Call for Applications for a Research Engineer position

“Explainable AI for Decision Support Tools”

This Research & Development Engineer position is funded through the Chist-Era project "Explainable Predictive Maintenance" (XPM) https://www.chistera.eu/projects/xpm. The XPM project aims to integrate explanations into Artificial Intelligence (AI) solutions within the area of Predictive Maintenance (PM). In the XPM project, we will develop different types of explanations. We will demonstrate their usefulness through several dimensions. In particular, the identification of the component or part of the process where the problem occurred. Also, the understanding of the severity and future consequences of the detected deviations; the selecting of the optimal repair and maintenance strategy from among several alternatives created based on different priorities, and the understanding why the problem occurred in the first place as a means to improve the system design for the future.

This position is dedicated to the design of an explainable decision support tool. It allows us to provide recommendations about the maintenance plans (actions) to perform. The decision support tool will be the equivalent of an adaptive human-machine interface that will provide prescriptive maintenance advice to foster human operators' awareness of the evolution of the degradation dynamics (trigger environmental and operation conditions parameters, degradation characteristics, components reliability and criticality, Remaining Useful Life (RUL), etc.), and will define the actions to be taken for asset management optimization. The impact and efficiency of the provided explanations and recommendations (actions) will be quantified and demonstrated through four selected case studies: electric vehicles, metro trains, steel plant and wind farms.

The tasks to be done by the post-doc researcher are the following:

- Defining a weighted objective function for the predictive maintenance in order to optimize a predefined set of asset criteria (maintenance costs, uptime, reliability, etc.) by considering environmental, inventory, and human resources availability constraints. The weights must consider not only the latter constraints but also the application domain (operation conditions, failure modes, components criticality and reliability, etc.),
- Provide the basic formal specification of the AI optimisation problem and the explanation of the actions required to perform this optimisation, based on the objective function defined,
- Design of an interactive decision support tool in order to implement the AI-optimization method and explanation of the actions to be performed. This support decision tool is used as a mean for the prescriptive maintenance and the operators can interact with it in order to obtain specific emphasis or explanation around a recommendation or action to perform.
• Evaluate the impact of the decision support tool for maintenance costs, critical components uptime, and reliability purposes. It will be done for specific case studies such as wind turbines.

The candidate must have confirmed skills in Data Science (Feature engineering, Machine Learning, Deep Learning, Reinforcement learning, Deep-Reinforcement learning) with application to optimization. She/He must be familiar with the use of Python with its associated packages and libraries.

The selected candidate for this position will work with the other partners of the project and build her/his results based on the results of the other partners through regular meetings. The workplace of the accepted candidate will be at the Institute Mines-Telecom Nord Europe in Douai-France.

For more details and/or to apply for this position please send your motivation letter, the names of two references, and a detailed CV including the references of your publications and achievements to:

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