Probabilistic Estimation of Unobserved Process Events (Extended Abstract)*

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By performing business process management (BPM), organizations try to gain competetive advantages and to increase customer satisfaction. BPM assists companies to ensure the quality and efficiency of their business processes. Process controlling plays an important part in process management and happens on the daily operational level. It is necessary to keep track of the performed activities in running process instances to enable process controlling. Delays and deviations from the expected behavior can be detected by business analysts, when the processes are monitored. Yet, to enable monitoring, process events need to be collected from the process environment.

In cases of automated process execution by a process engine, monitoring is available for all orchestrated process activities. Many business processes, however, do not lend themselves to automatic orchestration. An example can be encountered in hospitals, where most business processes are manually enacted. In practice, it is often inefficient or infeasible to document and monitor every step in the business process. Additionally, manual process execution and documentation is prone to errors, e.g., documentation of performed activities is often missing. Here, organizations need to deal with process events that occur, but remain unobserved by the monitoring environment. Even without the precise record of when the events occurred (or will happen), an unobserved process event can serve as basis for operational process decisions. One example is whether to invest in more resources to ensure timely completion a case, if anticipating that the case will be finished too late.

In such settings, we offer means to reason about unobserved process events in a probabilistic way. For example, we provide answers to critical questions of process managers, such as ”when will this case be finished?”, or ”when did we perform the activity that’s missing from documentation?” We rely on an advanced probabilistic model that is based on a stochastic variant of Petri nets and provide the required toolset in the open source platform ProM. That is, we provide techniques to enrich models based on historical observations, to predict the remaining time of processes, and to ensure quality of documentation by missing data management. Additionally, we propose a mechanism to optimize configuration for monitoring and prediction. That is, we offer guidance in selecting the most important activities to manually document. The proposed approaches are evaluated against state-of-the-art approaches using real process data of a hospital and also with process data gathered from further domains showing more general applicability.

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