

## Topics for the seminar on process analysis (CS 719, HWS 2023)

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This document provides a list of topics suggested for the literature study. The accompanying topic descriptions provide information about the potential research questions you can aim to answer in your literature study.

**Process mining in education.** Educational process mining is the practice of leveraging tools to discover insights in education, e.g., to gain insights into the learning processes of students or provide tailored advice to students. In this project, you will investigate the different use cases, studies, and techniques for process mining in education.

**Time series analysis in process mining.** Time series analysis involves data analysis over time to uncover meaningful statistics and characteristics. In this project, you will summarize the use of time series analysis techniques in the process mining domain and their application in addressing process mining tasks.

**Process rules and patterns discovery.** Event data is multi-perspective, with information on activities, execution time, resources, and other attributes. Detecting temporal rules and dependencies between attributes is crucial for understanding process execution. Your task is to review process mining techniques to discover rules and patterns in event data.

**Stochastic process mining.** Recently, process mining techniques have started incorporating stochastics into their consideration in order to, e.g., deal with uncertainty in the event data or reflect likelihoods. In this project, you will investigate the current usage and potential of such stochastic process mining.

**Process complexity assessment.** Analyzing process complexity from event data involves understanding complex process structures over time. Your task is to explore existing process mining frameworks and techniques that examine event data dimensions such as activities, timestamps, and resources to quantify complexity.

**Process stability and dynamics.** Process stability and dynamics analysis aims to understand the constancy and changes in processes over time. This analysis utilizes event data to reveal stable phases and dynamic shifts, thereby providing insights into the factors influencing process behavior and its variations. Your task is to investigate state-of-the-art techniques using event log data to gain insights into process stability and dynamics.

**Prescriptive process monitoring.** Prescriptive process monitoring is a task that aims to make recommendations on what actions to take (if any) for ongoing process cases, e.g., by recommending to take preventative steps to improve the odds that a case will have a positive outcome or by recommending which activity to perform next to ensure efficiency. Your task is to investigate the current spectrum of prescriptive techniques and identify opportunities for future research.

**Develop your own topic.** You are also free to propose your own topic by looking at publications at key venues such as the international conferences on *Business Process Management* (BPM), *Advanced Information Systems Engineering* (CAiSE), and *Process Mining* (ICPM), as well as journals such as *Information Systems* and *Decision Support Systems*. Topics can relate to research areas such as business process management, process mining, process analysis, stream processing, and robotic process automation.