

Enabling Big Data Analysis in SDM Systems: Add-on based Integration of ML Methods

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The vast amount of known and upcoming Machine Learning and Data Analysis libraries as well business intelligence tools and services (e.g. TensorFlow, Theano, Dask, AWS Quicksight, Sagemaker, Dash) or application related machine learning algorithms (e.g. Femalyst or SimExplorer) play a crucial role in the development and deployment of machine learning models. Proprietary interfaces and data formats raise important considerations regarding accessibility and interoperability along a simulation data processing workflow.

Utilizing a simulation data management system leads to a complete record of all simulations carried out, over a defined period of time. This record set usually includes all simulation metadata (such as load case, solver version, and components) and the simulation output (raw output and derived secondary results, such as key-results). Having all this data centrally organized and stored in a uniform structure allows further data analysis and knowledge extraction across multiple simulations. Open ML libraries and third-party black-box solutions can help to extract insights from the data stored in the SDM system, identify patterns and trends, and make data-driven decisions.

In SDM systems, fundamental data analysis and visualization solutions are often integrated or could be integrated relatively quickly, but moderate to complex approaches are more challenging to integrate, which is typically different from the core business of an SDM system vendor.

This presentation will demonstrate the technical approach of SCALE.result - the Add-on concept - for integrating third-party solutions into a SDM system by utilizing Femalyst from SIDACT as exemplary show case.

The tool Femalyst aims to identify anomalies in structural behaviour (outlier or so-called events) and indicate in which area of the structure the simulation result deviates substantially from the previous results. The analysis results of events are provided with a score value, allowing the user to assess the degree of deviation. Each detected event is further visualized by preview animations and 3D sub-models, which allows the user to instantly evaluate the outlying simulation.

Based on the presented Add-on approach, SIDACT is enabled to include their technology as third-party tool into an existing SDM System with a proprietary front and backend part and access to the simulation data within the platform SCALE.result.