# Embracing the world of artificial intelligence

*How the IBM Integrated Analytics System makes machine learning easy*

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## Building the ladder to AI

The widespread data explosion over the last several years is driving a desire for artificial intelligence (AI) so that companies can more fully use the plethora of data for deeper, more meaningful insights. The longing for AI is, in turn, fueling the need for machine learning (ML) and data science as core building blocks – often described as "rungs" on the ladder to AI. Machine learning, for example, helps with mining value from data sources organizations may not yet be fully using.

The first rung of the AI ladder represents proper management and governance of data. Businesses are turning toward strategies that make use of more types of data, including structured, semi-structured, and unstructured data–so naturally they need a solution that integrates all this data together. Hybrid data management helps connect this vast range of data spread across multiple locations so that it may be used to quickly uncover the deep insights companies desire. With all of the data accessible as part of one integrated system, the data can more effectively be used to arrive at well-rounded, holistic insights. This is particularly true for ML and AI where a data corpus must be built to inform the development and continued refinement of models.

In addition, machine learning can help organizations sort through the vast libraries of data they may have to better identify what data is most meaningful for solving a particular problem. This results in a much deeper level of insight, which can then be used to make better decisions or explore new ideas and sources of competitive advantage.

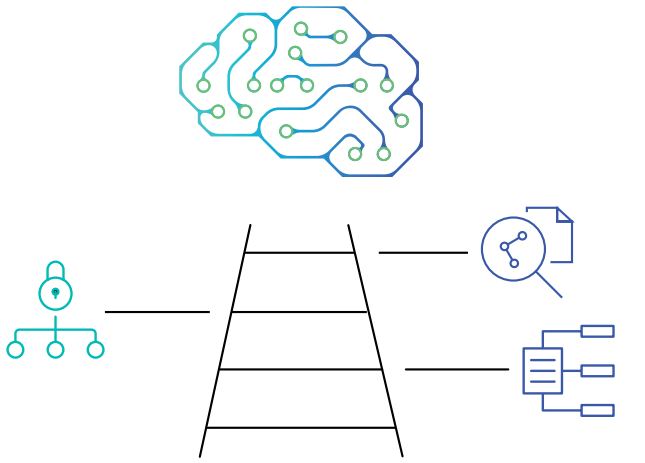

*Figure 1*: Creating a successful AI practice requires a number of building blocks to be implemented beforehand.

## The journey from descriptive to predictive to prescriptive

With the rise of better data access and processing ability, there has been a significant change in the level of knowledge that can be derived. It has seen analytics evolve from descriptive to predictive to now prescriptive.

At first descriptive analysis reigned because of its simplicity. The data was reviewed after an event had occurred to determine what the result had been. For example, revenue after a day of sales could be tabulated and assessed then compared to previous days' revenue to determine if it was a good or bad day relatively speaking. While insightful and necessary, this level of analysis is limited at helping inform actions that must be taken.

With predictive analytics, introducing more variables such as weather, month, or hours of operation enables a clearer picture to emerge. A trend of very high revenue on sunny days would mean a business owner could reasonably predict and prepare for the same if he notices a string of sunny days in the weather forecast. This ability was incredibly helpful in allowing businesses to take proactive steps and capitalize on what their data showed was likely to happen.

With ML and AI that extends one step further by allowing tools to offer prescriptive suggestions based on the vast amount of data absorbed as part of its corpus. In our revenue example, this could mean that the trend of increased revenue on sunny days could be linked back to sales of sunblock. Taking into account this information along with third-party weather data, the suggestion could be put forth to a store owner that he should order a new shipment of sunblock three days ahead of schedule due to an upcoming string of sunny days. In other words, ML and AI allow the business to get to the core questions of "Why?" and "What should be done now?"

## IBM Integrated Analytics and System

In the future, AI is going to be used in many different industries. Healthcare, for example will use medical history, external variables and current vitals to suggest courses of prevention and treatment in the moment. Developers could use AI to help create a better automated support system that returns the best answers in natural language based on previous question similarity and how helpful people had rated certain answers. ML will be a tool that helps make AI happen. And even though many organizations may store or process data every hour, some may not know how to mine information from that data to benefit their business.

That's where the IBM Integrated Analytics System (IAS) and ML can help. IAS is a unified hybrid data management analytics appliance providing massively parallel processing (MPP). It comprises a high-performance hardware platform and optimized database query engine software that work together to support various data analysis and business-reporting capabilities.

IAS is also preconfigured with IBM® Watson™ Studio, a platform that provides all the open source tools that data users need for ML. However, Watson Studio is not just for data scientists and data engineers, but also accessible by DBAs and line of business owners. For instance, DBAs can deploy pre-built models and perform other functions in a simplified way that doesn't require an expert in data science or engineering, which allows line of business owners to have their data requests fulfilled much more quickly than having a model created from scratch.

