

Data Intelligence

Step-by-Step Guide on How Enterprises Can Create Value from Data in Uncertain Times

White Paper

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Preamble

This white paper will give interested professionals and managers an overview and better understanding of the Camelot Data Intelligence initiatives and key benefits of leveraging SAP Data Intelligence across your organization.

As businesses step into the post-corona future, they need to focus on the digitalization of their value chain and services and on how to succeed in the next normal. This puts more weight on gaining value out of data and on embracing data intelligence.

The future of supply chain – the key focus area of Camelot – is all about coping with digital transformation as well as redesigning your supply chain to optimize its resilience and speed. New information technologies, AI applications, and operational technologies are exploding around us and bringing rapid change to what is possible in the end-to-end value chain. Covid-19 related developments have given a strong push to new solutions that help companies to become resilient and grow their businesses.

These kinds of technologies are not to be approached without its share of challenges, threats and obstacles. Organizations that do this well will gain real-time knowledge beyond the human level and set the standard for future supply chain management. Artificial Intelligence can enable exceptional agility and accuracy in supply chains, regardless of industry, when properly implemented and used. It can also ignite a transformational increase in efficiencies and decrease in costs where it is possible to automate repetitive manual tasks.

Camelot Data Intelligence capabilities help to find, select and implement the right use cases and create substantial, fact-based value. Furthermore, Camelot is one of the pioneers in leveraging the SAP Data Intelligence platform in order to develop and maintain data pipelines across systems and the data life cycle. We use our professional knowledge in enterprise data science to develop outstanding concepts for our clients operating across various industries - supporting them in mastering any crisis.



Page

Steffen Joswig Managing Partner Camelot ITLab

With SAP Data Intelligence platform and Camelot's industry and technology sources across structured and un-structured data types. Frank Schmalle, Head of Enterprise Data Management, Global IT, Evonik Industries AG

How to Succeed with Data Science and Transform Data into Value

Who owns the data owns the future? Prof. Yuval Noah Harari, Historian and Author

Figure 1: Five building

blocks of success-

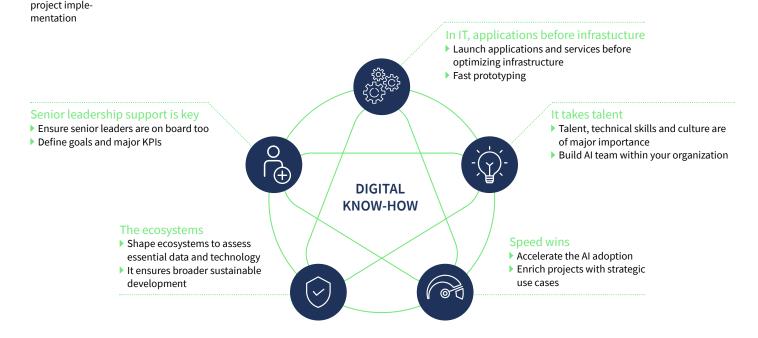
ful data science

Data science adds value to any company that can make good use of its information. From dashboards and insights to assisting stakeholders with decision making processes, data science is essential to any business in any sector.

It has become clear that modern businesses are overflowing with data. There is enormous value in data processing and analysis where data science has the ability to unlock it. It is a well-known fact that data-driven organizations are much more likely to acquire and retain customers than their peers and they are more likely to be profitable as a result.

Only with the domain knowledge and expertise of professionals who have been operating in a certain industry for years, data science and machine learning will be able to create the expected business value.

Organizations worldwide are catching up to these developments and opening up to data science service centers where a modern data scientist knows how to get actionable insights out of the data domain and eventually generate value. Simply getting a data scientist into your organization does not solve all the challenges and does not generate profit directly. The process requires teamwork and includes many aspects in order to be successful (see Figure 1).



Senior executives must be involved at the early stage of the data science project or, more broadly, digital transformation. A clear understanding of the problem must be made, how it impacts the organization, and what the goals for addressing it are. Without complete executive assistance, data science projects are too long and difficult to succeed. They also need executive assistance to assess and control budgets, staff choices, and day-to-day priorities.

Without an IT and data overhaul, a data science project cannot succeed. Improving the availability of good quality data and IT infrastructure will take time, but this does not circumvent the need for organisations to build apps and services that would allow data science and machine learning execution on your data.

