

# DevOps



## Advancing Machine Learning With DevOps

Machine learning is one of the most promising applications of artificial intelligence in businesses. However, almost nine out of ten projects fail before they even go live. DevOps and MLOps can help.

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**A**llowing failure is one of the most basic prerequisites for innovation. If you are not prepared to fail, you will not be able to create anything new. As the German CTO of a Japanese IT service provider with a strong culture focused on innovation, I myself am deeply convinced of this. However, if only one of ten machine learning projects ever go live, something is definitely wrong. After all, machine learning is one of the central applications of artificial intelligence (AI) and the basis of numerous future technologies such as autonomous driving, smart cities, and the Industrial Internet of Things (IIoT). To advance ML and other AI technologies, we therefore need a new form of collaboration between the development and operation of solutions based on DevOps principles - MLOps for short.

### Continuous evaluation

Why MLOps? Because AI is different. In traditional IT, the code determines the behavior of the system. The functionality of the system can be evaluated and tested step by step. In artificial intelligence applications, on the other hand, data determines the behavior of the system. The difficulty here is that the source data is updated in machine learning and other AI processes. Therefore, we need to continuously monitor the behavior of ML models. This process corresponds to the principle of continuous integration (CI) in traditional software development. Experts in MLOps refer to this as continuous evaluation (CE). In addition to the technological know-how for automating evaluation processes, this has to include close collaboration with the company's data scientists.

### MLOps in practice

A typical use case for this type of MLOps is quality improvement. For example, a Japanese automotive company launched a project in which

machine learning is to help improve vehicle quality based on complaint letters in natural language. ML analyzes the meaning of the complaint data in the texts. A particular challenge was to maintain the accuracy of the analyses even when introducing new products. Here, we created a simple and fast way to update new classification models based on „bag-of-words“ and „gradient boosting“. The immediate result: In the areas of data processing, design, and deployment, the lead time was reduced by a total of six weeks. Among other things, the high speed of checking complaints had a positive impact here. At the same time, the model is much easier and more economical to maintain - throughout the entire lifecycle. Similarly, in an AI project of an internationally operating insurance company, it was possible to simplify and automate the development and operation of the solution to such an extent that no operational support from IT is required for operation and continuous evaluation. The data scientists can dedicate their time to their data experiments - without any restrictions stemming from the IT infrastructure.

### Reliability of AI

Third example: In an Italian bank, the aim was to detect anomalous behavior in gigantic volumes of financial transactions. Experts see this application as a key benefit of artificial intelligence in digital banking. However, the volumes of data involved make manual training of AI models impossible. By using MLOps, an automated system for training the data models was established. Since every analysis and every prediction is reproducible, this model also fulfills the most important requirement for AI, not only in the financial industry: reliability. Without reliability, it will be very hard to convince anyone to trust an AI application with anything, much less with something as important as financial records.



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**DevOps** (the combination of development and IT operations) is gaining importance in software development – also regarding SAP. DevOps enables companies to react to the fast-changing market environment with agility and speed.

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