AI and KPI-Based Decision and Optimization Algorithms

Explainable AI by Means of Interpretable KPI Labels

Qualitative labeling as an AI method combines decision-making and optimization algorithms (DOA) with machine learning. The associated Deep Qualicision software learns to set DOA parameters efficiently, so that almost any DOA technique working on business process data can automatically adjust itself. In more general terms, the method can be used for learning relations that are created by any AI-based decision-making systems. This is done by determining of KPI-based evaluations on the input and output patterns of the respective AI system. The evaluations describe which input and output patterns perform more positively for which values, and which more negatively.

If time series are formed using such generally preprocessed evaluations, Deep Qualicision is able to create systems of data clusters that allow analyzing the behavoir of the AI decision-making system to be analyzed from the perspective of the business process the AI system is intended for. This creates a new KPI-related view of the results of the AI system, which does not help to explain the results relating to AI, but does this from the perspective of the target business process. In this way, an AI system, which represents a black box from the business process's perspective, is given a business process-related KPI explanation component, which helps to understand the behavior of the black box on a KPI basis.

Machine Learning Method Automatically Recognizes KPI Goal Conflicts

The core of Deep Qualicision is a machine learning technique that is based on independent recognition of KPI goal conflicts in business process data by means of extended fuzzy logic. The goal conflict analysis helps to arrange the process data in such a way that the Deep Qualicision algorithm can independently recognize how to label in which situations.

The Deep Qualicision learning logic can be placed as a surrounding layer around each AI system, whose behavior can be evaluated by KPIs.

In this way, systematically and methodologically proven relations can be learned which create qualitative labels for input patterns of the respective AI system using KPIs of the target process

