An Informative and Comparative Study of Process Mining Tools

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Abstract— Service-oriented enterprise computing systems are the recent trends in which the business process plays a vital role. Nowadays theorganizations are keen on storing their data in a useful format so that the database creation and retrieval process becomes easier. Event logs are stored in information systems like ERP, CRM and WFM which captures different activities in the organization which can be further used for creating business process models. Process mining research is to fill the gaps between business process and various IT systems. One of the main objectives of process mining is to extract information from event logs. The extracted knowledge from these logs enable us to determine the actual process and existing process models for further analysis, evaluation and continuous improvement in their quality. Various process mining tools are available in the market as open source and commercial tools. Abrief detail about the existing tools and their functionalities are compared and explained in this paper. Some of the process mining tools, namely ProM, Disco, and Celonis are discussed.

Keywords— Business processes, Process mining tools, Event Logs.

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1 INTRODUCTION

Business processes documentation is a key suggestion of a strong business process management (BPM) in organizations [1]. The existence and increase of Process-Aware Information Systems [2] such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), B2B (Business to Business), SCM (Supply Chain Management) and WFM systems has released the access for a new efficient type of method to study the execution of processes, called process mining [3]. The information systems usually record events executed during a business process execution. These event logs can be analysed to improve the execution of processes and improve the quality of the organization's services. This is where process mining plays a role in the organizationbehaviour. Many organizations need to understand how their processes operate in the real world. Every organization wants to produce more in less time. One way to accomplish this is having a well-defined business process model that reflects the dependencies between tasks and also tasks that can beprocessed in parallel. To create a business process model, the data stored in different information systems [4] can be used for a better overview of the actual process usingprocess miningtechniques. That means, deviations can be analysed and continuous improvements can be made in the business process. Process mining techniques help organizations discover and analyse business processes based on raw event data. Process mining tools are a helping aid to implement the business process models in the organisation which in turn improves the productivity. This paper deals with the information regarding available tools related to Process mining and a comparison table which is prepared based on the features and applications of the tools.

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2BUSINESS PROCESS MINING SOFTWARE TOOLS

The business process mining software tools that are capable of creating a process model [5] or a flowchart (describing a process instance) from event logs, existing process pretemplates, or user applications found in an enterprise information system. Existing process mining software's which are available for use are ProM tool developed at Eindhoven University of Technology, Disco is a complete Process Mining software by Fluxicon, Celonis Discovery - the Process Mining solution offered by Celonis, Fujitsu Process Analytics, Rapid Miner, Process Gold Enterprise Platform an integration of Process Mining and Business Intelligence. Many tools are available for creating business process models. The selected tools for discussion are ProM, Fluxicon (Disco) and Celonis. Theselection was based on availability of the tool for academic evaluation purpose only.

2.1 ProM

Process Mining was developed in the EindhovenTechnical University, Netherlands. They had developed an open source framework as ProM tool for creating business process models. Process mining tool is a powerful tool with many algorithms and features. Plugins are provided for different mining algorithms, for analysis, conversion and export modules. The software tool is an open source which aims mostly the academic and research group. There are different plugins which can be added on demand to the tool. Figure 1 shows the ProM tool screen to import the file. ProM imports event logs compliant with the MXML or XES formats and can load process model definitions in different standards. Some of the key features of ProM are discovering the control-flow perspective of a process [7], social network analysis, analysing the resource and performance perspective of a process, discovering events based on decision rules and conformance checking with a va-

riety of algorithms. ProM provides several export formats such as CSV and PNG, MXML, XES.

