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Detect the unexpected - Visual Analytics for next generation distribution and transmission control centers

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Abstract

Grid operators need to manage an increasing amount of data that is fed into the Control Center such as smart meter data, weather forecasts and asset data. At the same time, the concerns about grid stability increase due to volatile feed-in of electricity from wind farms and solar plants as well as new load like e-mobility. Operators need good visualization tools for understanding the situation. However, just visualizing data is not enough anymore, as the amount of data is too complex.

Next generation control centers need means for exploring data interactively. Visual analytics combines the advantages of automated data analysis and human knowledge and expertise by putting the user in control. Two prototypes will demonstrate the strengths of visual analytics. Both prototypes are based on real data of a European distribution grid utility. The first prototype represents a use case inside the Control Center for analyzing unplanned outages based on trouble calls, SCADA messages and 'digging' activities. The second prototype reflects a back office scenario for evaluating asset health based on actual overloads, asset age and the amount of potentially affected customers. The two prototypes combine data from multiple sources (SCADA, outages, trouble calls, geographical and electrical context and asset management) into a comprehensive view that allows the user to interact with data and explore the situation. While interacting, the user can understand the dependencies on the power grid and gain new insights about the situation, thus, improving his/her situational awareness and decision making.



Discussion questions:

1. What is visual analytics and what benefit does it have (from descriptive to prescriptive analytics)?
2. Where specifically can visual analytics add value for transmission and distribution grid management?
3. What alternative strategies may exist?

References:

[1] A. Jäger, S. Mittelstädt, D. Oelke, S. Sander, A. Platz, G. Boumann and D. A. Keim. „Lessons on Combining Topology and Geography – Visual Analytics for Electrical Outage Management”, Best Paper_at Eurovis Workshop on Visual Analytics, 2016.