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Organisations

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27/03/2017 → present
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08/06/2017 → present
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Publications:

Measuring and Explaining Cognitive Load During Design Activities: A fine-grained approach
Recent advances in neuro–physiological measurements resulted in reliable and objective measures of Cognitive Load (CL), e.g., using pupillary responses. However, continuous measurement of CL in software design activities, e.g., conceptual modeling, has received little attention. In this paper, we present the progress of our work intended to close this gap by continuously measuring cognitive load during design activities. This work aims at advancing our understanding of WHEN and WHY designers face challenges. For this, we attempt to explore and explain the occurrence of CL using fine–granular units of analysis (e.g., type of subtasks, evolution of design artifact's quality, and manner of technology use). We expect implications for the future development of intelligent software systems, which are aware WHEN a particular designer experiences challenges, but also WHY challenges occur.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Software Engineering, University of Innsbruck, University of South Florida
Authors: Weber, B. (Intern), Neurauter, M. (Ekstern), Burattin, A. (Intern), Pinggera, J. (Ekstern), Davis, C. J. (Ekstern)
Number of pages: 47
Publication date: 2018

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Mining Developers’ Workflows from IDE Usage
An increased understanding of how developers’ approach the development of software and what individual challenges they face, has a substantial potential to better support the process of programming. In this paper, we adapt Rabbit Eclipse, an existing Eclipse plugin, to generate event logs from IDE usage enabling process mining of developers’ workflows. Moreover, we describe the results of an exploratory study in which the event logs of 6 developers using Eclipse together with Rabbit Eclipse were analyzed using process mining. Our results demonstrate the potential of process mining to better understand how developers’ approach a given programming task.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Software Engineering
Authors: Ioannou, C. (Intern), Burattin, A. (Intern), Weber, B. (Intern)
Streaming Process Discovery and Conformance Checking

Streaming process discovery, streaming conformance checking, and streaming process mining in general (also known as online process mining) are disciplines which analyze event streams to extract a process model or to assess their conformance with respect to a given reference model. The main characteristic of this family of techniques is to analyze events immediately as they are generated (instead of storing them in a log for late processing). This allows to drastically reduce the latency among phases of the BPM lifecycle (cf. Dumas et al (2013)), thus allowing faster process adaptations and better executions.

Time and activity sequence prediction of business process instances

The ability to know in advance the trend of running process instances, with respect to different features, such as the expected completion time, would allow business managers to timely counteract to undesired situations, in order to prevent losses. Therefore, the ability to accurately predict future features of running business process instances would be a very helpful aid when managing processes, especially under service level agreement constraints. However, making such accurate forecasts is not easy: many factors may influence the predicted features. Many approaches have been proposed to cope with this problem but, generally, they assume that the underlying process is stationary. However, in real cases this assumption is not always true. In this work we present new methods for predicting the remaining time of running cases. In particular we propose a method, assuming process stationarity, which achieves state-of-the-art performances and two
other methods which are able to make predictions even with non-stationary processes. We also describe an approach able to predict the full sequence of activities that a running case is going to take. All these methods are extensively evaluated on different real case studies.

**General information**

State: Published  
Organisations: Department of Applied Mathematics and Computer Science, Software Engineering, University of Padua, Eindhoven University of Technology  
Authors: Polato, M. (Ekstern), Sperduti, A. (Ekstern), Burattin, A. (Intern), Leoni, M. D. (Ekstern)  
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BFI (2009): BFI-level 1  
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Scopus rating (2005): SJR 1.406 SNIP 1.288  
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Toward an Automated Labeling of Event Log Attributes

Process mining aims at exploring the data produced by executable business processes to mine the underlying control-flow and dataflow. Most of the process mining algorithms assume the existence of an event log with a certain maturity level. Unfortunately, the logs provided by process unaware information systems often do not comply with the required maturity level, since they lack the notion of process instance, also referred in process mining as “case id”. Without a proper identification of the case id attribute in log files, the outcome of process mining algorithms is unpredictable. This paper proposes a new approach that aims to overcome this challenge by automatically inferring the case id attribute from log files. The approach has been implemented as a ProM plugin and evaluated with several real-world event logs. The results demonstrate a high accuracy in inferring the case id attribute.

A Framework for Online Conformance Checking

Conformance checking – a branch of process mining – focuses on establishing to what extent actual executions of a process are in line with the expected behavior of a reference model. Current conformance checking techniques only allow for a-posteriori analysis: the amount of (non-)conformant behavior is quantified after the completion of the process instance. In this paper we propose a framework for online conformance checking: not only do we quantify (non-)conformant behavior as the execution is running, we also restrict the computation to constant time complexity per event analyzed, thus enabling the online analysis of a stream of events. The framework is instantiated with ideas coming from the theory of regions, and state similarity. An implementation is available in ProM and promising results have been obtained.
Designing Visual Decision Making Support with the Help of Eye-tracking

Data visualizations are helpful tools to cognitively access large amounts of data and make complex relationships in data understandable. This paper shows how results from neuro-physiological measurements, more specifically eye-tracking, can support justified design decisions about improving existing data visualizations for exploring process execution data. This is achieved by gaining insight into how visualizations are used for decision-making. The presented examination is embedded in the domain of process modeling behavior analysis, and the analyses are performed on the background of representative analytical questions from the domain of process model behavior analysis. We present initial findings on one out of three visualization types we have examined, which is the Rhythm-Eye visualization.

