

Dotted Chart and Control-Flow Analysis for a Loan Application Process

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Abstract. We summarise our approach and results of analysing a real-life event log taken from a loan application process in a Dutch financial institute. We mine the control-flow model and analyse different variants of the process statistically and with dotted charts. This allows us to conclude performance properties of the historic execution of the process. Furthermore we examine the resources assigned to different process steps.

1 Control Flow Analysis

The process describes the flow of customers applying for a loan/overdraft at a financial institute. It starts with creating the application which is done by the customer, followed by several tasks for processing it automatically by systems and manually by employees and finishing with an approval or rejection of the application. The process consists of 3 sub-processes. One focuses on work that involves human interaction spanning across a longer period of time (e.g. checking for fraud, calling the customer, assessing the application) while the other two describe results of an action or a decision about the application (e.g. declined, cancelled, accepted, approved, sent back, finalised, etc.). A submitted application can be declined immediately by the system, which is the most common way of handling applications (happens in 26% of the cases). If the application is not automatically declined, it can either be examined for fraud (and based on that declined or further processed), or further processed by employees. If the application is not declined, it is either pre-accepted by the system or an employee examines it manually (activity “fixing incoming lead”). After that the application is initially accepted and an employee starts filling in information for it. An offer is created and sent to the customer, then the customer is called once or more, in order to discuss the offer. Finally the customer sends the offer back, so it can be assessed. Phone calls with the customer to clarify issues about missing documents constitute the most frequent and time consuming activity in that phase of the process. Based on the assessment the offer can then still be declined or approved (in which case it is also always registered and activated). An approval of the applications happens only 2,246 out of 13,087 times. We used different methods for mining the control flow. The fuzzy miner in the software *Disco* allowed for the best understanding of the process on different levels of abstraction from infrequent behaviour.

2 Dotted Chart Analysis

For getting an overview of the log from different perspectives of the process we performed a dotted chart analysis, i.e. the event log is plotted in a chart. The chart puts various properties of the events (e.g. the activity, resource and trace the event belongs to or the time of its occurrence) into relation. An example of such a chart can be seen in Figure 1. Every dot in the chart represents an event

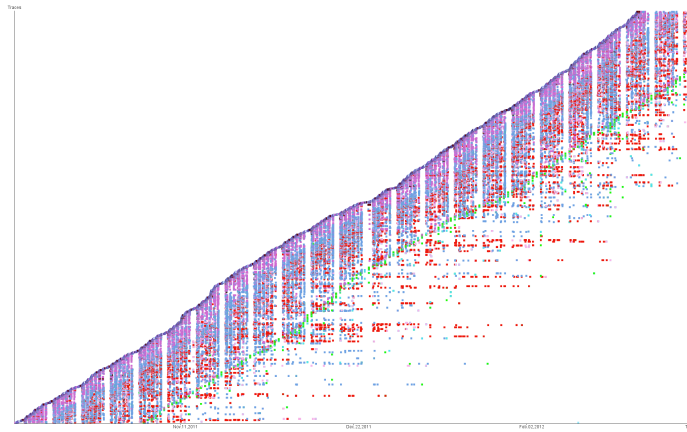


Fig. 1. Dotted Chart of the Event Log

in the log. The coordinates of the dots (time, trace) describe the time the event occurred and the process instance it belongs to. The colour of the dot represents the corresponding business process activity. Process instances (traces) in the chart are sorted by the time of their instantiation. Zooming into the chart and filtering different properties, one can easily see how long the process instances are running, how many and which activities are involved and whether there are repetitions, which days are of low or high workload, etc. Patterns in the chart become obvious (e.g. many applications are cancelled automatically after 31 days) and can then be further analysed. Looking at charts from a resource perspective, we learned more about the performance of the resources and which roles they take in the process (which sets of activities they are assigned to). Six of the resources have rights for approving loans while a single resource is doing most of the fraud checks (78%). More observations and a more detailed description of the process and used methods are given in the full report [1].

References

1. T. Molka, W. Gilani, and X.-J. Zeng, *Dotted Chart and Control-Flow Analysis for a Loan Application Process*, Report for BPI Challenge 2012, <http://www.win.tue.nl/bpi2012/lib/exe/fetch.php?media=molka.pdf>. 2012.