

Artificial Intelligence and Big Data are watching Power Systems

Louis Wehenkel

University of Liège - Belgium

Technical session Nr.¹: 4

Abstract

Artificial Intelligence methods have been proposed since the 1980's to address complex problems in power systems planning and operation. At the first EPCC workshop, held in 1991 in Alpbach (Austria), several presentations already proposed quite interesting Artificial Intelligence approaches (Expert systems, Machine Learning) to address relevant questions of concern to the EPCC community, and this has continued over the years. But it is a fact that all this enthusiasm has had only very little impact on the practice of electric power system operation and planning.

Today Artificial Intelligence is again on the forefront, driven by important achievements in several application fields (bioinformatics, computer games, autonomous robots, computer vision, natural language processing). These achievements were possible thanks to the availability of massive data sets and a multiplication of active data gathering channels, which have enabled tremendous progresses in machine learning algorithms that also take advantage of modern computational infrastructures (cloud computing, GPUs, cloud-storage etc.). Buzzwords such as 'Artificial Intelligence', 'Deep-Learning', and 'Big-Data' nowadays appear in Tabloids and TV-shows, and the society is becoming anxious about how it will be impacted by them. Meanwhile, many of the best research teams in theoretical physics, applied mathematics, and computer science, have turned their focus on this domain and many of their best researchers have already been recruited by the GAFAM/BATX industries.

This situation raises many interesting questions to be discussed at EPCC 2017: Which new elements can change the game in terms of leveraging Artificial Intelligence and Big Data technologies in the context of power systems operation and planning? What are the most promising applications? What are the possibilities, and what are the challenges for taking advantage of them? How to combine these novel possibilities with well-proven analytical approaches to create additional value? How to keep a critical mass of talented researchers focusing on our problems and how to collaborate in the best way with the GAFAM/BATX industries?

My presentation will elaborate on these questions in order to foster the discussions at the workshop.

¹ 1: Impact of system resiliency on control center functions, 2: Dynamic system performance monitoring and control, 3: Next generation control centers/Generation and distribution control centers, 4: Data modeling/Big Data, 5: Vendors panel