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[Summary 2/4]

This set of summaries offers an overview of the role of AI, in particular Deep Learning, in the predictive process.

Introduction

Deep Learning (DL) is a subset of AI that can enhance predictive process behavior[1]. The article focuses on Long Short-Term Memory (LSTM), a Recurrent Neural Network that falls under the DL scope.

LSTM role in the Predictive Process Monitoring (PPM)

LSTM provides predictions and explanations based on generic Key Performance Indicators (KPI). This specific AI model can **store** information for a predetermined time. It uses **event streams** (sequence of business events chronologically ordered) and **event logs** (record of events that occurred within the operating system) to **predict future events**. LSTM is designed as an individual structure containing memory cells and inputs, outputs, and forget gates, enabling it to **control the flow of data**, **manage information**, and **provide predictions**. This AI model is beneficial for improving predictive monitoring in business processes. Its prediction capabilities outperform traditional Neural Networks because of its **long-term memory**. However, as a DL model, LSTM needs to be integrated with software applications to work properly. Indeed, software applications provide data streams that are crucial to the predictive process. In its case, LSTM uses Pandas to manage data[2].

Predictive Monitoring for Business Processes and Interpretability

Predicting future events is particularly helpful in the monitoring process as it enables early detection of potential issues, performance optimization, and data-driven decisions. However, predictive business monitoring must feature explanation capabilities to certify the accuracy of the predictions. The AI model LSTM, uses the library Keras to explain predictions to humans. The explanation not only helps humans understand the prediction, but it helps them understand how the model works. Within the Deep learning realm, another example of neural network integrating explanation capabilities is the **Gated Graph Neural Networks (GGNN) model**[3]. While LSTM focuses on **sequential data**, GGNN is well-suited for **graph-structured data**. GGNN visually represents chronological data for stakeholders to understand what's behind a prediction and help them make decisions. The model is also able to assist with **risk management** by identifying potential risks. This fosters a proactive approach to the monitoring process. An innovative approach[4] to improve business process outcomes and monitoring using Machine Learning suggests the integration of both structured and unstructured data. The goal is to link correlation and causation to improve AI models and better understand business processes. This innovative approach could benefit not only **LSTM** but also AI models such as **XGBoost**, a very efficient model able to analyze structured data and organize tasks.

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[1] Summary of the article "Deep Learning For Predictive Process Behavior"
[2] Summary of the article "Explainable Process Monitoring"
[3] Summary of the article "Explainable Predictive Business Process Monitoring Using Graph Neural Networks.
[4] Summary of the article "Predictive and Prescriptive monitoring of Business Process Outcomes"