Companies will increasingly embrace innovation and ecosystems to obtain the information, techniques and services they need in the upcoming years. The effect of introducing evolving technologies and frameworks into an enterprise environment is always a concern for business executives regarding security, reliability, support, scalability and so on.

Most companies invest in various disparate solutions to run data science in order to enhance their operations. Companies use bottom up approaches where different teams would initiate data projects within their scope. Such situations lead to unconnected IT landscapes that are very complex to maintain and do not guarantee the levels of data integration required for AI to deliver company-wide value. Such a combination does not necessarily guarantee security, is very costly and it is difficult to get enterprise-wide support from multiple vendors. Therefore, companies must make a sophisticated choice on their journey towards becoming an intelligent enterprise.

Increasing speed of new AI technologies entering the market every day requires companies to make fast decisions and adopt new solutions quickly. Together with our customers we create a clear set of practices for digital learning, dealing with data, sharing outcomes, attracting talent, and relocation of resources. This translates into reusable adoptable services.

With a clear vision you can identify and create the right opportunities for establishing an intelligent enterprise in your organization and overcome common pitfalls and silos.

Camelot helps companies with their strategy for identifying, managing and maximizing the value of data to guide decisions and optimize and automate business processes (see Figure 2).



Strategy – First Stage of Any Data Science Project

Artificial intelligence will shift from the hype state to practical usage and value in 2021, when companies start to leverage their strength. There are also challenges ahead as AI gains traction. In a data science project, as in many other fields, the main goals should be set at the beginning of the project. At this stage, business leaders need to take artificial intelligence into account even if they don't fully comprehend it. The AI implementation barriers organizations face the most are related to management and culture rather than data and technology.

That explains why companies are cautious with integration of AI into their business processes. According to the 2020 MIT/BCG Sloan Management Review study, 70% of global executive respondents understand how AI can generate business value, an increase from 57% in 2017. Regardless of this trend, just 1 in 10 companies generates significant financial benefits with AI.

Nonetheless, many companies do use AI to enhance customer service, make better decisions and make their operations more efficient. Looking forward, worldwide expenditure on cognitive solutions will keep growing and business gains will be clearer to evaluate.



With the support of a strategic partner, companies will find the right path into data science for their organizations. Camelot offers ideation workshops that typically take one or two days. Business executives and data scientists come together to discuss the most critical concepts from data science, AI and ML (machine learning) fields – and what is in it for them. Design thinking and innovation workshops help to define clear objectives and workplans for enhancing customer value cases with AI capabilities.

A well-structured and properly executed data science project can achieve tangible and measurable benefits across various performance areas. Once the necessity of a more data-driven approach is recognized the guiding project team, including executive decision makers and sponsors, should develop an environment to examine the improvement opportunities for predictive business analytics or AI-empowered processes.

The team needs to evaluate target-state alternatives, with each alternative evaluated based on decision criteria that achieve a best fit for launching the process.

As-is Check – Quick Assessment of Business Readiness

Every single company, every single client we have is able to select the appropriate use cases, the ones that will bring value. Not based on assumptions but based on reality and supported by Camelot guidance.

The selection of data science use cases is a cumbersome process. The first step to implementing a data science strategy is selecting one or two pilot data science projects. These initiatives will help businesses gain momentum and gain insight into what it takes to build an AI product. Managers will also be able to see and measure direct benefits before scaling it up to a broader perspective. When these first projects prove to be successful, stakeholders will be willing to invest in building additional AI capabilities.

There is a straightforward approach to the AI use case selection with the help of our experts.



USE CASE Strategic: SELECTION Ensure

- Ensure executive support
 - Clearly generate value calculation and understanding
 - Assessing use case selection impact

Business:

- Analysis of the feasible use cases
- Design and maintain only what and where needed
- Validate data quality framework by measure to improve approach
- Help realize the uses case(s)

IT:

- Assess required IT infrastructure
- Identify IT constrains
- System resources correspond to solution roadmap, concurrency, workload and business users



Use Case Implementation

Once priorities and capabilities are recognized, an organization needs to adopt a desired target state that is built on solid analytical foundation. Additional challenges, however, are usually not covered or over- simplified. Therefore, a step-by-step guidance helps you to identify most challenging functionalities of the platform of choice. The key benefit of this is significant time-saving in learning effort.