Detection and quantification of flow consistency in business process models

Business process models abstract complex business processes by representing them as graphical models. Their layout, as determined by the modeler, may have an effect when these models are used. However, this effect is currently not fully understood. In order to systematically study this effect, a basic set of measurable key visual features is proposed, depicting the layout properties that are meaningful to the human user. The aim of this research is thus twofold: first, to empirically identify key visual features of business process models which are perceived as meaningful to the user and second, to show how such features can be quantified into computational metrics, which are applicable to business process models. We focus on one particular feature, consistency of flow direction, and show the challenges that arise when transforming it into a precise metric. We propose three different metrics addressing these challenges, each following a different view of flow consistency. We then report the results of an empirical evaluation, which indicates which metric is more effective in predicting the human perception of this feature. Moreover, two other automatic evaluations describing the performance and the computational capabilities of our metrics are reported as well.
Online Conformance Checking for Petri Nets and Event Streams

Within process mining, we can identify conformance checking as the task of computing the extent to which executions of a process model are in line with the reference behavior. Most approaches currently available in the literature (for imperative models, such as Petri nets) perform just a-posteriori analyses. This means that the amount of nonconformant behavior is quantified after the completion of the current execution. The tool presented in this paper, instead, proposes an approach for online conformance checking: not only it is capable of quantifying the deviating behavior on the fly, but the computation complexity is also restricted to a constant complexity per event analyzed. This enables the online analysis of an infinite stream of events. The tool is implemented as a package of the ProM framework and promising results have been obtained and are presented in this paper.

General information
WoPeD - A "Proof-of-Concept" Platform for Experimental BPM Research Projects

WoPeD (Workflow Petrinet Designer) is an open-source, Java-based software product supporting the creation, simulation and analysis of business process models. Over the years, WoPeD has become a widely-used tool in the academic sector, primarily known and used for teaching purposes. To some extent WoPeD is also playing a second role by serving as an experimental software platform for implementing and validating research ideas from various BPM fields. This demo gives an overview over the features which have been added to WoPeD following this “proof-of-concept” research approach.
Development and implementation of high-dimensional normal behavior areas for citizens with dementia, in proactive care at nursing homes

Technical University of Denmark
Period: 01/01/2018 → 31/12/2020
Number of participants: 4
Phd Student:
Khomiakov, Maxim (Intern)
Supervisor:
Burattin, Andrea (Intern)
Ersbøll, Bjarne Kjær (Intern)
Main Supervisor:
Stockmarr, Anders (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

Effective, Co-created and compliant ACM
The goal of the EcoKnow project is to develop world-leading solutions for the effective digitalization of knowledge work processes that empower caseworkers and citizens to plan evidence-based optimal process flows for the individual case, guaranteeing both efficiency and compliance with the law. EcoKnow brings together knowledge from leading national and international researchers, municipalities, representatives for case workers, key industrial partners, digitalisation consultants and lawyers, researching and developing methods for co-creation technologies for real-time analysis of process logs (process mining) and adaptive case management through a multi-disciplinary situated design process.

Department of Applied Mathematics and Computer Science
Software Engineering
Period: 01/09/2017 → 31/08/2020
Number of participants: 3
Acronym: EcoKnow
Project participant:
Weber, Barbara (Intern)
Burattin, Andrea (Intern)
Abbad Andaloussi, Amine (Intern)

Activities:

International Workshop on Business Process Intelligence
Period: 10 Sep 2017 → 11 Sep 2017
Andrea Burattin (Organizer)

Department of Applied Mathematics and Computer Science
Software Engineering
Degree of recognition: International

Related event

International Workshop on Business Process Intelligence
10/09/2017 → 11/09/2017
Barcelona, Spain
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

International Workshop on Business Process Intelligence
Period: 19 Sep 2016
Andrea Burattin (Organizer)
Department of Applied Mathematics and Computer Science

Software Engineering
Degree of recognition: International

Related event

International Workshop on Business Process Intelligence
19/09/2016 → 19/09/2016
Rio de Janeiro, Brazil
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

International Workshop on Business Process Intelligence
Period: 31 Aug 2015
Andrea Burattin (Organizer)
Department of Applied Mathematics and Computer Science
Software Engineering
Degree of recognition: International

Related event

International Workshop on Business Process Intelligence
31/08/2015 → 31/08/2015
Innsbruck, Austria
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Prizes:

Best Demo Award
Andrea Burattin (Recipient)
Department of Applied Mathematics and Computer Science , Software Engineering

Details
Awarded date: 21 Sep 2016
Degree of recognition: International
event: 14th conference in the field of Business Process Management
Prize: Prizes, scholarships, distinctions

Best Process Mining Dissertation Award
Andrea Burattin (Recipient)
Department of Applied Mathematics and Computer Science , Software Engineering

Description
The Best Process Mining Dissertation Award is awarded by the IEEE Task Force on Process Mining to an outstanding PhD thesis focused on the area of business process intelligence. The award is particularly dedicated to works contributing to research in the area of process mining and/or the innovative use of process mining techniques for solving practically relevant problems.

With this award, the IEEE Task Force on Process Mining wants to draw attention to excellent works by young researchers and promote the research area as a whole.

Details
Awarded date: 8 Sep 2014
Degree of recognition: International
Granting Organisations: IEEE Task Force on Process Mining
Prize: Prizes, scholarships, distinctions