UNIVERSITY
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Master Thesis

"An Analysis of the Loan Application Process using Process Mining"

Process mining techniques are becoming more and more popular in both academia and practice, as they provide different possibilities to analyze data thoroughly and in every detail. Process discovery, compliance checks, bottleneck analysis, process variants comparisons, and improvement suggestions are based on data and can provide valuable and accurate insights into the process execution and its efficiency. Combining process science and data science, process mining is one of today's most powerful tools for data scientist and process managers. Thereby, process science constitutes a broad discipline providing different process-centric approaches including business process management (BPM), workflow management, business process reengineering, etc. Adding data-centric approaches to these model-driven approaches allows to enrich the modelling with the evidence found in the data   (cf. Van der Aalst & Damiani, 2015)

As an application example, the Business Process Intelligence (BPI) Challenge 2012 provides data on the loan application and evaluation process in a Dutch bank. Using IT system support during the process execution, banks can provide the data necessary for process mining. Banking service providers are furthermore experiencing increased competition and especially in the loan application process, process standardization and optimization measures are becoming more important.

The publicly accessible data provided by the BPI Challenge 2012 shall be analyzed in order to give recommendations on improvement measures. A process map of the standard process should be constructed and assessed concerning the different variants. In particular, the throughput time should be analyzed and cases with very short or very long throughput time should be identified in order to derive the impact factors of process speed in this specific exemplary case.

The aim of this master thesis should be:

- to introduce process mining and its role for process management and service operations,
- to discuss and advance theory by merging process science and data science,
- to analyze the loan application process of a Dutch bank in order to identify improvement measures for the loan application process, especially concerning responsiveness, and
- to give a general recommendation on how process mining can improve service processes and design and where the limitations are.

Basic literature:

Frei, F. X., Harker, P. T., & Hunter, L. W. (2000): Inside the black box: what makes a bank efficient? *Performance of Financial Institutions: Efficiency, Innovation, Regulation*, edited by Patrick T. Harker and Stavros A. Zenios, 259-311**.**

Van der Aalst, W. (2016): Process mining. Springer, Berlin, Heidelberg.

Van der Aalst, W. M., & Weijters, A. J. (2004): Process mining: a research agenda. *Computers in Industry,* 53 (3), 231-244*.*

Van der Aalst, W., & Damiani, E. (2015): Processes meet big data: Connecting data science with process science. *IEEE Transactions on Services Computing*, 8(6), 810-819*.*

Data set:

van Dongen, Boudewijn (2012): BPI Challenge 2012. 4TU.ResearchData. Dataset.
https://doi.org/10.4121/uuid:3926db30-f712-4394-aebc-75976070e91f