It is also very useful to use benchmarking and to find similar existing use cases that already had shown some desired benefits. Once we do the data intelligence training and a use case is identified, we begin a first prototype. Introducing the prototype needs a strong foundation like SAP Data Intelligence.

Delivery – Start with Prototyping on the Data Intelligence Platform

AI, ML and Data Science are very hot topics nowadays and AI-driven solutions implementation is in high demand. Many companies are facing failures in such initiatives because they lack experience, the proper IT landscape or scale up too soon.

Prototypes are all about fail fast, succeed big. With our prototypes, our clients have the right approach to detect the value of good ideas very quickly and change focus when necessary. And then, of course, a regular feedback process is guaranteed because key stakeholders are already involved. Digital prototyping enables presenting potential valuable ideas to our stakeholders as early as possible and continuously collects the feedback. It is less painful to fail at the early stage of the implementation of the solution, compared to the full-scale product that eventually fails to meet your objectives. In the early stage, a company can try and sort out only the good "candidates" that deserve further investments.

Reduced time and costs to be invested to see results. There is no need to wait for months to get tangible deliverables. This also allows for flexible planning with regards to budget and resource constraints.

High agility to quickly adapt to changing circumstances like market changes, or to include new data sources and technological innovations. The product is not already outdated by the time you can first use it.

Closer and improved involvement of stake holders which enables them to see and participate in the development, which in turn increases the overall quality and acceptance of the design with each iteration.

The primary reason to start small is that this prototyping process is not only performed once, but will be iterated many times in reality. One has to keep in mind that projects in data science are intrinsically exploratory and open-ended to some extent. The goal might be clear, but it is often unclear from the start what kind of data is available, or whether the available data is a good fit for the task at hand.

This implies that this process is repeatedly iterated and enhanced, attempting distinct characteristics, distinct types of preprocessing, distinct techniques of machine learning, or perhaps even going back to the source and attempting to add more information sources.

A prototype feasibility study is the single most important stage of our solution discovery process.

Camelot helps its customers to answer these questions before engaging into the prototype development:

Figure 5: Benefits of

Prototyping

- Do you know how to build the solution?
- Do you have the skills on the team to build this?
- Do you have enough time?
- Do you need any architectural change to build this?
- Do you have on hand all components that you need?
- Do you understand the dependencies involved?
- Will the performance be acceptable?
- Will it scale to the levels your needs?
- Do you have the infrastructure necessary to test and run this?
- Can you afford the cost to provision this?

Inherently iterative, the whole prototype building process is often extremely explorative. Once the output matures, you are prepared to try the actual prototype testing and implementation. The actual output of this phase is a Proof-of-Concept that is followed by implementation services and DevOps support for enterprise data science.

And this brings us to the production systems.

Production-Enterprise Implementation

There is a huge opportunity hidden in the massive amounts and types of data that are constantly generated within an enterprise, along with the business digitalization. The data landscape is getting more and more complex, with multiple data lakes, data warehouses, operational applications, E-Commerce, online interactions and other highly integrated systems. Furthermore, in order to react to growing company requirements, IT finds itself under tremendous pressure to provide data insights and implement easy data sharing with business partners.

Key Concerns:

- Data silos when only one group in an organization can access a set or source of data. Users can not access data and operate with it through the silos. It can be very difficult to connect enterprise data and business operations to gain value from data.
- Complex data governance across various landscapes. Managing data security and privacy requirements is a critical need for an enterprise data landscape. Well-established end-to-end data governance is a must for a modern organization in order to ensure data accuracy and security.
- Enterprise readiness for Big Data technologies. Data lakes often have limited governance, little or no automation in schedule processing, only partial monitoring and inefficient security levels.
- Poor or outdated integration tools. Currently available tools require considerable effort to produce enterprise-wide data scenarios. This makes it challenging to rapidly connect and implement desired data outcomes.
- Lack of certain specialized skillsets. Implementing, scaling and creating value out of data r equires highly specialized resources. It is often difficult to retain such talents in the company.

SAP Data Intelligence is a data operations (DataOps) management solution designed to kickstart enterprise readiness for AI by addressing the common concerns of data endeavors.

