SERVICE

Hyperparameter Optimization

*Beyond**Analytics***

ClearVu Analytics™

Why Hyperparameter Optimization in Automated Machine Learning?

A recurring task is building models based on data to represent the underlying relationships. In practice, methods from the field of Automated Machine Learning (AutoML) are frequently used. These include a wide range of modeling techniques such as neural networks, random forests, support vector machines, and radial basis functions. Many of these methods already deliver satisfactory results with their default settings, but there is significant potential to further improve model quality.

Optimizing Hyperparameters

This improvement can be achieved by optimizing the parameters that control the training process, known as hyperparameters. The goal of this optimization is to minimize the error within a cross-validation. Cross-validation ensures that the model maintains strong generalization capabilities. After the optimization process, a set of optimized hyperparameters is available to initiate the final training run.

Integration into CVA Tools

Hyperparameter optimization is integrated by default into all CVA Tools. Unless explicitly disabled by the user, it is always executed. A simple example (modeling the Rosenbrock function[1]) is shown next.

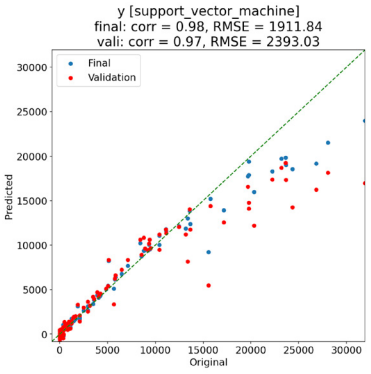

fig. 1: Standard Hyperparameter

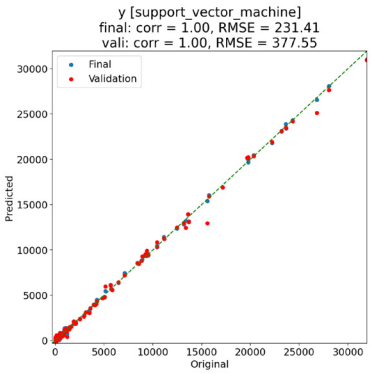

fig. 2: Optimized Hyperparameter

The Benefits of Hyperparameter Optimization at a Glance

+ Automated improvement of model quality
+ On average, +10% higher performance through hyperparameter optimization
+ Robust models thanks to cross-validation
+ Integrated by default in all CVA Tools
+ Reduced error rates (RMSE) and improved generalization
+ Broad applicability: Automotive, Chemicals, Consumer Goods, Manufacturing
+ Support across development, optimization & monitoring

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To illustrate model quality, predicted values are compared with actual values in the charts. Additionally, the Root Mean Square Error is shown for both the final model and the cross-validation. The improvement in model quality, especially for higher values, is significant.

Extensive testing has shown that, on average, model quality can be improved by 10%.

Your Benefit

AutoML, and thus hyperparameter optimization, plays a crucial role in the digital transformation of many industries such as automotive, chemicals, and consumer goods. Data-driven optimizations like these are increasingly used in product development, product optimization, and in production for commissioning, process monitoring, or process optimization.

divis intelligent solutions GmbH

We are specialists in optimizing processes and products, implementing predictive maintenance and predictive quality, and achieving significant improvements and savings for our customers. Our company philosophy “Beyond Analytics” is an expression of our unconventional problemsolving approach, in which we apply the latest methods of artificial intelligence and machine learning for our customers. We have successfully implemented numerous applications in the automotive, chemical and consumer goods industries, among others.

Contact and Information

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