

POMElog: Generating Event Logs from Unplugged Processes

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Abstract. We consider *unplugged processes* to be those processes that are not supported by any information system. In order to analyze them using Process Mining techniques, those processes could be video recorded and then watch the recordings to create an event log. POMElog was developed as a simple user-friendly process-aware tool to aid a domain expert on manually tagging unplugged processes recordings. The tool allows to create events, update times, and export the event logs generated. Also, the tool has been used in real cases, specially to generate event logs for surgical procedures in the medical education domain.

Keywords: process mining, log generation, event logs, PODS4H

1 Process Mining for Unplugged Processes

Process Mining and other Process-Oriented Data Science techniques have been widely applied to processes supported by an information system that records event data about their execution. This event data is extracted from the information system database, and an Event Log is created to be used by process mining commercial or open-source tools. However, there are other processes that could benefit from a similar analysis, but that are not supported by any information system, and therefore, there is no database with event data stored on it. Examples of those processes are manual tasks, such as the repair of an air conditioning system or a surgical procedure. We call the former *plugged processes* and the latter *unplugged processes*.

In [1], the authors propose a method to analyze unplugged processes using process mining. In this particular case, the processes were surgical procedures in the context of a medical training course. The method proposes to record the unplugged processes, then to watch them, and manually tag the activities that happened in the moment they occurred. This tagging was subsequently exported in terms of an Event Log in order to analyze it using Process Mining tools. Figure 1 shows a comparison of the proposed approach for unplugged processes and the classic one for plugged processes.

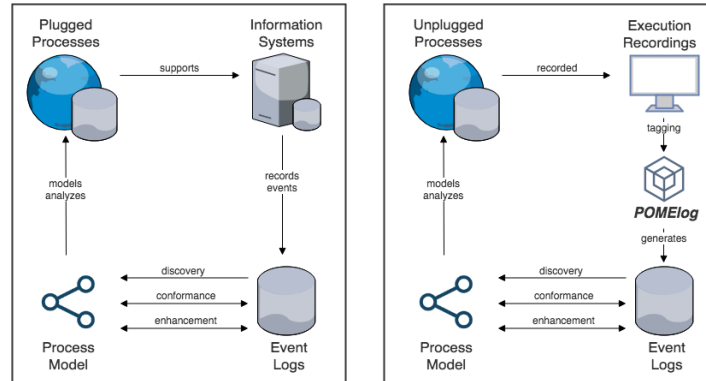


Fig. 1. Process Mining for plugged processes (left) and unplugged processes (right).

The key step of the method was the tagging procedure. It was necessary to have a tool that aided the domain expert on the tagging process. The criteria defined for the tool were: 1) *user-friendly* for non-computing related domain experts (e.g., a doctor in this case), 2) *simple* since domain experts could get overwhelmed with options and menus, and reject the use of the whole methodology, and 3) having an underlying *process-oriented* perspective and treating processes in the tool as first-class citizen, incorporating the notion of event log, activities, instances, among others. Pilot studies were developed with tools from other domains, e.g., VCode VData. However, they were far from intuitive for non academic experts, and they were not process-oriented friendly. Finally, we decided to develop our own tool that satisfied all three criteria: *POMElog*.

2 POMElog and its Features

In this section, we introduce the main features of POMElog. Figure 2 shows where are these features in the tool interface:

Interact with the recorded processes: The tool allows to interact with the video in a common way, i.e., play and stop the video, move forward and backwards, mute and allow sound, and to display the video in full-screen to observe the details in a more clear way. See area B in Figure 2. POMElog allows to decrease the speed of the video, to analyze the difficult parts that require a slow video but without having to stop it, and to increase the speed to identify activities in processes with a high sparsity of activities. See D in Figure 2.

Walk through the list of activities: Giving an unplugged process and its corresponding set of activities, the tool allows the user to walk through the list of activities. For an easy and more direct access to the activities, those are grouped in sets (with an intuitive name and a color). For example, those sets could correspond to different phases of a process. Once clicked, a set expands showing the list of activities associated to it. Each activity has a short name

(to easily identify the activity), and a longer and more descriptive name to fully understand when the activity should be identified in the video. See A in Figure 2.