The solution aims to create synergies between different teams in an enterprise and provides a dedicated space for everyone to add their inputs towards the successful deployment of an AI system.

A typical scenario in SAP Data Intelligence would be:

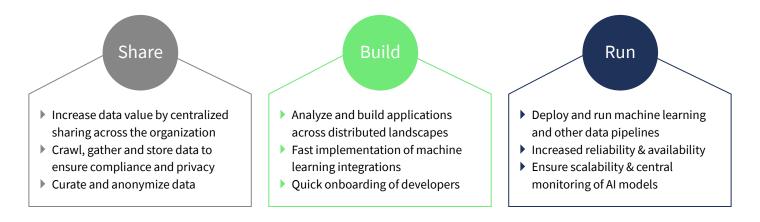
- A system owner provides a user account in the connection management tool of SAP Data Intelligence.
- A business analyst takes over to visually validate the data in the metadata management tool, the analyst can also maintain detailed data dictionaries and add semantics in the tool for the data scientists to understand the business problem.
- The data scientists can check the findings of the business analyst and uses the Machine Learning and Life Cycle Modelling tools to develop their algorithms and models, keep track of their inputs, versioning and documentation.
- Data engineers use the pipeline modeler tool in SAP Data Intelligence to expose and automate the models provided by the data science teams to different system.
- During the whole process, the IT organization keeps track of system health and utilization with the advanced logging visualizations in the system management tool of SAP Data Intelligence.

SAP Data Intelligence provides the infrastructure needed for a productive deployment of AI combined with a systematic approach to tackle solution implementations. It supports organizations with a solid foundation for the intelligent enterprise vision. Indeed, the true benefits of SAP Data Intelligence lie in scale, as more systems are onboarded, organizations can build more complex ML models and enact cross-system pipelines with real time information sharing.

Value of Integration

When building a data science use case for an enterprise, the first step is to consider business objectives and KPIs that must be achieved during the use case implementation. In fact, the value of integration is fundamentally different from business outcomes. Data Intelligence benefits are indirect benefits for an organization where the value is leveraged at massive scale (see Figure 7).

Figure 7: Data Intelligence Benefits



Main benefits fall into three major categories – share, build and run:

- Share: Companies must empower employees to easily access data and actionable insights. Different data assets must be discoverable, embeddable and well-documented so that authorized users can leverage them in the specific business context. Such data sharing increases the value of data, as it is not hidden in silos. Proper Data Protection is also crucial for the company.
- Build: The build phase of a project must be efficient and wellde- fined. The best integration platform must meet several require- ments such a fast combined platform for data scientist collab- oration, scalability for production use and a fast onboarding for developers. This also ensures a quick onboarding for developers who join the team at later stages.
- Run: Benefits that fall under this category include fewer mainte- nance hours associated with integrations and APIs, less time spent on upgrades and updates, and lower operating costs. Proper exe- cution ensures scalability and monitoring for the data intelligence in place.

The main value of data intelligence is represented by the time saved by consultants, engineers and data scientists over the long term. By incorporating the notion of speed, companies must try to quantify how agile a Data Intelligence tool is, which depends on speed of operations.

Further, one must select a strategic digital integration platform that would help to overcome integration complexity. Such a platform would offer a comprehensive end-to-end approach. It would first, converge data integration and various applications into a coherent set of "skills" and, second, reduce the burden of managing an increasing number of connections. This ensures getting maximum value from the enterprise data. This brings us to the SAP Data Intelligence Platform.

In a business environment with a strong analytics culture, data and insights are easily discoverable and accessible. Interesting findings, highlights, statistics and patterns are systematically shared across the right teams — in many cases summarized and visualized as 'data stories'.

SAP Data Intelligence Platform

SAP announced the SAP Data Intelligence platform with the goal to offer a coherent machine learning and data science foundation that leads businesses to an Intelligent Enterprise evolution. The SAP Data Intelligence platform is, where enterprise AI meets intelligent information management.

