Model Discovery from Motor Claim Process Using Process Mining Technique

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Abstract- All the insurance industries are facing the great challenge to find the ways and means to handle the huge digital data of the event logs, which were automatically generated for every business activity. It is a great challenge before the solution providers to find a solution to manage this data explosion. Merely providing a solution to hold these digital data is not wise enough, instead converting this digital data as a boon to trace the foot prints of the process and then convert it into visual models. These models can further be enhanced, which leads to process evolution. Machine learning and data mining are the only solutions to handle this challenge properly. This paper has made an attempt to convert the event logs in to a tangible visual model.

Index Terms- Business intelligence, Data explosion, Digital universe, Event logs, process model.

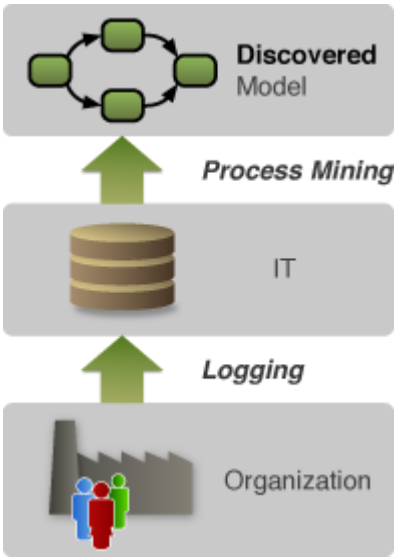
I. INTRODUCTION

The downpour of business data of event logs has grown and become unimaginably huge and triggers many challenges not only for data handling but also for data mining, particularly for process mining. The main goal of process mining is to use event logs to extract process related information. For example, by modeling a business process and analyzing it, management may get ideas on how to reduce costs while improving service levels.

II. PROCESS MINING

Process mining is a bridge between data mining and business process management. Process mining is applicable to a wide range of systems. These systems may be pure Information systems or systems where the hardware plays a more prominent role. The only requirement is that the system produces Event Logs, thus recording the actual behavior. Process mining is practically relevant and the logical next step in Business Process Management. Process mining provides many interesting challenges for scientists, customers, users, managers, consultants, and tool developers.

Discovery: Traditionally, process mining has been focusing on discovery i.e., deriving information about the organization context, and execution properties from enactment logs. An example of a technique addressing the control flow perspective is the alpha algorithm, which constructs Petri net model describing the behavior observed in the event logs. Process mining is not limited to process models and resent process mining techniques are more and more focusing on other perspectives e.g., the organizational perspective, performance perspective or data perspective. For example, there are approaches to extract social networks from event logs and analyze them using social network analyzer. This allows organizations to monitor how people, groups or software/system components are working together. Also there are approaches to visualizes performance related information e.g., there are approaches which graphically shows the bottlenecks and all kinds of performance indicators e.g., total flow time or the time spent between two activities.



Conformance: There is an a-priori model. This model used to check if reality conforms to the model. For example there may be a process model indicating that purchase orders for very huge amount require two checks . Another example is the checking of the so-called "four-eyes" principle. Conformation checking may be used to detect deviation, to locate and explain these deviations, and to measure the severity of these deviations.

Extension: There is an a-priori model. This model is extended with a new aspect or perspective, i.e., the goal is not to check conformance but to enrich the model with the data in the event log. An example is the extension of a process model with performance data, i.e., some a-priori process model is used on which bottlenecks are projected.

III. MODEL DISCOVERY FROM MOTOR CLAIM PROCESS

Consider the processing of motor claims in an insurance company [7]. First the customer registers the claim with the insurance company (task *register the claim*). The loss is recorded in the claim register (task *examine*) and a claim form is issued to the customer. The insurance company then verifies the policy records to see if the policy is in force and also confirms 64VB clause of the Insurance Act, 1938 of India (task *Check 64 VB confirmation*). The insurance company then decides (task *decide*) and either accepts the claim (task *Honour the claim*) or rejects the claim (task *Repudiate the claim*).

