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Data-driven predictive maintenance and time-series applications

Kefalas, M.

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Propositions
accompanying the thesis

**Data-driven Predictive Maintenance and Time-Series
Applications**

Marios Kefalas

1. Automated machine learning (AutoML) methods can be applied for the remaining useful life (RUL) estimation in data-driven predictive maintenance (PdM) after appropriate pre-processing of the raw data. [Chapter 4].
2. Optimizing a remaining useful life (RUL) estimation pipeline by considering predictive uncertainty with predictive performance can allow for more transparency into the estimation process and facilitate the selection of a suitable method for the RUL estimation. [Chapter 5].
3. Explainable AI can facilitate the understanding of the data generating process of industrial processes. In such tasks, the quality of the data should not pass unnoticed. [Chapter 6].
4. Time-series techniques from industry can also serve as effective methodologies in the medical domain. However, first, it is imperative that privacy, and model explainability be adopted throughout. [Chapter 8].
5. The availability of data-driven methods has, in a sense, democratized the remaining useful life (RUL) estimation - and predictive maintenance (PdM) thereof - due to their (mostly) domain-agnostic nature and wide applicability.
6. Prognostics and health management (PHM) methods could prove to be suitable in monitoring and alerting patients with (serious) risk of injury by, for example, considering and combining their medical history, activity, and relevant biomarkers.
7. Multi-objective hyperparameter optimization of machine learning pipelines might be better suitable for real-world problems in which conflicting objectives might exist.
8. Everything we do, whether it is conscious or not, is a result of an optimization process, which is sometimes, thousands of years in the making.
9. “I know that I know nothing”: The Socratic limitation on knowledge points elegantly toward a humbling truth in science, namely that we can never be sure that we possess the absolute truth but merely an illusion of it.