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CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES
CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

Seminar of the

Probability and Statistics Group

Explainable Artificial Intelligence for Predictive Maintenance: From Model Explainability to Explanation Evaluation



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Date
25 | November | 2026

Time
14:00

Location
11.2.21
DMat, University of Aveiro

Abstract

Artificial Intelligence (AI) is increasingly used in predictive maintenance to support fault diagnosis and Remaining Useful Life (RUL) prediction. However, the high performance of deep learning models often comes at the cost of interpretability, limiting their adoption in safety-critical industrial applications. Explainable Artificial Intelligence (XAI) has emerged as a promising approach to improve the transparency of AI models and support trustworthy decisions. In this talk, I introduce the main concepts of XAI and illustrate the role of post-hoc explainability in predictive maintenance through our research on RUL prediction. An explainable framework combining feature clustering, Long Short-Term Memory (LSTM) networks, and SHAP explanations is first presented to improve both prediction performance and model interpretability. The talk then addresses a major challenge in XAI: how can the quality of AI explanations be objectively evaluated? Although post-hoc methods may generate different explanations for the same prediction, their evaluation remains an open issue. A property-based evaluation framework is presented that links quantitative evaluation metrics to key explainability properties, providing a structured approach for comparing post-hoc XAI methods.

About the speaker

Genane Youness is an Associate Professor and researcher at CESI Engineering School in France, and an Associate Researcher at the MSDMA–CEDRIC laboratory at CNAM in Paris. She holds a PhD in Statistics from Pierre and Marie Curie University (Paris VI) and has extensive experience in higher education and research in Statistics and Data Science. Her main research interests include Explainable Artificial Intelligence (XAI), Machine Learning, predictive maintenance, failure prognostics, and multivariate statistical modelling, with a particular focus on developing data-driven approaches for industrial applications.

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