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PROCESS MINING FALLS IN BUSINESS INTELLIGENCE

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***Abstract*— Process mining methods allow for extracting information from event logs. It is a method that establishes a communication between data mining as a business intelligence and business process management. Process mining is to extracting process knowledge from event logs, process models and mining algorithms. The concept of process mining is to analyze, monitor, and enhance real processes. Today many activities occurring in processes are either supported or monitored by information systems. In this paper we show the usage of process minig in different areas and its implementation in real world.**

Keywords— **Process mining, Business intelligence, text mining, web mining, and customer relationship management.**

I. INTRODUCTION

Process mining implementation is useful for large scale of various business systems. These systems are integrated information systems (e.g. ERP System) or may be the systems (such as Embedded Systems)where the hardware plays a prominent role on the basis of the information systems that produce event logs.The information System that produce event logs are called as process Aware information Systems(PAIS) For Example- Workflow Management System, ERP Systems, Case Handling Systems, PDM Systems, CRM Systems, middleware and Hospital Information Systems to support a large variety of business processes.Other operational Processes or Systems can be monotored e.g. X-ray machines,highend-copiers,web services careflows in Hospitals.

Process mining is the systematic analysis of the information contained in the "event logs"that can be constructed from the data collected and stored by information systems."An event log" is a table that contains all recorded events that relate to executed business activities.It can also be defined as a sequential arrangement of computer system tasks which are saved to a file in the system and that file can be analyze later by the system administrator for identify user's accountability on the system .

The aim of process mining is the construction of process model based on an availabel logging data and a model is an immaterial representation of its real world used for a specific purpose .models can be used to reduce the complexity. A "Process model" is a graphical representation of a business that explains the functions between business intelligence and business process management. These process mining models can be explained in different modeling languages e.g. Business Process Model and Notation (BPMN), Event Driven Process Chains (EPC) or Petri Nets. Petri Net is a dominant modeling language in process mining. Petri net language is less suitable for addresses that are not familiar with its syntax and semantic.BPMN constitutes the data basis for Process mining algorithms. BPMN provides semantics that are easily understandable for thr recipient that do not possess a theoretical background. Process mining, also referred to as workflow mining, and has been proposed as a tool for analyzing business processes based on events logs [6].

Section II describes the literature survey, section III describes the process mining versus other mining, and section IV discuss the conclusion and future scope of our paper.

II. LITERATURE SURVEY

Process mining can be seen in the larger context of business process intelligence (BPI) and business activity monitoring. A BPI toolset on top of HP's Process Manager is described. The BPI toolset

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includes a so-called "BPI Process Mining Engine"[1][2]. Zur Muehlen explains the PISA tool that can be used to analyze performance metrics from workflow logs [3]. BPI tools do not allow for process discovery and conformance checking, and offer relatively simple performance analysis tools that depend on a correct *a priori* process model. [5]

Sun, Zeng, and Wang [12] in 2011 proposed the system which made use of process mining in order to deal with the challenges of distributed execution of the processes, like those of optimized distribution and fragmentation of a process with respect to time and resources. With the help of process mining the system fragmented the workflow for the distributed execution of the process. This model records in order execution of the workflow and helps in analysis of its temporal behavior. Based on the examination of this model, they were able to determine the minimum time requirement and the most efficient way of fragmenting the workflow in order to maximize the resource utilization.

Authors proposed an SED-based workflow recommendation technique which improves process modeling by providing a guidance to extend or complete the business process under construction. We not only addressed the problem of distance calculation between two processes containing complicated structures such as AND-Join and OR-Split, but also improved the efficiency for matching two fragments. In addition, we proposed a framework for prototype implementation and two algorithms respectively for pattern discovery and workflow recommendation are also presented. The experimental evaluations conducted on synthetic and real world datasets showed that our method achieved better or equal performance in both efficiency and effectiveness when comparing with other methods (i.e., GED-based method and Flow Recommender). Also, it turns out to be a promising approach for improving the efficiency and accuracy of business process modeling in real applications. [13]

III. Process Mining versus Other Mining

A. *Process Mining*

Process mining refers to the discovery, conformance and enhancement of process models from event logs currently produced by several information systems (e.g. workflow management systems).

B. *Text Mining*

Text mining also referred to as text data mining, or bag of word. Text Mining is to process unstructured (textual) information, extract meaningful numeric indices from the text, and make the information in the text accessible to the various data mining algorithms.