The insured is required to submit a detailed estimate of repairs from any repairer of his choice. Generally, these repairs are acceptable but at times the insurance company asks the customer to obtain repair estimate from another repairer, if they have reason to believe that the competence, moral hazard or business integrity of the first repairer is not satisfactory (task *Panel assessment*).Verification of all the claim documents by the approved loss assessor or the surveyor is the task *Check documents.*

Note: Section 64 VB of the Insurance Act, 1938 of India stipulates that no risk can be assumed without prior payment of full premium except when

(i) The entire amount of the premium is guaranteed to be paid by a bank before the end of the first calendar month after the month in which the risk is assumed, or

(ii) An advance deposit is made with the insurer to the credit of the Insured sufficient to cover the payment of the entire amount of premium

Table 1: A fragment of insurance event log : each line corresponds to an event

CASE ID	EVENT ID	PROPERTIES			
		TIMESTAMP			
		DATE	TIME	ACTIVITY	RESOURCE
1	4587320	11/8/2011	15:05	Register claim request	Raj
	4587321	11/8/2011	15:30	Examine	Sam
	4587322	11/8/2011	15:45	Check 64VB confirmation	Mano
	4587323	11/8/2011	16:30	Decide	Ravi
	4587324	11/8/2011	16:45	Repudiate the claim	Mani
2	4587331	26/04/2011	11:30	Register claim request	Sam
	4587332	26/04/2011	11:45	Check 64VB confirmation	Mano
	4587333	26/04/2011	12:00	Examine	Raj
	4587334	26/04/2011	12:30	Decide	Ravi
	4587335	26/04/2011	12:45	Honor the claim	Mani
3	4587341	29/06/2011	18:20	Register claim request	Raj
	4587342	30/06/2011	9:45	Examine	Ravi
	4587343	30/06/2011	10:15	Check 64VB confirmation	Mani
	4587344	30/06/2011	10:40	Decide	Mano
	4587345	30/06/2011	15:20	Panel assessment	Sam
	4587346	30/06/2011	16:00	Examine	Mano
	4587347	1/7/2011	10:00	Check documents	Sam
	4587348	1/7/2011	11:00	Decide	Mano
	4587349	1/7/2011	13:15	Honor the claim	Ravi
4	4587351	3/3/2011	10:00	Register claim request	Ravi
	4587352	3/3/2011	11:00	Examine	Mani
	4587353	3/3/2011	11:15	Check 64VB confirmation	Sam
	4587354	3/3/2011	12:10	Decide	Mano

	4587355	3/3/2011	15:25	Panel assessment	Sam
	4587356	3/3/2011	17:00	Check documents	Mano
	4587357	3/3/2011	17:45	Examine	Sam
	4587358	4/3/2011	9:30	Decide	Mano
	4587359	4/3/2011	10:15	Honor the claim	Mano
5	4587391	17/09/2011	11:30	Register claim request	Sam
	4587392	17/09/2011	11:45	Examine	Mano
	4587393	17/09/2011	12:30	Check 64VB confirmation	Mano
	4587394	17/09/2011	12:45	Decide	Ravi
	4587395	17/09/2011	15:30	Panel assessment	Mani
	4587396	17/09/2011	14:10	Check documents	Raj
	4587397	17/09/2011	15:00	Examine	Ravi
	4587398	17/09/2011	15:30	Decide	Ravi
	4587399	17/09/2011	15:45	Repudiate the claim	Mani

The above table represents the information in an event log. The bare minimum requirements for process mining are that an event can be related to both a case and an activity.

With the information from the above table we obtain the more compact information representation of the event log as shown below.

Table 2 :Trace of the event log

CASE ID	TRACE
1	(a,b,c,d,h)
2	(a,c,b,d,g)
3	(a,b,c,d,e,b,f,d,g)
4	(a,b,c,d,e,f,b,d,g)
5	(a,b,c,d,e,f,b,d,h)

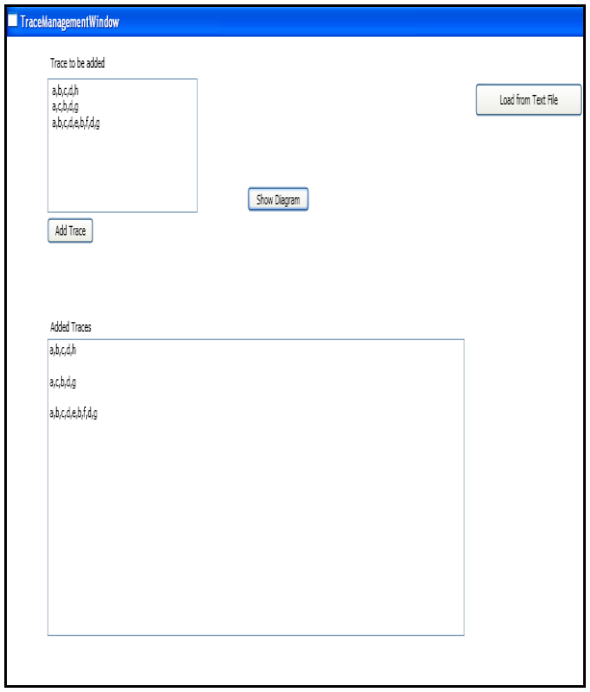
In the above table, the case is represented by a sequence of activities referred to as trace and the activity names are represented by single letter labels. The various labels mentioned in the table denotes as

