Special Issue

Explainable Machine Learning

Message from the Guest Editors

Dear colleagues, Machine learning methods are currently used widely in commercial applications and in many scientific areas. There is an increasing demand to understand the way a specific model operates and the underlying reasons for the decision produced by the machine learning model. In the natural sciences, where ML is increasingly employed to optimize and produce scientific outcomes, explainability can be seen as a prerequisite to ensure the scientific value of the outcome. In societal contexts, the reasons for a decision often matter. Typical examples are (semi-)automatic loan applications, hiring decisions, or risk assessment for insurance applicants. Here, one wants to gain insight, also due to regulatory reasons and fair decision making, why a model gives a certain prediction and how this relates to the individual under consideration. For engineering applications, where ML models are deployed for decision-support and automation in potentially changing environments, an assumption is that with explainable ML approaches, robustness and reliability can be realized more easily.

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About the Journal

Message from the Editor-in-Chief

Machine learning deals with understanding intelligence to design algorithms that can learn from data, gain knowledge from experience and improve their learning behaviour over time. The challenge is to extract relevant structural and/or temporal patterns ("knowledge") from data, which is often hidden in high dimensional spaces, thus not accessible to humans. Many application domains, e.g., smart health, smart factory, etc. affect our daily life, e.g., recommender systems, speech recognition, autonomous driving, etc. The grand challenge is to understand the context in the real-world under uncertainty. Probabilistic inference can be of great help here as the inverse probability allows to learn from data, to infer unknowns, and to make predictions to support decision making.

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