C. *Business Intelligence*

Business Process Management (BPM) is essentially a cycle of modeling, executing, monitoring and optimizing the designs of process models. Creating knowledge bases through data warehousing and making decisions out of actionable information forms the part of Business Intelligence.

D. *Customer Relationship Management*

Customer relationship management (CRM) is a management process that refers to practices, strategies and technologies for the industrial management and analysis between the customer interactions and data throughout the customer lifecycle.

E. *Graph Mining*

Graphs are always used for visual communication for customers in modeling, most complicated structures, such as images, chemical structures, biological networks, social networks, the Web, workflows, and XML documents.

F. *Music Mining*

Music mining is a method used for an audio signal that can be automatically analyzed and searched. It is commonly used in Artificial Intelligence technique i.e., speech recognition, natural language processing (NLP).

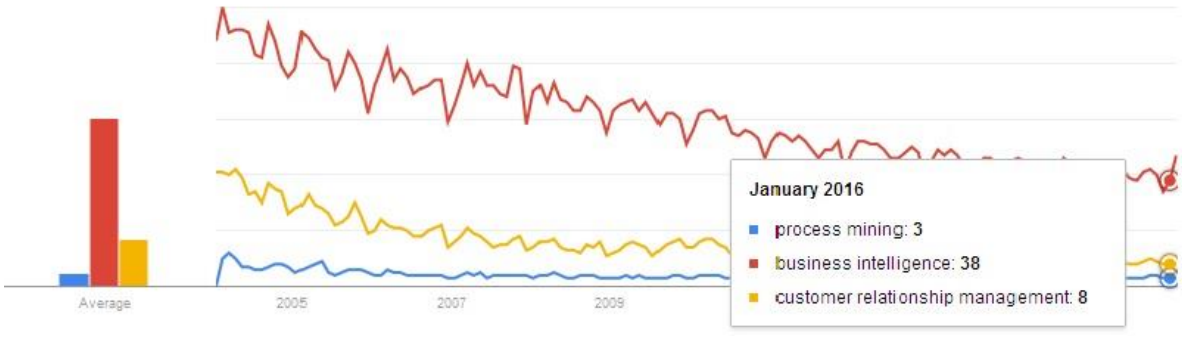

Fig. 1. Comparison between Process Mining to other in worldwide region in Business and Industry

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Figure 1 shows the graph Process Mining is continuously decreasing from the year 2005 to 2015 reach upto 3 as compared to Business Intelligence and CRM on the basis of business perspective. CRM is slightly increasing upto 8 from the year 2005 to 2015 as compared to Process Mining & CRM on the basis of business perspective. BI reached maximum at 38 from the year 2005 to 2015 as compared to Process Mining and CRM on the basis of business perspective.

Figure 2 shows Music mining & Graph mining around the world is decreasing from 2005 to 2015 upto 4 as compared to Process Mining and Text Mining on the basis of business perspective. Process Mining is globally increasing upto 24 from 2005 to 2015 as compared to Text mining, Graph Mining, & Music Mining. Text Mining reached maximum upto 35 with slight variations all over the world as compared to other mining such as Process Mining, Graph Mining and Music Mining.

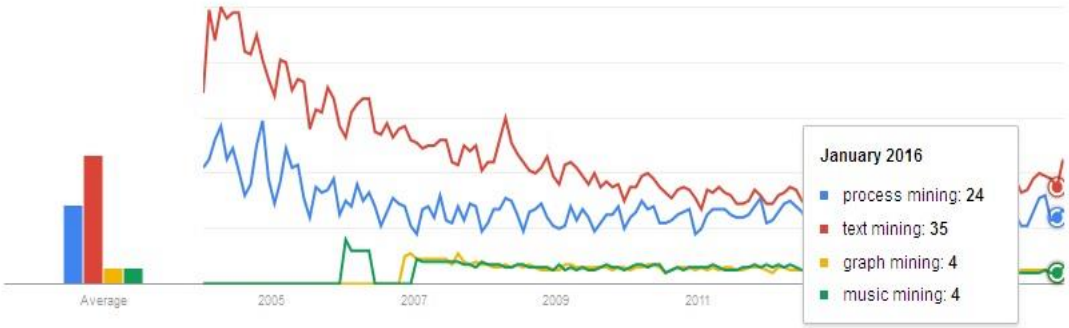

Fig. 2. Comparison between Process Mining to other in worldwide region in all categories

Figure 3 shows Graph mining and Music mining is not used from 2005 to 2015 in India but Graph Mining is used upto 3 and Music Mining is used upto 2 in the world on the basis of business perspective.