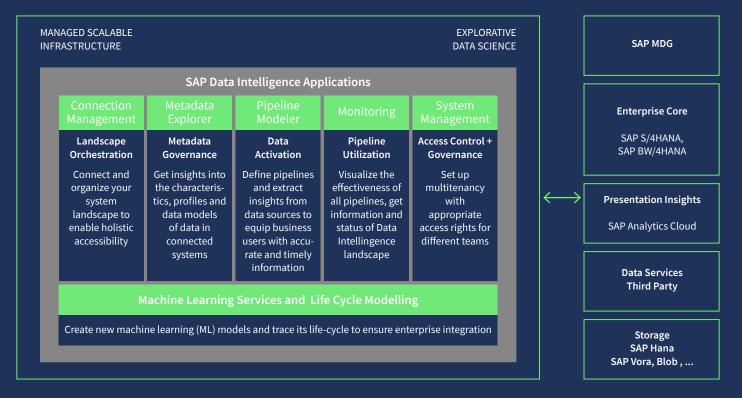
Raw data + Enterprise data + Intelligent Insights = Smart Decision Making

The vision of the Intelligent Enterprise is at the heart of the SAP strategy. To reach this goal AI applications have to be delivered at scale. Ideally there should be one integrated offering with one data science frontend covering full lifecycle management – all integrated with SAP systems. Delivering these applications can be quite challenging and every stakeholder faces a different point of view:

- 1. The CIO would like to deploy and scale data science or ML applications at low cost and requires a stable solution.
- 2. The Data Science team would like to have a development environment which is compatible with enterprise requirements, but still with further exploration possibilities.
- The final IT operation or DevOps team is focusing on re-usability, stable deployment and maintainability.

Figure 8: SAP Data Intelligence Platform Architecture

SAP is aiming exactly at these three stakeholders with the goal to manage end-to-end machine learning scenarios within one system. You acquire a complete set of instruments in this single, integrated solution to solve the gap between development and deployment. In any company function you can have access to trusted data and the means to share it freely with customers (see Figure 8).

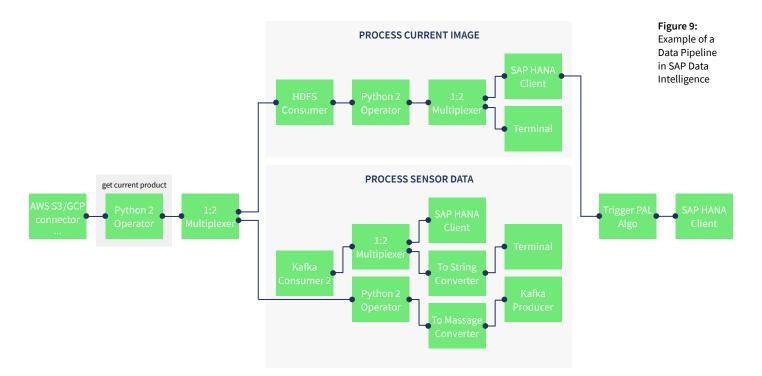


CONNECTED SYSTEMS

This software is transportable across all cloud and on-premise environments. It gives the possibility of analyzing data coming from a diverse data landscape within the organization. It offers visibility and access to a wide spectrum of data systems and resources, allows for fast data pipelines creation, optimizes their deployment and provides monitoring while experimenting with new machine learning techniques. As shown in Figure 9, you can access any structured, unstructured, or streaming data source from the cloud, SAP and non-SAP applications. Using data intelligence applications, you can transform multiple data connections into reusable datasets, that are understood by ML services and modeling.

A set of open-source toolkits that are familiar to data scientists and IT teams, such as Jupyter, R, and Python are available in every fresh installation. Other programming languages and environments can also be made available by means of customizing a docker image.

Each step in a data pipeline (see Figure 9) is executed in a set of Docker containers orchestrated by Kuber- netes. Kubernetes is an open-source technology for automating deployment, scaling, and management of containerized applications. It groups containers that make up an application into logical units for easy management.



A central cockpit allows you to dynamically allocate resources to deploy and retrain models and track performance. In brief, you can transform your business applications to deliver an Intelligent Enterprise.

When looking at all aspects it becomes clear that this is not a light-weight explorative framework, rather, it tackles the problem of full AI lifecycle management. A quick entry point for non-experts will still be difficult, especially with the promise of the so-called citizen-data-science-ship not yet provided. Citizen data scientist is a person whose job function lies outside of statistics and analytics, but can still generate machine learning models with advanced diagnostic analytics or predictive and prescriptive capabilities.

