PACMEL

Process-aware Analytics Support based on Conceptual Models for Event Logs (**PACMEL**)

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- **Duration:** 24 months
- **www:** external webpage

Motivation

Nowadays great attention is paid to the Industry 4.0 concept, whose central idea is the exploitation of large amounts of data generated by different kinds of sensors, to enact highly automatized, robust processes and to develop high quality process monitoring systems that support intelligent semi-autonomous decision making. At the same time, big data analytics as core competency and a process-oriented management approach are very often indicated as pillars of any modern company. Towards this, the main objective of PACMEL is to develop a process-aware analytics framework for analyzing data from sensors and devices, enabling its use for process modeling and analysis, with the aim of improving the business processes according to the BPM cycle. The framework can be applied to the data system of smart factories to support the business process management activities in the scope of process modeling and analysis. On the one hand, it will allow the creation of conceptual models of particular industrial processes being executed in the factory, taking into account the various abstraction levels of the collected data. This will be achieved by combining knowledge extraction techniques with semantic technologies such as ontology-based data access and integration. On the other hand, it will support model mapping methods and visualization techniques that allow one to relate the interpreted sensor data to the process models for process analysis. We will use a real dataset, related to a very complex and specific process, from an industrial domain (mining). The complexity of the considered process is a consequence both of its intrinsic characteristics, and of the conditions under which it is realized. Working with this challenging example will bring valuable insights and results that can be applied across various industrial domains including aeronautics and manufacturing.

Intended results

The main challenge tackled by the PACMEL project concerns the knowledge-based interpretation and use of sensor data in factories to improve process-driven management. This challenge is especially important in the classic production plants and mines that aim at transitioning to Industry 3.0 and later to Industry 4.0. In such facilities, although it is common to encounter both low-level sensor networks and high-level BP management (BPM) systems, there is still a semantic gap between the low-level

sensor readings and the high-level BP models. Specifically, in PACMEL we will address the following research questions:

1. How can we extract relevant events from different dataset formats (unstructured/structured) to discover the business processes being executed?
2. How can we combine relevant events to discover complex business processes operating in a networked ecosystem?
3. How can we efficiently support process analysis and modeling for BPM purposes using sensor data-based event logs?

To address these questions, we will combine knowledge extraction techniques with semantic technologies, and ontology-based data access and integration technology. We will create a general process-aware analytics framework that can be applied across various industrial domains.

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