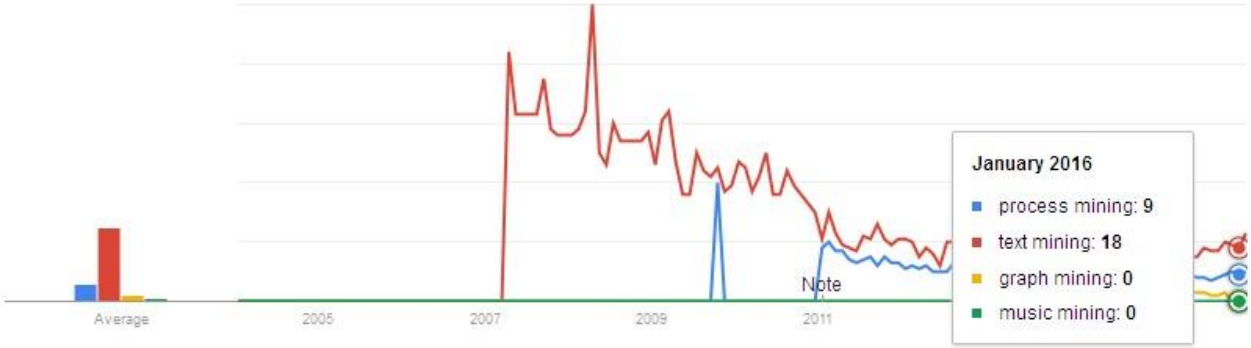

Fig. 3. Comparison between Process Mining to other mining in India region in Business and Industry

Figure 4 shows Process mining is slightly increased upto 9 in India whereas Process Mining is globally used all over the world upto 24 as compared to Text Mining, Graph Mining and Music Mining on the basis of business perspective. Text mining reached maximum upto 18 in India whereas in world Text Mining is reached maximum upto24 (same as Process Mining of the world business) from the year 2005 to 2015 as compared to graph and music mining on the basis of business perspective of India and World.

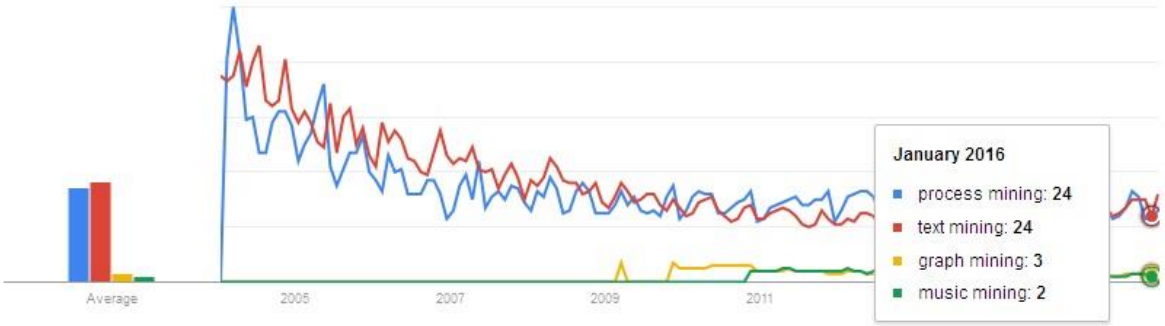

Fig. 4. Comparison between Process Mining to other mining in worldwide region in Business and Industry

IV. Conclusion and Future Scope

As depicted from the graph, the work done is represented in the field of process mininig in comparison to other mining. In context to business perspective maximum work done is in the field of Business Intelligence. Globally, after Text Mining interest have been shown next to Process mining in comparison to other minings but in India not much work has been done in Process Mining in context to business perspective. Event data are available in most organizations and in all sectors there is a continuous need to improve and adapt operational processes. Examples are: Top Sector High Tech Systems, Top Sector Logistics and Top Sector Health. Top sector high tech systems are high-tech systems (wafer steppers, medical equipment, etc.) are already recording events for remote diagnostics and servicing. Process mining can be used to understand how systems are used in the field, why and when they fail, and how they can be improved, etc. Top Sector Logistics are event data around the physical movement of goods can come from different data sources. Tagging of products (e.g. RFID) and integrated supply chains are generating torrents of data that can be used to improve processes from source to sink. Top Sector Health is a need to reduce costs in care processes. Today's hospitals and other care providers collect detailed data about individuals. This can be used to optimize care, both in terms of quality and costs.

In future we implement the finding, merging, and cleaning event data in process mining and also dealing with concept drift.

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