First International Workshop on Artificial Intelligence for Business Process Management (AI4BPM)

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The use of AI in BPM has been discussed as the next disruptive technology that will touch almost all of the business operations and processing activities being performed by humans. In some cases, AI will dramatically simplify human interaction with a process, in other cases it will extensively support humans in the execution of tasks, and in yet other cases it will enable full automation of tasks that have traditionally required manual contributions. Over time, AI may lead to entirely new paradigms for business operations and processes. For example, instead of BPM models centered on process and/or case management, we anticipate models that are based fundamentally on goal achievement, as well as models that fully enable continuous improvement and adaptation based on experiential learning.

AI examples are:

- Machine learning and genetic algorithms for data analysis, e.g., predictive monitoring, workflow discovery, and reachability
- Fuzzy reasoning for supporting business process modeling
- Neural networks for placement detection in assembly workflows

These are only a few examples of what AI technology can do to improve and reengineer business processes. Recently, major IT companies have developed cognitive services to make AI technology ready to use for developing applications. Many large companies started projects to plug these services into their processes or to develop their own AI solutions based on these services. At the same time, AI researchers are discussing safety issues and identifying important sources of risks in AI solutions.

The workshop identified many potential sources for synergies between AI and BPM. On the one hand, several AI solutions can be used in the context of BPM, e.g., planning for adapting or composing business processes, machine learning for process mining and analysis, constraint reasoning for process transformation, verification, and compliance checking.

On the other hand, AI will influence the role of humans within a business process and solutions should be developed to address questions such as novel requirements on employee qualification, shared responsibilities between AI and humans, control and impact of automated decision-making.

Four full and two short papers were presented at the workshop. The focus of the papers ranged from leveraging machine learning approaches for addressing BPM problems to applying planning approaches in BPM scenarios on the one hand, and from analyzing event logs using AI techniques to finding optimal paths in business processes on the other hand.

In particular, Hinkka and colleagues addressed the problem of predicting sequences of activities in business process instances using recurrent neural networks. Ponnalagu and colleagues propose an approach leveraging process context, state, and goals to predict process performance. Høgnason and Debois leverage genetic algorithms for solving the problem of event reachability for DCR (dynamic condition response) graphs. Shing and colleagues present a pipeline for discovering workflows from unstructured natural language texts. Eshuis and Firat propose the use of fuzzy logic for modeling uncertainty in guard stage milestone (GSM) declarative artifact-centric process models. Finally, Knoch and colleagues leverage AI technologies and techniques to automatically detect material picking and placement in the assembly workflow to gather accurate data about human behavior.

The importance of the synergy between the AI and BPM fields also emerged in the keynote by Tijs Slaats. He showed how techniques for temporal logic verification can be applied for discovering declarative process models. Moreover, he also showed how these techniques have recently been used in combination with Petri nets discovery approaches in order to mine hybrid process models, which contain both a declarative and a procedural part.

Each talk was followed by an interesting discussion with the audience. Everybody agreed to continue this experience at next year's BPM conference and to take the chance to further foster the interaction between AI and BPM by targeting with the call for paper also other research areas at the intersection between the two fields.

To sum up, the workshop received a significant number of submissions and a very good attendance. It clearly showed the strong interest of the BPM community in how the AI and BPM fields can potentially fertilize each other. Of course, many of the questions raised in the call for papers remained unaddressed by this year's submissions, e.g., assessing the business risks of AI technologies, understanding the interplay of humans and robots in business processes, using AI technologies such as AI planning to create dynamic business processes. However, we believe that this only goes to show how much more can be done in the future in this research direction.

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