Data Science Project Example

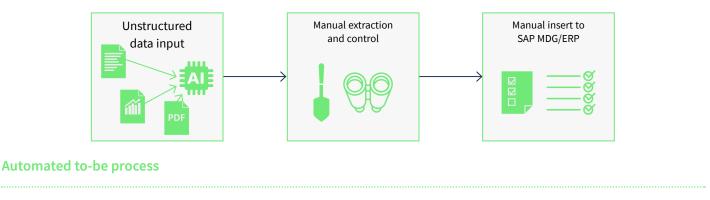
Working with Camelot to leverage the SAP Data Intelligence platform, clients are able to:

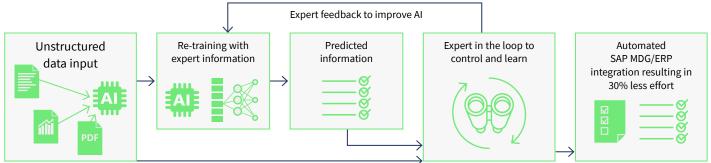
- Take advantage of strategic, innovative data management co-development projects with Camelot ITLab and SAP
- Ease support of specification extraction from unstructured data within the purchasing process by integrating domain experts as a vital part within AI applications
- Develop and deploy machine learning models in less than three months in the field of packing material creation through SAP Data Intelligence deployment
- Manage the increasing complexity of different data sources to lay the foundation for future data alignment
- Improve the manual information extraction overhead by up to 30% while systems continuously converge to its best possible state

Figure 10: AI Empowered Information Extraction

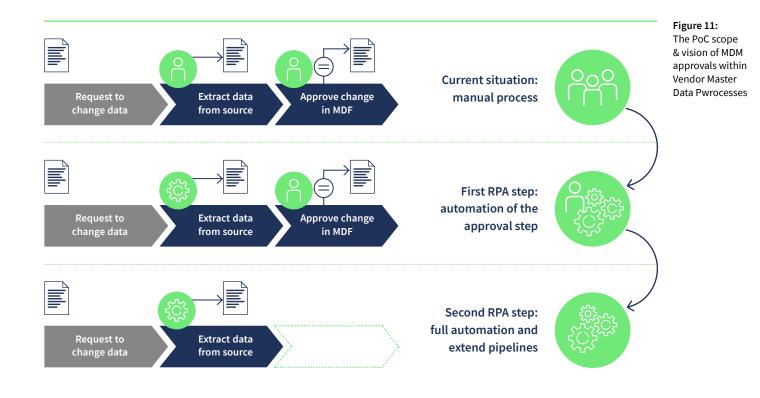
Camelot ITLab has recently been engaged in a Proof-of-Concept (PoC) for Robotic Process Automation (RPA) that aimed at simplifying Master Data entries. RPA is a form of business process automation technology based on artificial intelligence (see Figure 10).

Manual as-is process





Together with the client we were looking for ways to streamline the daily manual work involved in extracting packaging material information. As of today, the process relies on an expert going through every package received: they must either read a PDF document or an image, that has all the information such as size, volume, name etc. Our aim was to minimize the time and effort it takes for the experts to store valid master data by introducing an AI-enabled extractor and an easy to use annotation tool. Thus, providing the first level of semi-automation for a valid material master data process (see Figure 11).



An "Expert-in-the-Loop" system is a system, where the domain expert is in the center of the process. The goal is to learn continuously from the expert input (annotation process) while allowing a more convenient staging towards the master data systems (UX layer).

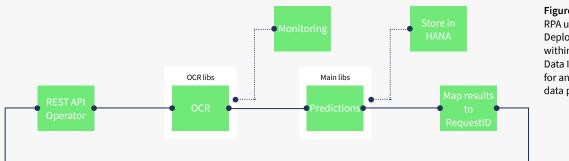


Figure 12: RPA use case: Deployment within the SAP Data Intelligence for an intelligent data pipeline

The pipeline provides a REST API interface, which is a commonly used architecture for web services over HTTP. HTTP clients can call the service and upload documents to be analyzed, the pipeline takes care of performing the Optical Character Recognition (OCR), the extracted images with corresponding text are then fed to the Entity Recognition Model based on Conditional Random Field algorithm for predicting the value for every word in the document. The results are mapped back to the requestor ID and sent back to the HTTP client.