## Advantages of doing machine learning with IAS

- **Hybrid data access.** Datasets can be stored locally on IAS or accessed across the organization (on-premises or in the cloud) using the IBM Common SQL Engine's federation capabilities.
- **In-memory columnar engine.** The powerful server and MPP BLU in-memory columnar engine means ML can be done quickly and efficiently.
- **Faster ML.** An Embedded Spark engine within the core IAS engine enables faster ML, there is no need to move data over the wire and no network penalty.
- **Quicker Ssetup.** No installation and management costs mean you can start doing ML as soon as the box arrives.

## Advantages of Watson Studio

- **Open source tools in one place.** Simplify the creation, training and deployment of analytic models using your enterprise data and, with server-based tooling, eliminate having to install tools on each client machine.
- **Integration.** Use with RStudio, Spark and Jupiter and support popular languages like Python, R and Scala.
- **Sample notebooks and collaborative workspace.** Create your own custom applications that can be powered by ML and share projects/notebooks with your teams.
- **Model management dashboard.** Manage all users' models and deployments in one place, including model statistics and health with self-healing algorithms.

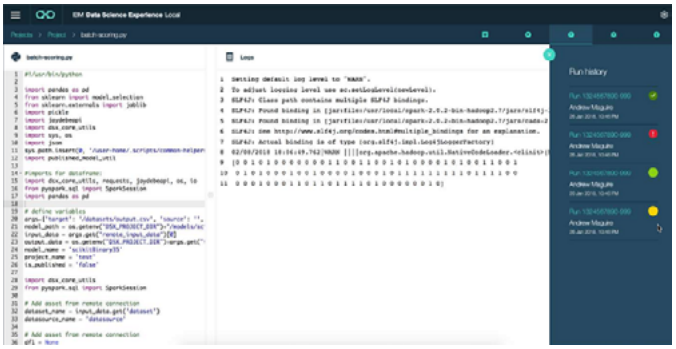

*Figure 2*: Watson Studio has been designed with a clean, easy to use interface

# Machine learning use cases

## Healthcare

Every year many people are affected by the flu, sinus problems, asthma, and skin related health challenges due, in part, to changes in weather and climate. These relatively small health issues have a significant and costly impact on national economies, hospitals and health insurance providers each year.

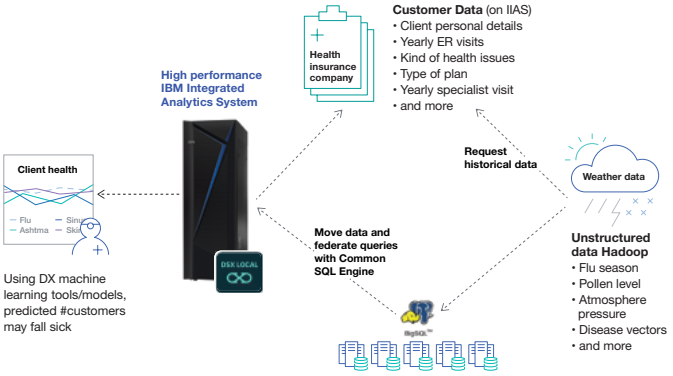


*Figure 3*: An example of IAS and Watson Studio as part of a Healthcare Solution

However, using IAS and ML techniques (as illustrated in Figure 3), health care providers and insurance companies can develop a predictive model–based on a person's medical history and weather data—that indicates how many people may be impacted in a given year due to a weather change. With this knowledge they could then establish a policy of sending real-time notifications to those that might be affected through their mobile device with precautionary measures to help them stay healthy. By enabling easy access to machine learning with IAS, health issuance and related medical companies could enable more people to stay proactively healthy while also driving cost savings.

## Financial services

Machine learning can play a significant role for financial institutions by creating better predictions of customer behavior. Take, for instance, stock selection. An ML model could be built and trained to determine a customer's propensity to buy certain stocks based on factors such as age, gender and prior purchasing habits. By running a batch classification each night using this model on all customers, an organization can better evaluate the stocks that should be shown to certain investors. Some data science tools, like Watson Studio, even provide an interface that allows teams to review and manage the accuracy of models across time.

Well-integrated data warehouse appliances build on these ML capabilities by bringing together disparate pieces of data through federation and running additional analysis quickly on data sitting within the appliance. For example, a stockbroker that discovered a client was likely to buy an auto stock may want to look for one that will act as a hedge to the auto stock already in the client's portfolio. Using the in-database analytics of the appliance, they could run analytics in the moment to determine the correlation between potential new investments and the stock already in the portfolio. News stories could then be queried from a separate data source using federation to provide background information on the time periods in which the stocks trended in different directions. In this way, the broker can develop a much more complete picture that allows them to make a more compelling case to their client that they should move forward with buying the new stock.

*Figure 4*: An example of IAS and Watson Studio as part of a finance solution

An illustration of a potential architecture for this example is provided in Figure 4, and this video provides an in-depth demonstration of how that might work both on the surface and at a more technical level.

## Start climbing the ladder to AI

These use cases are just a small sample of what can be done when IAS and the built-in Watson Studio are used to create machine learning solutions.

To learn more and start planning how IAS can best be implemented for your own use case, please contact the IBM sales team or visit our content hub for a collection of online materials including demos, tutorial videos, migration information and documentation on how to get started.

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