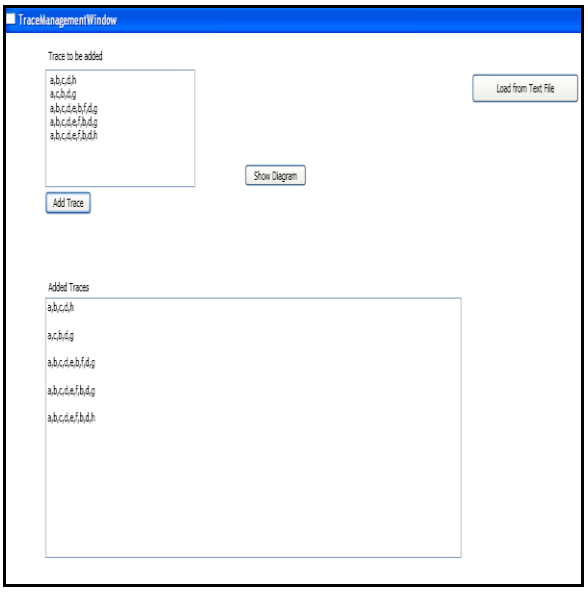
- a – Register claim request
- b – Examine
- c - Check 64VB confirmation
- d – Decide
- e - Panel assessment
- f – Check documents
- g – Honor the claim
- h – Repudiate the claim

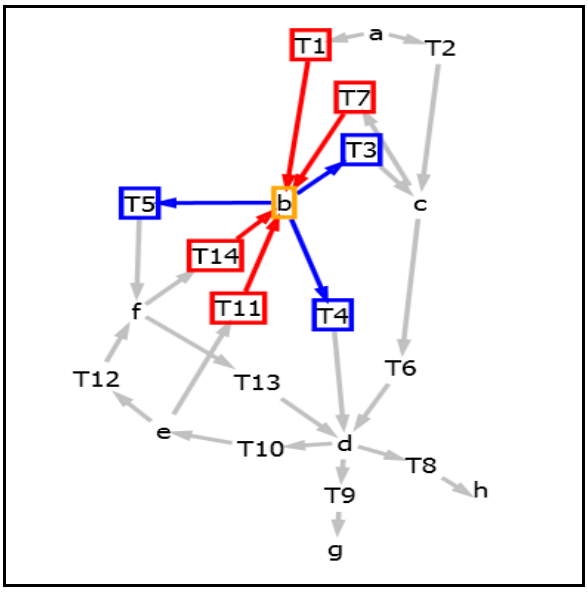
The information given in the above table can be transformed into a process model.

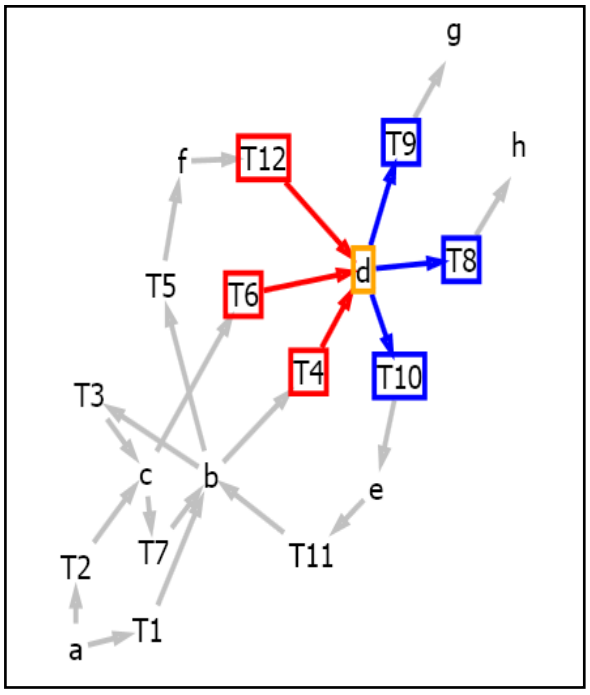
IV. Model Generator of the Trace Table

Model generator takes input from the trace table and generates a model, where a – h are the various activities and T1 – T11 are the transition states.









V. CONCLUSION

In this paper we discussed the challenges in handling digital data by the insurance companies and the suitability of process mining techniques to handle situation was also discussed. The trace table of the motor insurance claim process has been converted into a graphical model which is tangible visual model and may be used to identify the deviations, overlap and deadlock. By eliminating this, the process may be enhanced or reengineered so as to achieve the improved throughput of the process.

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