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Paper title: ***A General Framework for Predictive Business Process Monitoring***

Keywords specific to the paper:

Predictive Process Monitoring: The use of historical and real-time data to predict the course of current business processes.

business process management, process mining, business activity monitoring, predictive monitoring, and machine learning.

Summary of the main contributions:

The research paper examines the use of various artificial intelligence (AI) techniques to provide preventive monitoring of business processes. Describing a framework involving two main modules to answer research question RQ3, which uses AI methods to perform ongoing business process sequences.

1. The objective of this module is to identify running prefixes that are similar to those in historical logs of completed processes. Completing this step is crucial to understanding how in-progress cases might evolve based on historical data.

2. Having identified similar prefixes, this module analyses the suffixes corresponding to the identified prefixes and investigates a structured prediction model. To do this, it uses AI techniques such as recurrent neural networks and hidden Markov models. These methods are particularly well suited to predicting business processes that are intrinsically sequential and time dependent. Initial experiments have shown that predictions are generally accurate and robust, particularly for short suffixes, i.e. predictions about the next immediate events in the business process. The framework can effectively predict the next steps in an ongoing process with good reliability, but the accuracy of predictions can decrease for longer-term predictions.AI techniques are used for predictive monitoring of business processes in this framework, highlighting their potential to anticipate the outcomes of ongoing processes and, consequently, to improve decision-making and business process optimization.

A predictive framework is developed using a set of historical case traces to predict the most likely outcome of an ongoing process case. This framework combines a multiple classification method with an approach based on complex symbolic sequences, showing superior performance in early prediction with low execution time overhead.

A framework for real-time prediction of processing times and rejection probabilities, allowing checks to be reorganized to minimize over-processing. This method outperforms traditional audit control methods, demonstrating its effectiveness in application areas such as hospital healthcare and insurance.

the development of a framework for predicting how an ongoing process case might unfold to completion. This is based on identifying similar prefixes in historical logs and learning structured prediction models based on these prefixes, using techniques such as recurrent neural networks or hidden Markov models.

- AI model used (e.g. Neural network, etc.)

Recurrent Neural Networks (RNN).

Hidden Markov Model (HMM) tools.

The models are used to analyze the suffixes of the identified prefixes and acquire a structured prediction model, adapted to temporal sequences and complex dependencies between events.

- Introduce the AI models.

Recurrent Neural Networks (RNN)

RNNs are neural networks that can recognize information, such as text, time series or events. RNNs are used to study how business happens and predict next steps using historical information. RNNs are useful for processing information about important events, making them ideal for tracking business processes.

Hidden Markov Model (HMM) tools

HMMs are statistical models that determine hidden states from visible observations. HMMs can be used to predict transitions between different states of a process based on sequences of observed events. HMMs can help find ideas hidden in business processes and predict how they will happen.

- How do they contribute the idea proposed by the paper?

The idea is to use special software tools called artificial intelligence (AI) models to understand what happens next in a business process. These cases are like steps or moments that need to happen to complete a task, such as processing a customer order or managing a service request. Tests have shown that they are accurate at predicting events that are about to happen. These IT tools can help companies to know what is going to happen, enabling them to prepare or change the process if necessary.

Evidence-based BPM methods enable operators to respond to performance and compliance issues in real time. The aim of the research project is to create a robust framework for predictive monitoring, which can be used for a variety of process monitoring tasks.

- Supported by a software application? (If yes, provide more details)

Although the paper discusses the theoretical application of these models, it does not give specific details of a software application that uses these AI models directly.

The paper mentions the production of viable artefacts in the form of software that implements prediction models, indicating that these AI models are actually supported by a software application.

These applications make it possible to predict various properties of current business processes, such as the achievement of performance targets or the presence of work loops. They can predict various properties of current business processes and potentially explain the causes of different case properties. However, specific details about the software application, such as its name, structure or exact functionality, are not explicitly provided. The innovative approach and advances made in the field of predictive business process monitoring are highlighted in these contributions, with a focus on the use of AI methods to improve the accuracy and efficiency of predictions.

“RQ3. How can predictive monitoring methods be used to predict the entire sequence of activities leading to the process end and characteristics of the sequence? In other words, for an ongoing process case, we aim to determine the most likely trace suffix.”

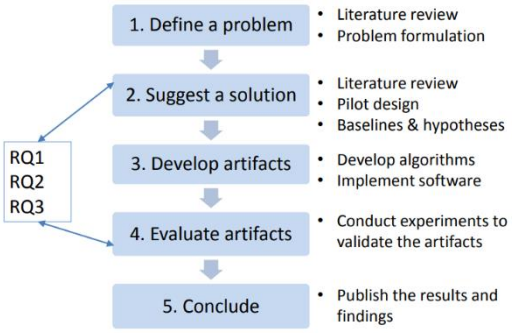

Fig. 3: Research Methodology.