# Qualitative Labeling with Qualicision AI

**As part of the Qualicision AI framework, Qualitative Labeling optimizes raw business process data for machine learning applications by qualitatively assessing measurable data directly from business processes in the context of KPIs (Key Performance Indicators) and analyzing interactions based on this. This automatically creates an algorithmic bridge between the unprocessed raw business process data and artificial intelligence (AI) methods, which significantly simplifies the time-consuming process of manual data analysis for labeling data.**

**Q**ualitative Labeling is based on the automatic detection of KPI goal conflicts and KPI goal compatibilities in business process data. The KPI goal conflict analysis based on extended Fuzzy Logic helps to automatically classify the business process data in such a way that interactions are derived from raw data, which enable the further use of the data by AI methods. The

In contrast to applications such as image recognition or speech processing, where data patterns remain static once they have been labeled, the patterns to be labeled in business process data are dynamic and always structured differently, for example due to continuously changing order mixes and process states, which must be continuously relearned.

classes of data patterns (see Figure 1). These are launched to users for confirmation or correction (see Figure 2).

## Easy introduction to Qualitative Labeling of business process data

Due to the universality of the process, any existing PSI software based on the treatment of KPIs can be used as a KPI labeling engine. First and foremost is the Qualitative Labeling of business process data with KPI evaluations. The input for the software essentially consists of two main components: Firstly, data streams of the business process to be analyzed are recorded and automatically converted into time series using timestamps (see Figure 2, top graph). Secondly, key performance indicators (KPIs) and their value ranges, which are to be used to analyze the business process in question, are agreed with the process owner.

In addition, the value ranges of the KPIs are divided into desired and undesired value ranges. In the example figure 2, the green labels stand for desirable or good signal ranges, while red labels connote areas that are critical, i.e. undesirable from a process perspective.

If, for example, the different transformer voltages are considered as KPIs for a utility company's plant
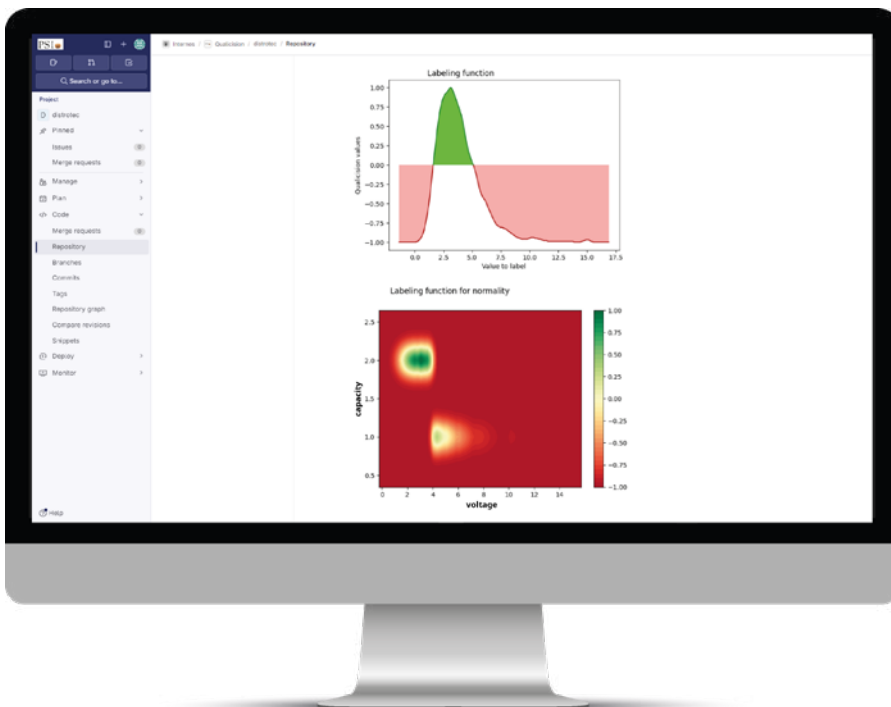


*Figure 1: Qualicision Qualitative Labeling Tool—self-calculated classes of data patterns.*

automated derivation of qualitative labels is so important for the application of AI methods to business process data because business process data changes continuously with the dynamics of business processes.

