RAS Working Group meeting 11.03.2020

Participants: A. Apollonio, G. Blarasin, L. Bortot, T. Cartier-Michaud, G. Daniluk, D. Delkov, Y. Donon, L. Felsberger, E. Gousiou, A. Herskind, S. Hurst, M. Janitsche, F. Murgia, T. Podzorny, S. Sagmo, B. Todd, J. Uythoven, A. Verweij, C. Wiesner, M. Zerlauth

The slides of the presentation can be found on the Indico page:

https://indico.cern.ch/event/895295/

Investigating Failure Patterns in Particle Accelerator Infrastructures with Explainable Deep Learning - L. Felsberger, T. Cartier-Michaud

The speakers introduced a machine-learning framework to mine logging data of complex infrastructures, such as particle accelerators, for predictive failure patterns. They tested if explainable AI methods help identifying the relevant failure precursors of failures.

Questions, Comments and Discussion:

J. Uythoven asked which physical signals were responsible for the power converter failure. L. Felsberger responded that it was related to a set of external condition signals.

M. Zerlauth recommended that one should look ahead of the external conditions as input signals, as they already a result of lower lying signals. He found the presented framework to be good, but would want it to be applied to more understood and controlled problems.

A. Apollonio also pointed out that further data sources should be considered.

T. Podzorny pointed out that the method reveals that there is little correlation within the used LASER data. B. Todd added that for him it shows that LASER needs to be improved.

L. Bortot asked if a penalisation of the inputs was applied. L. Felsberger answered that it was not done but could be implemented easily.

A. Verweij recommended applying the method to the major event of 2008 to see if it had prevented the incident.

Machine learning and EPC - B. Todd

B. Todd gave an overview of EPC's strategy, current projects and outlook for the field of machine learning and its applications within the group. The conclusion was that ensuring good data quality would be of highest importance for EPC, irrespective of activities in machine learning. The recommendation was to keep research in machine learning ongoing without major investments in the near future and to investigate how to design system so that reliability relevant data is automatically logged and high data quality ensured.

Machine learning and MPE - A. Apollonio

A. Apollonio gave an overview of machine learning activities in MPE and an outlook on its future. He pointed out that downtime is largely due to a combination of several factors for which machine learning methods could be promising.

He introduced the LHC signal monitoring project, for which analytics based on machine learning models could be carried out. The failure prognostics framework introduced in the firs talk was quickly reviewed. First ideas of machine learning in the QPS system were mentioned.

It was concluded that machine learning is an interesting field with potentially useful insights. However, more resources to work on it will not be requested. He pointed out that the ATS sector could benefit from a common framework for sharing tools and methods.

Questions, Comments and Discussion:

M. Zerlauth added that the benefits of doing machine learning could be made clearer.