Adding a new event: When an activity is clicked, it is directly added to the event log (see area C in Figure 2), with the time (start and complete) the video was at the time of clicking. The video can be played or stopped (for more precision) at the time of the event creation. Events are displayed in ascending order by the time of their creation, to facilitate access for the user. Events can be easily removed clicking the rubbish bin icon.

Updating start and end time: That is probably one of the most intuitive and appreciated features by the final users, specially compared with other tools. Clicking on the time (start or complete) of an activity will update the time with the video time in the moment of the click. A common action is to create the event at the start of the activity, and wait for it to finish to click on the end time to update it. Notice that, unlike some tools, POMElog interface has no drag-and-drop bars for each activity that would over-complicate the interface.

Event log export: Finally, POMElog allows to export the events in terms of an Event Log (currently in CSV and XES in the future). The tool allows both to export it at the activity level (the more classic approach), or at the set/phase level, where the activities of the Event log are defined by the set/phase of the event and not the activity of the event. The latter is useful for a high-level analysis of the process. See E in Figure 2.

Notice that, in Section 4, there is a link to a video and a demo of the tool, where the features could be better understood. POMElog was developed as a user-friendly intuitive simple tool to aid domain experts on generating event logs from manually tagged recordings of unplugged process executions. Notice that, the name of the tool, POMElog, derives from the domain where it was first used, i.e., Process-Oriented Medical Education (POME).

3 Maturity and Case Studies of POMElog

POMElog is a mature tool used in a larger software suite for unplugged processes in the medical education domain. Consequently, there are several case studies:

Tailored Process Feedback [1]: In [1] the authors proposed an approach to provide *Tailored Process Feedback for Surgical Procedures in Medical Training*. In this case, the authors analyzed videos of the execution of central venous catheter placements on a medical phantom by a group of students on a surgical training course. Event logs were generated from the videos using POMElog, and latter used as input for the process mining tool Celonis to create meaningful process-oriented reports.

Conformance Checking Challenge 2019 [2]: In 2019, the *Conformance Checking Challenge 2019 (CCC19)* was proposed as part of the 1st International Conference on Process Mining. In this challenge, the participants were provided with a model and a log, being the challenge to provide a meaningful conformance report on the case. In that edition, the event log provided was generated using POMElog.

4 Screencast and Availability

As it was mentioned, POMELog was developed as a tool to be used in a larger suit called POME (Process-Oriented Medical Education), a web system developed to completely incorporate the process perspective into the training of surgical skills. POME allows the creation of courses, grades, users, activities, and roles. Given the nature of the information contained in POME and the non-disclosure agreements (NDA) considered in the project, in this demo paper we provide a proof-of-concept prepared version of POMELog. This version is available for reviewers and readers in <https://pome-icpm.firebaseio.com>. It contains a pre-loaded set of activities and a single video to tag. To illustrate the maturity of the tool, both the set of activities (in Spanish) and the video corresponds to a real medical education case used in a real analysis [1]. Additionally, there is a screencast in <https://youtu.be/IJKbrFhwq2A> showing the main features.

5 Conclusion

This paper presented POMELog, a tool to generate event logs from unplugged processes, i.e., processes that are not supported by an information system, but that could benefit from being analyzed using Process Mining and other Process-Oriented Data Science techniques. The tool visualizes video recordings of such unplugged processes executions, and allows the user to manually tag activities according to when they start and finish in the video. The tagging can latter be exported in terms of an Event Log to be analyzed with state-of-the-art Process Mining tools. Notice that, POMELog was designed to aid in the manual (not automatic) tagging for a domain expert, reducing the time and effort needed. That is not necessary a bottleneck of the approach, and there are scenarios where that could be beneficial (e.g., pedagogically, medical students tagging they own video increases the understanding of their mistakes). Despite that, POMELog could include future features that automatically aid in that manual tagging. For example, suggesting/predicting an activity (or a small set) to be included next, based on previous taggings of the same processes.

Acknowledgments. CONICYT FONDECYT 11170092, CONICYT REDI 170136, VRI-UC Interdisciplinary II170003, FOND-DCC 2017-0001, CONICYT-PFCHA / Doctorado Nacional / 2017-21170612 and 2019-21190116.