This can only be done automatically using software. Qualitative Labeling is one such method. It allows interactions to be automatically identified in historicized and current data by means of goal conflict analysis—in the form of self-calculated
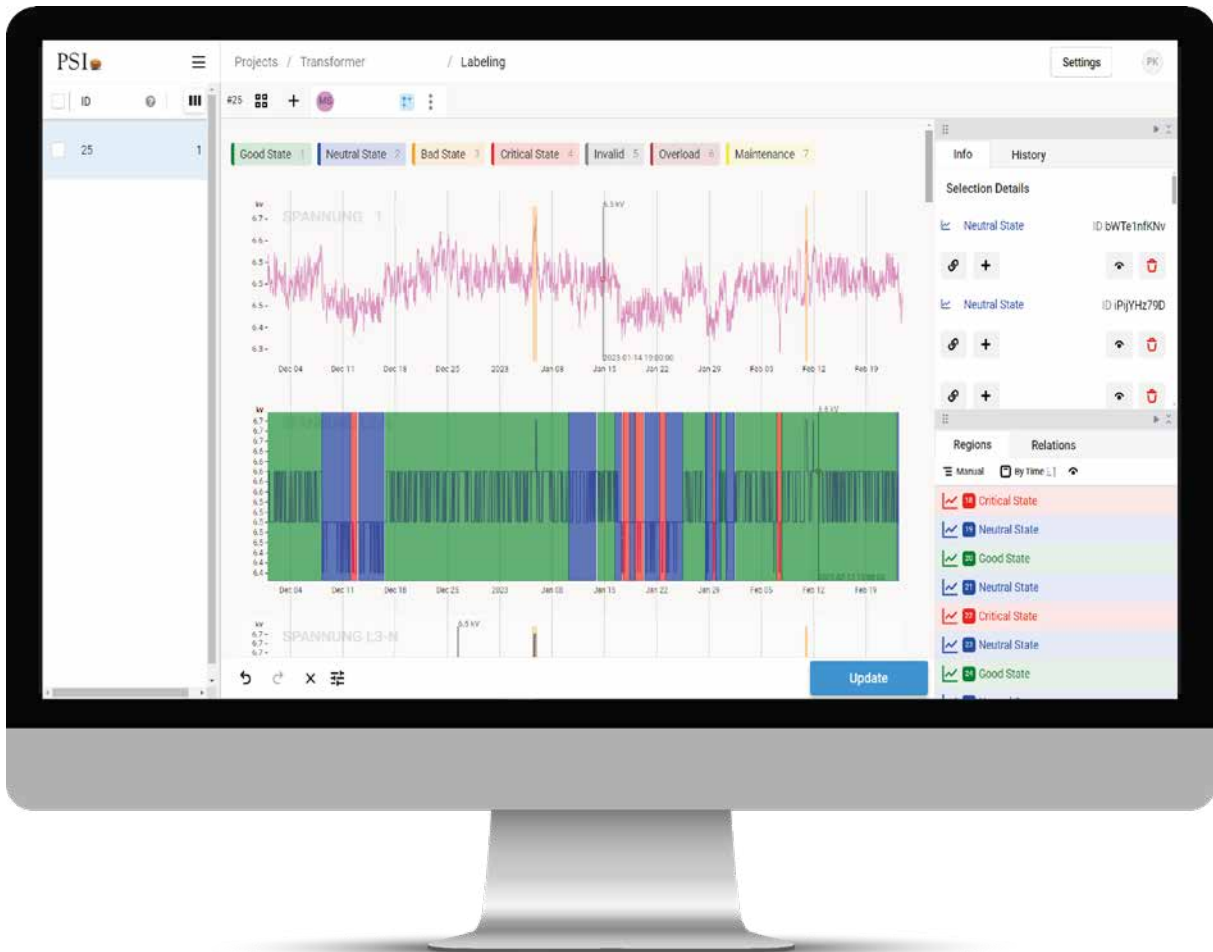
*Figure 2: Qualicision Qualitative Labeling Tool—interactive Qualitative Labels.*

according to their capacity utilization, a percentage value greater than 85% can be defined as desirable and positive for the capacity utilization. Values below 85 percent, on the other hand, are negative and are considered increasingly unfavorable the further they deviate from this minimum target value. A process owner can carry out this evaluation of positive, not desirable and neutral (blue labels) areas even without in-depth knowledge of AI, as these correspond to their everyday evaluation of process flows.

In this way, raw business process data can be evaluated with regard to the defined KPIs and the data can be completed with a suitable number of qualitative labels. The labeled business process data created in this way is much easier to use for AI procedures. The calculated qualitative labels also improve the traceability and explainability of the AI results. In many cases, the qualitative labels are used to bring about the self-adjustment of optimization algorithms, so that learning optimization processes are created from classic optimizations. From the customer's perspective, it is therefore very easy to start using Qualitative Labeling with the help of the Qualicision Qualitative Labeling Tool.

## Machine learning for all PSI software tools

Qualitative Labeling is used as an extended functionality of a switchable machine learning process as part of a Qualicision-based, multi-criteria optimization in order to equip already running PSI applications with learning self-adjustments. This allows the optimization to react to relevant changes in the business process data as well as not requiring the user to do so.

The process can be transferred to any software application via the associated framework. This means that Qualitative Labeling of business process data is available in principle for preparing the use of machine learning methods for all group-wide PSI products that use Qualicision AI technology. ◉

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