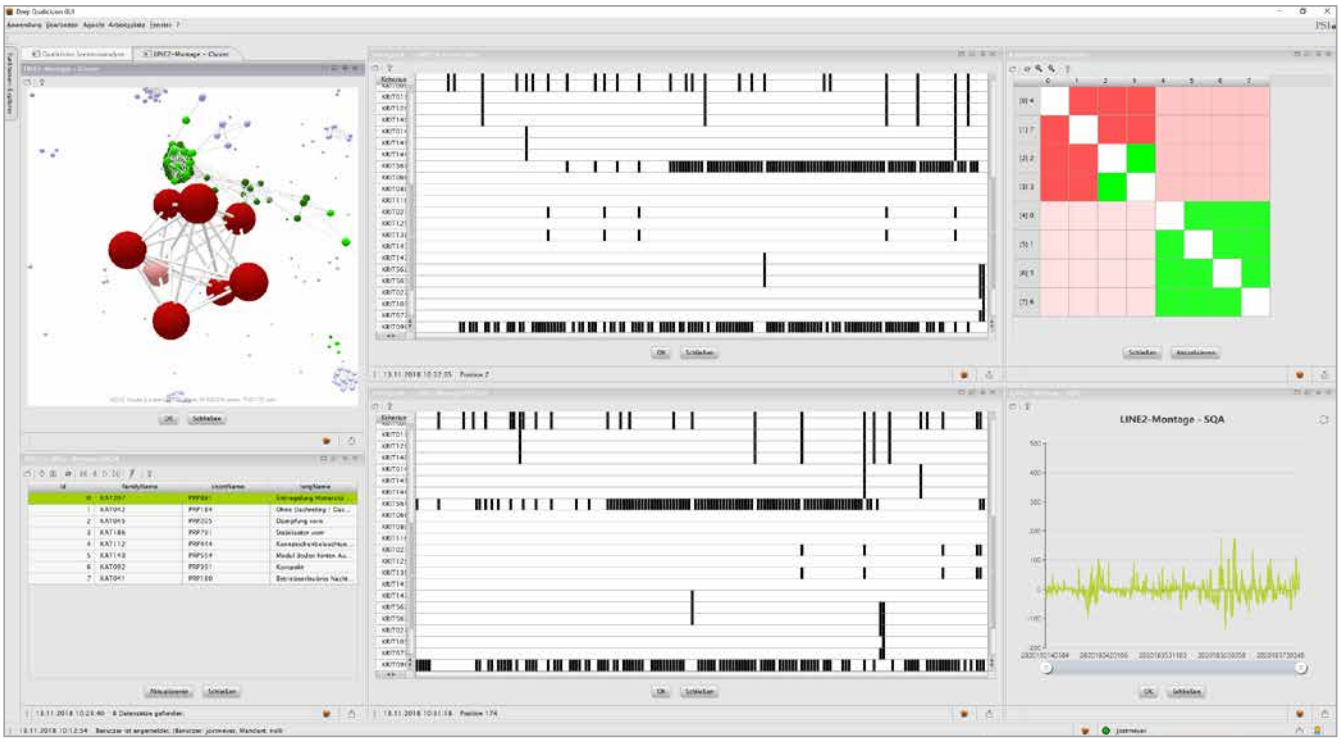

Figure 1: Deep Qualicision GUI based on the PSI Java framework.

or in other words the output patterns of the AI system. Thus, relations, that previously were created by the manual labeling action of human data scientists, can now be detected and interpreted in an automated way. The formerly manual interpretation regarding the positive or negative impact the available data will have on the KPI results of the process (manual labeling) is now done automatically by the analysis of qualitative optimizations. If the results of the analyzed AI system can be evaluated and described using KPIs, the previous bottleneck of data processing for AI methods can largely be replaced by a much simpler process of describing the results by means of KPIs. Since the description by using KPIs essentially requires knowledge about the process for which the AI system was developed, the method is based precisely on this knowledge and not on the technical AI knowledge of data analysts. The qualitatively labeled data of the AI process can also be interpreted by non-AI experts in connection with appropriate visualizations (see figure 1) and can be made available for additional process-oriented analyses.

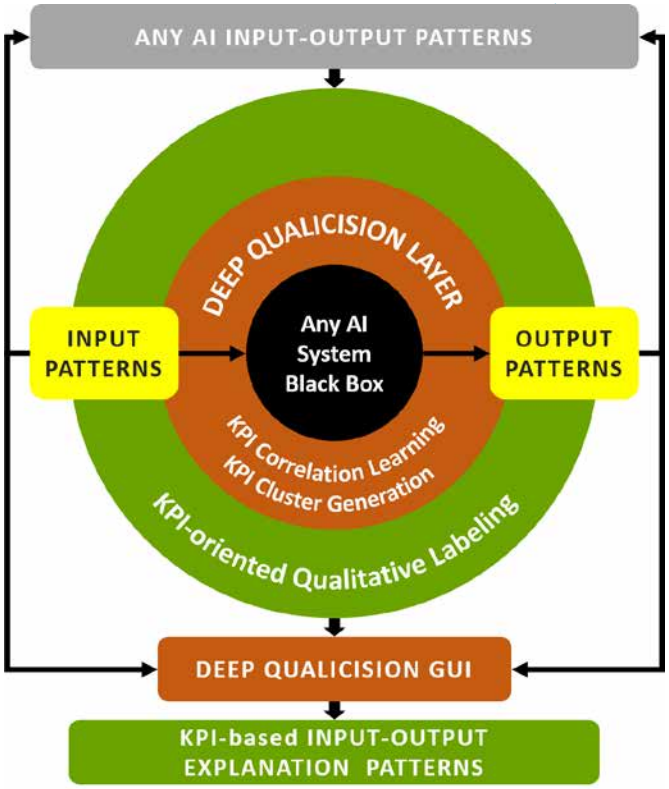

Figure 2: Deep Qualicision layer model for KPI-oriented interpretability.

Since KPI-oriented cluster techniques are one component of Deep Qualicision, the process of automated interpretation and explanation of the behavior of AI systems paves the way to KPI-oriented explicability of AI system results (Explainable AI).

Figure 2 shows how AI systems that are used for handling business processes can be embedded in the Deep Qualicision analysis layer. Process KPIs and their results are easier to understand, as their interpretation requires the technical knowledge of process specialists and not the knowledge of AI specialists.

PSI FLS
Fuzzy Logik & Neuro Systeme GmbH
Dr. Rudolf Felix
Managing Director
rfelix@psi.de
www.deepqualicision.ai