References

1. Lira, R., et al.: Process-oriented feedback through process mining for surgical procedures in medical training: The ultrasound-guided central venous catheter placement case. *Int. J. Environ. Res. Public Health* **16**(11) (2019)
2. Munoz-Gama, J., , Garcia-Bañuelos, L., Armas-Cervantes, A.: Conformance Checking Challenge 2019 (CCC19). In: ICPM, Aachen, Germany, June 24-26, 2019 (2019)

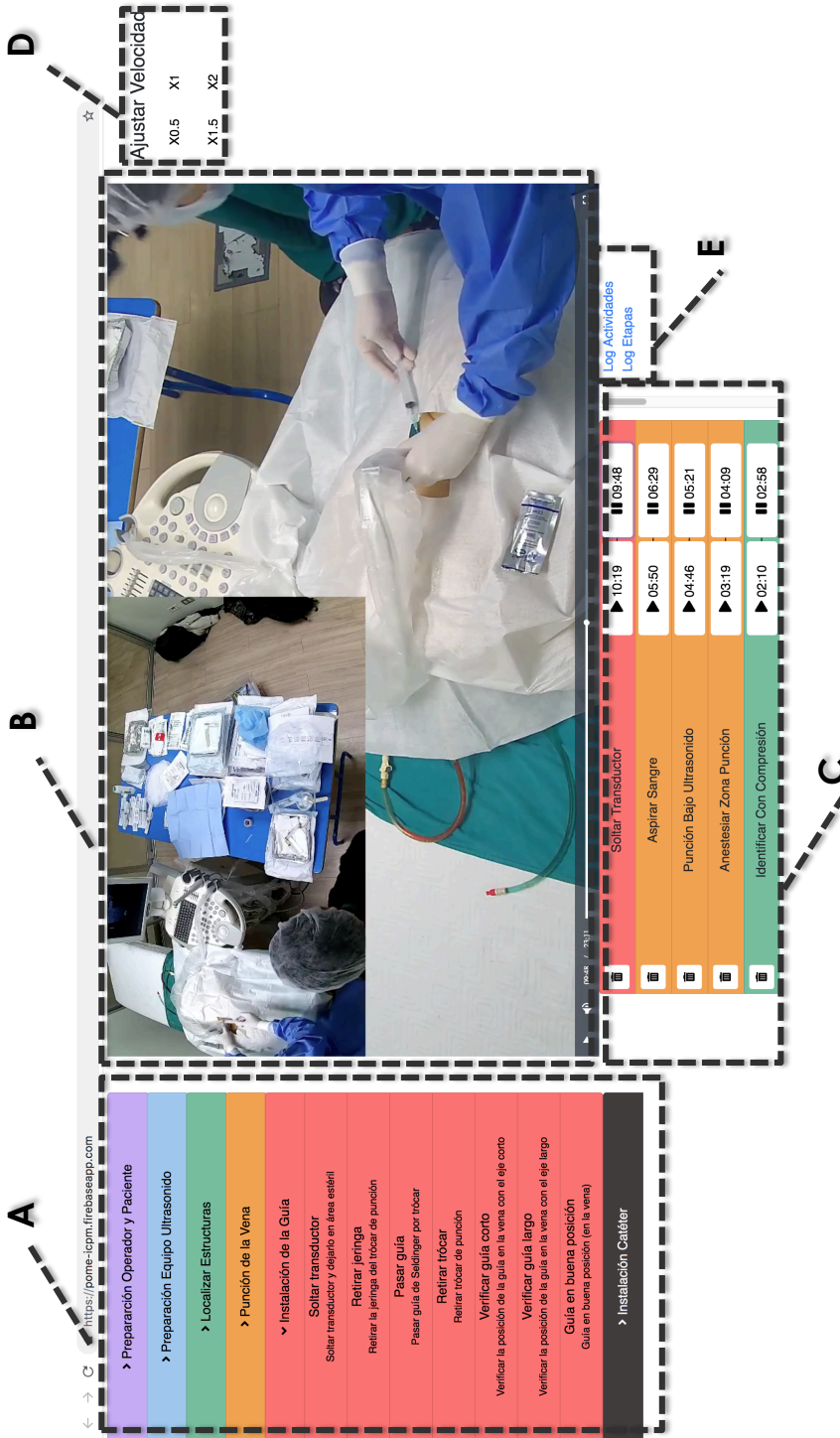


Fig. 2. POMElog and features.