of the "Big Data Application in Power System" book for Elsevier. The BDA members will be contacted for contribution.

Big data application in power distribution system TF -2

- Delivered a tutorial of Machine Learning and Big Data Analytics in Power Distribution System through our subcommittee's tutorial working group in March 2019.
- Contribute to the education of engineers and students in industry and academia by delivering a 1-day short course on Machine Learning and Big Data Analytics in Smart Grid in collaboration with EPRI in St. Louis in May 2019. Over 35 participants at the short course.
- Co-chair panel session at the IEEE PES GM 2019 "Big Data Analytics for Power System Economy, Reliability, and Security"
- Supporting the other panel session at the IEEE PES GM 2019 "Frontiers of big data analytics in the operation and maintenance of power distribution systems".

Big data application in power distribution system TF -3

- Developed a new graduate level course entitled Machine Learning and Big Data Analytics in Smart Grid. The course material will be made available to affiliate universities.
- Invited for a Utility University short course at 2019 DistribuTECH.
- Tutorial proposal on Machine Learning and Big Data Analytics in Smart Grid accepted at 2019 IEEE SmartGridComm in Beijing.

Big data webinar series TF -1

- Moved from the industrial topic to the academic topic.
 - Industrial Topic: Industrial Questions for Big Data and Its Applications
 - Academic Topic: Academic Answers based on Data Mining and Machine Learning
- Invited, organized, and coordinated 7 talks.

Academia Members:

- March 28, 2019, Prof. Nanpeng Yu from the University of California at Riverside
- June 7, 2019, Prof. Meng Wang from Rensselaer Polytechnic Institute
- June 19, 2019, Prof. Anurag K. Srivastava from Washington State University
- July 31, 2019, Prof. Chen-Ching Liu from Virginia Polytechnic Institute and State University

Industrial Members:

- December 14, 2018, Mr. Rupen Seoni from Environics Analytics
- November 26, 2018, Mr. Jeffrey S. Katz from IBM
- October 30, 2018, Dr. Zhenyu Huang from PNNL

Big data webinar series TF -2

- Built a website for the taskforce and the subcommittee.
 - Spend two months to organize the website structure.
 - Build 10 versions and test all the functions over 10 versions.
- Planned for expanding the website into an interactive learning site.
 - Plan to include data and demos from existing speakers.
 - Plan to correlate the information with other taskforces' online resources, e.g., Big data repository.
- <https://www.public.asu.edu/~yweng2/Tutorial5/>

Webinar website



SPEAKER LISTS UPCOMING WEBINARS SUBSCRIBE CONTACT



Big Data Tutorial Series

Task Force of Big Data Webinar Series
IEEE PES Subcommittee on Big Data & Analytics for Power Systems

Chen-Ching Liu

Virginia Polytechnic Institute and State University



July 31, 2019

Anurag K Srivastava

Washington State University



June 19, 2019

Meng Wang

Rensselaer Polytechnic Institute



June 7, 2019

Nanpeng Yu

University of California, Riverside



March 28, 2019

Rupen Seoni

Vice President, Environics Analytics



December 14, 2018

Jeffrey S. Katz

Head of Grid Technology, IBM



November 26, 2018

Data access WG

- Completed and launched the working group website, please see <https://bigdata.seas.gwu.edu>.
 - Establishing the database with over 64 diverse data sets, with the ability to search across different types of power system data sets that can help quickly pinpoint data sets to be used for driven-driven research and education.
- Holding a tutorial on big data analytics at IEEE SGSMA 2019 in College Station.
- Organizing the special Issue at IEEE Transactions on Smart Grid on Distribution Synchronphasors covering a wide-range of data-driven methodologies and applications.

Panels in GM 2019

- **Panel session: Big data analytics for power system economy, reliability and security** (Session chair: Wei Hu, Nanpeng Yu)
- **Panel session: Frontiers of big data analytics in the operation and maintenance of power distribution systems** (Session chair: Zhouyang Ren, Yunhe Hou)
- **Panel session: Data analytic tools for dynamic security assessment of bulk power systems** (Session chair: Rafael Segundo, Emilio Barocio)

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Presentation & Discussion of proposed panel for 2020 GM

- Note: Easier to have panel @ 2020 PES T&D (Chicago)
- 5 minutes for each person
- Presentation
 - Application of data analytics in solar integration

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Presentation & Discussion of proposed WG/TF

- 5 minutes for each person
- Presentation
 - Application of Cloud Computing in Power Systems
 - Internet of Things for Electric Power System
 - Predictive Analytics: Power, Meteorology, and Climate

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Outreach/Education

- Outreach to IEEE Smart Grid Initiative
- Potential of a series of workshops (perhaps in conjunction to ISGT?)
- Outreach to *Trends and Foundations on Electric Energy Systems*
- Course “Data Sciences for Modern Power Systems” twice at Texas A&M, also trained 30+ CenterPoint Engineers
- Springer Monograph under preparation
- Outreach to PEEC Research Subcommittee on a Potential Panel in GM 2020 on Data Science for Power System Education

We Need Volunteers!

- How to sign up?
 - Email le.xie@tamu.edu and mention your interest
 - Please mention which initiative(s) you are interested.
 - Interested in reviewing papers?
Please contact TCPC at
yannan.sun@oncor.com

<http://sites.ieee.org/pes-bdaps/>

