

Integrating Artificial Intelligence into Business Process Mining: Challenges, Advances, and a Roadmap for Innovation

This article looks at the application of artificial intelligence (AI) techniques to improve business process (BP) mining. It highlights the limitations of traditional methods and proposes a roadmap for the integration of AI in this field.

First, the importance of business process (BP) mining for organizations seeking to optimize their operations is highlighted. Traditional BPM techniques are limited in their ability to handle the complexity and growing volume of process data.

Traditional business process mining techniques face several challenges, including the difficulty of handling nested loops, duplicated and hidden tasks, and concurrent processes. These methods also struggle to detect anomalies, predict, and recommend actions in real time.

Recent advances in AI, including machine learning (ML) and deep learning (DL), offer new perspectives for overcoming these deficits. AI enables efficient pre-processing of log data, eliminating anomalies and extracting relevant features for event prediction and suggestion.

Roadmap for PM Exploration via AI

Stage	Description	Objectives	AI methods involved
Data pre-processing	Extract relevant features from event logs	Classify processes and identify anomalies	Data cleaning techniques, feature extraction
Model enhancement	Model enrichment with additional attributes	Increase accuracy and relevance of PM model	Supervised learning, semantic enrichment techniques
Output form	Determining the optimal form for representing results	Facilitating understanding and application of results	Graphical modeling, generation of formal business rules
Dynamic management	Updating the model as PM evolves	Keeping the model up to date with current practices	Continuous learning, dynamic adaptation techniques
Complexity management	Extracting complex behaviors from logs	Understanding complex, multi-faceted business processes	Neural networks, clustering algorithms
Prediction and recommendation	Using AI to predict and recommend actions in PM	Improving real-time decision-making in PM	Deep learning, recommendation systems
Parallel and distributed computing	Designing an optimal system for processing large amounts of data	Efficiently managing the growing volume of PM data	Frameworks such as MapReduce, Hadoop

To rigorously understand business processes and efficiently analyze the execution traces stored in their information systems, traditional methods are often complemented by innovative approaches using ML. These algorithms help in various aspects of PM, including extraction, prediction, recommendation, error detection and more.

The article concludes with the need to develop an optimal model integrating anomalies, semantics, and hidden rules from log data. It also considers the use of ontological concepts and deployment on real data from social networks to test the performance of the systems designed.

This detailed summary should provide a solid basis for your fellow students to summarize this article without omitting essential information.