

## **Support of machine learning in Process mining and decision making**

The document explores the utilization of Process Mining and Machine Learning to enhance decision-making in systems design, particularly focusing on their application in the electric torch design process. It introduces a dual-layer framework aimed at identifying significant process patterns and parameters crucial for decision-making in the design context. The study underscores the importance of process mining and machine learning techniques in automatically uncovering process patterns and predicting activity parameters, emphasizing the supervised classification's role in predicting new values from known data.

A comprehensive literature review is provided on the integration of Process Mining and Machine Learning techniques, citing various research works that demonstrate the collaborative applications of these techniques in tasks such as case data extraction and association rule mining. The document outlines the process mining layer, which involves transforming process executions' traces into event logs and extracting the most frequent patterns in the product design process. Additionally, the machine learning layer aims to predict the most frequent parameters for each activity selected.

A case study on the electric torch design process is presented to illustrate the proposed technique's application, showcasing its feasibility in assisting engineers during product design or redesign. The document also outlines future work, including addressing processes with more complex gateways and evaluating the proposed technique's performance on various indicators.

Furthermore, the document discusses the integration of Process Mining and Machine Learning techniques in supporting decision-making in systems design, highlighting Machine Learning's role as a subset of AI in predicting activity parameters and resources for product design. It references the use of supervised classification algorithms and reinforcement learning to develop software agents that learn from their experiences and feedback from the environment.

Moreover, various research works are cited to demonstrate the relevance of AI in the context of product design decision-making. The application of AI-related tools such as Weka and the use of AI techniques in predicting consumer responses to product form

further emphasize the connection between the document's content and artificial intelligence.

In conclusion, the document provides valuable insights into integrating process mining and machine learning to facilitate decision-making in design systems. It offers a structured framework leveraging these techniques to streamline and optimize the product design process, paving the way for further research and development in this domain and potential applications in engineering and various industries.