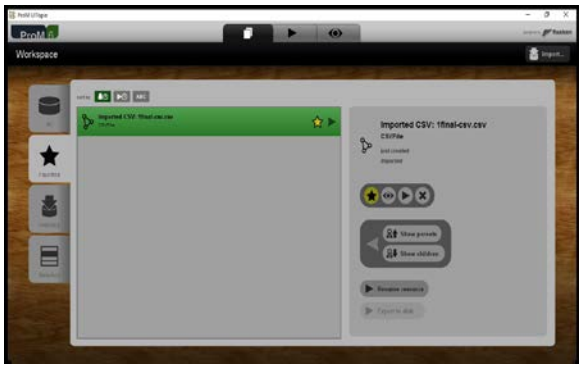

Fig. 1. ProM Tool

2.2 Disco

Disco is a commercial process mining tool developed by Fluxicon, which can run on top of Windows or Mac Desktops. It supports a wide range of event log import formats including CSV, MS Excel, MXML, XES, FXL Disco Logs and DSC Disco project files. Some of the features include automated process discovery, animation of process maps, event log filtering with various parameters, project management and detailed statistics. Before using Disco, the event log should fulfil the minimum requirement for analysis, includingcase ID, Activity and Timestamp. Furthermore, Disco reads pre-configured files in various standard formats like mxml, mxml.gz, xes, xes.gz, fxl, dsc. Disco provides an automatic process discovery mapping once the event log is imported in to the system. Figure 2 shows Disco tool with the fuzzy model. This enables to easily filter and inspect attributes in parallel with the discovered fuzzy model.

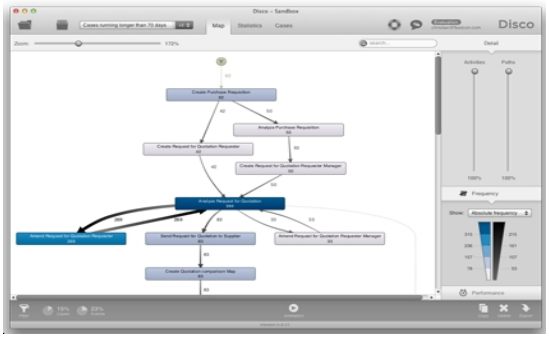

Fig. 2. Disco Tool

2.3 Celonis

The Celonis process mining tool offers real time process discovery technique while information systems are in operation. Various databases like SAP databases and other various RDBMS are supported by Celonis. The data source connection with the dedicated PostgreSQL is established in order to import event logs in to Celonis. Celonis is a commercial company that provides yet another software as a service process mining tool. Figure 3 shows the Celonis tool with process reports. Among the features for this tool include Automated Integration of source data, real-time surveillance of all business transactions, execution of process analyses, various filtering mechanisms and process reporting.

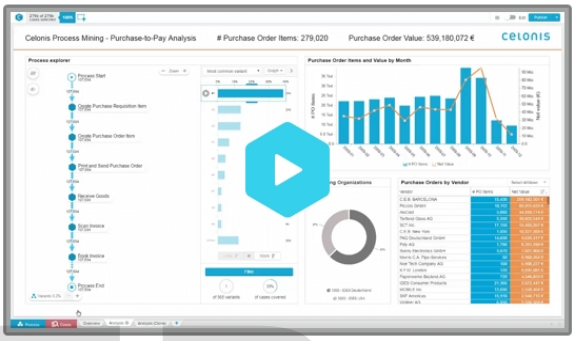

Fig. 3. Celonis Tool

3COMPARISON OF BUSINESS PROCESS MINING SOFTWARE TOOLS

ProM has a variety of filtering options compared to the other tools. Process discovery is one of the common operations that can be performed by any features of the tools. It is possible to present the discovered model in various formats based on the end user preference. In case of ProM, the discovered model [6] can be represented as BPMN diagram, Petri net, herustics model, transition system, inductive mined model and fuzzy model. Disco provides a filtering mechanism that is more transparent and clearly represented compared to the other tools. But for Disco and Celonis the output is fuzzy mining model to display the discovered model. ProM can support all core operations. Disco and Celonis cover partial operations. Disco is more suitable for either beginner or expert users due to its simplicity to use and fast processing of event logs.

Table 1 highlights the key functionality of the open source and commercial business process mining tools featured in this paper. From Table 1 it becomes clear that each tool can provide a graphical representation of a process though the method and notation used in each representation may differ. It is possible that an end user may select a process mining tool partly on the basis that it fits with the process modelling notation currently in use within their organisation.

