Implementing an Optimized Algorithm for Local Process Mining with Java

Local Process Mining [1] is an approach to find frequent patterns in unstructured event logs. It provides a useful way to generate new insights about complex processes, and the found patterns can help to simplify processes with many process steps.
The original implementation does not scale well with large event logs. Solutions have been suggested for faster computation time, but they rely on simplifying the input event log to a fraction of the original input, which might lead to suboptimal results [2].
This project aims at optimizing the algorithm for computing local process models without reducing the amount of input data. First ideas are present and waiting to be further developed and implemented.

Tasks:

- Develop a deep understanding of the concept and purpose of local process mining
- Analyze the current state-of-the-art vanilla implementation for local process mining (Java, ProM-plugin [3], based on [1])
- Support in developing a concept for an optimized algorithm to find Local Process Models
- Implementation of an optimized local process mining algorithm as a plugin for the process mining tool ProM [4]
- Benchmarking the optimized implementation against the state-of-the-art

Prerequisites:

- Advanced Java programming skills (Optimizing Data Structures and Access, Parallelization, ...)
- Experience with Git (Commits, Versioning, Project Management, ...)
- Strong interest in optimizing code and algorithms for speed

If you are interested in the topic, please apply with your latest CV and Transcript of Records at: johannes.roider@fau.de

Sources:

[1] Tax, Niek, et al. "Mining local process models." Journal of Innovation in Digital Ecosystems 3.2 (2016): 183-196.

[2] https://www.pads.rwth-aachen.de/cms/PADS/Studium/Abgeschlossene-Abschlussarbeiten/2021/~ntcyo/Discovery-of-Local-Process-Models-by-Com/

[3] https://promtools.org/

[4] https://svn.win.tue.nl/trac/prom/wiki/setup/HowToCreatePluginsInProM