As SAP Data Intelligence offers multiple ready to use operators, one can easily extend the pipeline to add an extra level of monitoring or store results and intermediary files in an external Hana Database.

For example, the pipeline can be used with an annotation dashboard (User Interface) for an extra validation with a domain expert before ingestion in an ERP system with a remote function call. This method significantly increases the accuracy of the algorithm as more training data is provided (see Figure 12).

Conclusion and Outlook

This whitepaper outlines the most efficient way to transform data into value and perform real enterprise data science.

Enterprise decision makers must re-define their applied data intelligence journey and consider the following steps:

- Define AI strategy. Learn from experienced data scientists and learn best practice. Integrate a realizable AI path into your business value roadmap.
- Setup organization and define use case. Analyze and select the appropriate use cases that generate value. Setup required IT infrastructure and allocate resources.
- Conduct data audit and data feasibility study. Benefit from our experience and analyze data as early as possible. Process, IT constraints and predictive model are jointly covered.
- Create PoV and rate outcomes against business case. Proof-of-Value is done and friction points in the prototype are identified. UX is evaluated and prototype design optimized.
- Scale to production. Ensure that value is delivered within the enterprise architecture. Enterprise data science is successfully implemented.

Performing these steps is a huge added value to your organization. Intelligent data management is the key for running a successful business now and in the future. Here, the SAP Data Intelligence platform can help you to achieve it with less efforts. You can design, deploy, and manage machine learning that is dedicated to solving your business challenges and ensures smooth AI implementation enterprise-wide and across the data asset lifecycle.

Glossary

Algorithm

A set of step-by-step instructions. Computer algorithms can be simple (if it's 3 p.m., send a reminder) or complex (identify pedestrians).

Artificial Intelligence

Artificial Intelligence is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning, reasoning and self-correction.

(Semi) Automation of cognitive tasks

(Semi) Automation of cognitive tasks is based on software bringing intelligence to information-intensive processes. It is commonly associated with Robotic Process Automation.

(Semi) Automation of business operations

(Semi) Automation of business operations, also known as business automation or digital transformation, is the technology-enabled automation of complex business processes.

Conditional Random Fields (CRFs)

Conditional Random Fields (CRFs) are a class of statistical modeling method often applied in pattern recognition and machine learning and used for structured prediction. CRFs fall into the sequence modeling family.

Data Science

Data Science is a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.

Docker

Docker is a set of Platform-as-a-Service (PaaS) products that use operating-system-level virtualization to deliver software in packages called containers. They are isolated from one another and bundle their own software, libraries and configuration files.

Jupyter Notebook

Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text.

Kubernetes

Kubernetes is an open-source containerorchestration system for automating application deployment, scaling, and management.

Natural Language Processing

A computer based attempt to "understand" spoken or written language. It must parse vocabulary, grammar, and intent, and allow for variation in language use. It often involves ML.

Optical Character Recognition

Optical Character Recognition is the conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo or from subtitle text superimposed on an image.

Regression

A measure of the relation between the mean value of one variable (e.g. output) and corresponding values of other variables (e.g. time and cost).

SAP Data Intelligence

Provides all the integration, orchestration, metadata management, connectivity and rich services of SAP Data Hub with the services of SAP Leonardo Machine Learning in the cloud.

Camelot ITLab GmbH

Camelot Innovative Technologies Lab (Camelot ITLab) is the leading IT consultancy for digital value chain management and driver of innovation in emerging enterprise technologies including Blockchain and AI. We guide businesses around the globe in transforming their IT ecosystems, with a strong focus on Supply Chain Management, Logistics, Data & Analytics, Customer Experience, and ERP.

Camelot ITLab is a long-standing partner of SAP with joint co-development initiatives, offering customized SAP implementations as well as our own disruptive solutions. As part of CAMELOT Consulting Group with 1,800 employees worldwide, Camelot ITLab stands for highest quality and responsibility, proven by an excellent track record. From innovations to solutions.

www.camelot-itlab.com

Why Camelot

- → Next level understanding of Enterprise Data Science
- Camelot helps you to understand and communicate the value of data science integration to your business
- Tailored to your current applied data to value path and your business needs

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