Humboldt-Universität zu Berlin
Mathematisch-Naturwissenschaftliche Fakultät
Institut für Informatik

Neural Networks for Partially Ordered Trace Resolution

Bachelorarbeit

zur Erlangung des akademischen Grades
Bachelor of Science (B. Sc.)

eingereicht von: Glenn Dittmann
geboren am: 13.06.1993
geboren in: Berlin

Gutachter/innen: Prof. Dr. Matthias Weidlich
Dr. Wolfgang Koessler

eingereicht am: ..... verteidigt am: .....

Contents

Purpose and scope of your entire report. The purpose of your entire report is to make a **scientific argument using the scientific method**.A scientific argument always has the following steps that all must come in this order.

SM1 **Explicate the assumptions and state of the art** on which you are going to conduct your research to investigate your research problem / test the hypothesis.

SM2 Clearly and precisely **formulate a research problem or hypothesis**.

SM3 **Describe the (research) method** that you followed to investigate the problem / to test the hypothesis in a way that **allows someone else to reproduce your steps**. The method must include steps and criteria for evaluating whether you answered your question successfully or not.

SM4 **Provide execution details** on how you followed the method in the given, specific situation.

SM5 **Report your results** by describing and summarizing your measurements. You must not interpret your results.

SM6 **Now interpret your results** by contextualizing your measurements and drawing conclusion that lead to answering your research problem or defining further follow-up research problems.

1 Introduction

Purpose and scope of Section 1. The introduction is a summary of your work and your scientific argument that shall be understandable to anyone in your scientific field, e.g., anyone in Data Science. A reader must be able to comprehend the problem, method, relevant execution details, results, and their interpretation by reading the introduction and the introduction alone. Section 1.1 introduces the general topic of your research Section 1.2 discusses the state of the art and identifies a research. Section 1.3 then states the research problem to investigate. Section 1.4 explains the research method that was followed, possibly with execution details. Section 1.5 then presents the results and their interpretation. Only if a reader thinks they are not convinced or they need more details to reproduce your study, they shall have to read further. The individual chapters and sections provide the details for each of the steps in your scientific argument.

You usually write the introduction chapter *after* you wrote all other chapters, but you should keep on making notes for each of the subsections as you write the later chapters.

1.1 Context and Topic (SM1)

1.2 State of the Art (SM1)

1.3 Research Question (SM2)

1.4 Method or Approach (SM3, SM4)

1.5 Findings (SM5, SM6)

2 Background

2.1 Preliminaries

Process Mining -> Conformance Checking
Log, Trace, Event, Certain Trace, Uncertain Trace
Event-Name, Event-Alias, Event-Properties
Neural Network
Partial Order, Total Order

2.2 Related Work

[dLLM18] [LMFvdA14] [LFvdA14] [vdALW19] [TVLRD17]

3 Problem Exposition (optional)

3.1 Context / Business Understanding (SM1)

3.2 Data Understanding (SM1)

3.3 Detailed Research Questions (SM2)

3.4 Detailed Method (SM3)

4 First Real Chapter addressing first Research Problem

4.1 First Sub-Problem

4.2 Second Sub-Problem

5 Second Real Chapter

6 Evaluation

6.1 Objective (SM2)

6.2 Setup (SM3)

6.3 Execution (SM4)

6.4 Results (SM5)

6.5 Discussion (SM6)

7 Conclusion

Your conclusions are not just a factual summary of your work, but they position, interpret and defend your findings against the state of the art that you discussed in Sect. 1.2. You specifically outline which concrete findings or methodological contributions advance our knowledge towards the general objective you introduced in Sect. 1.1. Objectively discuss which parts you solved and in which parts you failed.
You should explicitly discuss limitations and shortcomings of your work and detail what kind of future studies are needed to overcome these limitations. Be specific in the sense that your arguments for future work should be based on concrete findings and insights you obtained in your report.

References

[dLLM18] Massimiliano de Leoni, Giacomo Lanciano, and Andrea Marrella. Aligning partially-ordered process-execution traces and models using automated planning. In *Twenty-Eighth International Conference on Automated Planning and Scheduling*, 2018.

[LFvdA14] Xixi Lu, Dirk Fahland, and Wil MP van der Aalst. Conformance checking based on partially ordered event data. In *International conference on business process management*, pages 75–88. Springer, 2014.

[LMFvdA14] Xixi Lu, Ronny S Mans, Dirk Fahland, and Wil MP van der Aalst. Conformance checking in healthcare based on partially ordered event data. In *Proceedings of the 2014 IEEE Emerging Technology and Factory Automation (ETFA)*, pages 1–8. IEEE, 2014.

[TVLRD17] Niek Tax, Ilya Verenich, Marcello La Rosa, and Marlon Dumas. Predictive business process monitoring with lstm neural networks. In *International Conference on Advanced Information Systems Engineering*, pages 477–492. Springer, 2017.

[vdALW19] Han van der Aa, Henrik Leopold, and Matthias Weidlich. Partial order resolution of event logs for process conformance checking. 2019.

Selbständigkeitserklärung

Ich erkläre hiermit, dass ich die vorliegende Arbeit selbständig verfasst und noch nicht für andere Prüfungen eingereicht habe. Sämtliche Quellen einschließlich Internetquellen, die unverändert oder abgewandelt wiedergegeben werden, insbesondere Quellen für Texte, Grafiken, Tabellen und Bilder, sind als solche kenntlich gemacht. Mir ist bekannt, dass bei Verstößen gegen diese Grundsätze ein Verfahren wegen Täuschungsversuchs bzw. Täuschung eingeleitet wird.

Berlin, den 31/07/2020 .....