4BENEFITS OF PROCESS MINING

1.Objectivity is the primary benefit of process mining which helps the industries/organizations to create better models for good productivity.

2.Time is a major constraint in performing tasks, but process mining techniques get faster results if the right data is in place.

3.For any, especially manufacturing industry process mining gives the possibility to find exceptions and allows to check conformance so that if any deviation in production can be avoided.

4.It has the capabilities to give different views on the same data set, which is much appreciated.

5DISADVANTAGES OF PROCESS MINING

With many feasible advantages process mining also has few drawbacks viz.

1.One of the major issues with process mining is the search/collection of appropriate quality data. Since it is an issue fitting the same into a proper structure is also difficult.

TABLE 1
INFORMATIVE AND COMPARATIVE TABLE OF DIFFERENT PROCESS MINING TOOLS

Information	Software Tools		
	ProM	Disco	Celonis
Organization	The Process Mining Group, Eindhoven Technical University	Fluxicon	Celonis
Team	Wil Van Der Aalst and his research group	Dr.Anne Rozinat & Dr.Christian W.Gunther	Bastion, Nominacha, Martin Klenk, & Alexander Rinke
Country	Netherlands	Netherlands	Germany
License	Open Source	Commercial	Commercial
Version	Prom 6.6	Enterprise Edition	Enterprise Edition
Platform Support	Standalone (Desktop Version)	Standalone (Desktop Version)	Software as service version
Output Process Models	BPMN, WF, Petrinets, Heuristic Model, etc.,	Fuzzy Model	Fuzzy Model & Support of charts
Filtering Data	Yes	Yes	Yes
Process Discovery	Yes	Yes	Yes
Conformance Checking	Yes	No	No
Social Network Mining	Yes	No	No
Decision Rule Mining	Yes	No	No
Process Visualization	Yes	Yes	Yes
Performance Reporting	Yes	Yes	Yes
Import Data Type	csv, Mxml(Mining extensible Markup Language, Xes (extensible Event Stream)	Mxml, xes and fxl,dsc	csv, xls

2.The latest techniques implemented in to the tools have lack of documentation and intuitiveness.

3.Process mining techniques are very complex.

6 CONCLUSION

ProM can support all core operations. Disco and Celonis cover partial operations. Disco is more suitable for either beginner or expert users due to its simplicity to use and fast processing of event logs. From the informative and comparative table1, the authors discovered that filtering, process discovery and process visualization is possible in all the three tools. ProM tool is an open source and the other two Disco and Celonis tools are commercial. Process mining techniques are used to generate business process models to analyse the process in the organization by extracting information required from the event logs and provide new insight that facilitates the improvement of the existing procedure.

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REFERENCES

[1] A Shathry O, "Business Process Management: A Maturity Assessment of Saudi ArabianOrganizations", Bus Proc Managt J 22, 2016.

[2] Dumas, M., van der Aalst, ter Hofstede, "A Process-Aware Information Systems: Bridging People andSoftware through Process Technology", Wiley & Sons, 2005.

[3] van der Aalst, Weijters, "A Process mining: a research agenda", Computers in Industry, 231–244, 2004.

[4] Peter B. Southard, Soongoo Hong, Keng Siau, "Information Technology in the Health Care Industry: A Primer", Proceedings of the 33rd Hawaii International Conference on System Sciences, 2000.

[5] Diogo R. Ferreira and Daniel Gillblad, "Discovering Process Models from Unla belled Event Logs",springer, Business Process Management, Volume 5701 of theseries Lecture Notes in Computer Science, pp143-158, 2009.

[6] R.S. Mans, M.H. Schonenberg, M. Song, W.M.P. van der Aalst, "Process mining in Health Care: A Case Study", Proceedings of the First International Confer ence on Health Informatics, Volume 1, ISBN 978-989-8111-16-6, p 118-125, 2008.

[7] Aruna Devi, T. and Dr. Sudhamani, "A study on task behavior using workflow and process mining", International Journal of Current Research, Volume 8, Issue 04, pp. 29482-29486, 2016.