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This set of summaries offers an overview of Business Process Management (BPM) and Automation, with a focus on Business Process Monitoring.

Introduction

There are two types of process monitoring: active process monitoring and passive process monitoring. The first one refers to the real-time tracking of business processes. The second one only delivers insights about business processes upon request. In Business Process Management, one of the main challenges is that general approaches lack automation. That emphasizes a gap between the business world and the technological world. To fill this gap, a new system called Semantic Business Process Management (SBPM) was created.

Semantic Business Process Management (SBPM)

SBPM¹ combines traditional business processes with semantic technologies such as Semantic Web systems and SWS. It aims to provide accurate insights into business process execution by monitoring event logs and analyzing their behavior.

SBPM is a 5-steps process using ontologies (formal representation of knowledge) to define formal conceptualization:

- **Observe:** Ontologies play a pivotal role in transforming monitoring information into a semantic form. The goal is to enable better navigation, manipulation, and queries.
- **Evaluate:** During this phase, timely computation of business metrics such as execution time is assessed to support business practitioners. SWS technologies orchestrate different analysis techniques.
- **Detect:** The goal is to identify and predict anomalies, also called “deviations”, or unexpected process behavior.
- **Diagnose:** When a deviation has been detected, it is up to the user to interpret the data using the structured approach.
- **Resolve:** After detecting a deviation and diagnosing it, it is time to design and apply a resolution strategy. Due to the multiplicity of reasons that could have caused a deviation, this is a complex phase. It is known as the orchestration of SWS, where users specify their own strategies.

The major advantage of SBPM is that it uses ontologies, which enhance data interpretability.

Traditional Business Process Management

Business Process Management² consists of controlling, adapting, and optimizing business processes. It's also defined as a systematic approach to capture, shape, execute, assess, and monitor automatic and non-automatic processes. BPM aims to improve corporate performance by spotting issues. BPM is widely used. According to an anonymous survey

¹ Summary of “An Outlook On Semantic Business Process Mining and Monitoring”.

² Summary of “Automated business process management (BPM) - in times of digital transformation using machine learning or artificial intelligence”.

done among 25 digital companies in Germany, BPM is known and used by all of them. Furthermore, 85% of the respondents indicated that they'd like more process optimization and BPM applications. The survey also highlights how important AI, machine learning, and deep learning are in process optimization.

AI and Automation in BPM

As one of the main driving factors behind the development of digitization³, AI demonstrates a high potential in fostering innovation and developing automation. However, it still needs to be investigated to grasp the full understanding of its potential. Nowadays, business processes tend to be data-driven, which makes them prone to AI use. In this case, AI could automate some tasks, increase available manpower, and provide insights that humans can't. Based on this reasoning, BPM researchers developed new AI methods such as **Reference Model Mining (RMM)**, **Predictive Process Monitoring (PMM)**, and **Process Discovery (PD)**.

- **RMM** combines automated approaches with human intelligence to achieve results efficiently.
- **PMM** uses Deep Learning to predict events and anticipate future process behavior.
- **PD** aims to establish a common meaning of Process Discovery for both AI systems and human process miners. Ultimately, it'll help them optimize their different approaches.

Hence, AI is a valuable tool when it comes to optimizing Business Process Management performance. Each approach has its own set of advantages, depending on the different BPM stages.

AI legal challenges and limits

AI is now used in several fields and by different entities as it offers interesting optimization possibilities. But questions arise regarding its limitless capabilities. The article mentions the example of how AI and machine learning could help entrepreneurs monitor legal requirements to prevent legal disputes⁴. However, it has its set of drawbacks. In this case, risks are related to the lack of interpretability, audibility, data privacy, and cybersecurity. Another questionable use of AI is how governments, and in this case, Russian authorities, leverage AI to track illegal activities. Russian tax authorities widely use AI to ensure tax regulation compliance, and monitor entrepreneurial activities, preventing violations. This raises questions about the legal weight that AI can have. That is why AI should be regulated based on security and transparency principles, as well as technological sovereignty. In a world where AI can be used for such a broad range of activities, from data quality assessment to surveillance, some ethical questions keep arising regarding the limits of AI.

³ Summary of "Leveraging Artificial Intelligence for Business Process Management (Extended Abstract)".

⁴ Summary of "Prospects of Artificial Intelligence Use for Business Monitoring Legal Aspects"