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White paper

Implementing (AWS) **Machine Learning** in your organisation in 6 steps

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www.globalknowledge.com
info@globalknowledge.co.uk
0118 912 1929

Introduction

From smart voice assistants to self-driving cars, and from smart product configurators to predictive models that have the potential to minimise the damage caused by climate change, machine learning is reshaping the ways in which we interact with machines, the world and our fellow human beings. Machine learning is quickly becoming one of the hottest technologies on the market, mainly because it has the potential to greatly improve services, applications and devices.

Data warehouses and lakes are becoming so big and vast that humans are unable to manually process all of this information. This is where machine learning comes in. The technology allows companies and individuals to process and analyse huge chunks of information in a largely automated manner.

In this whitepaper, we are going to take a look at a phenomenon called machine learning. We will also show you how to sustainably implement the power of machine learning in your organisation using the AWS platform, along with the accompanying AWS services. So be sure to read on if you want to harness the full power of machine learning to grow your business and improve your services.

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What is (AWS) machine learning?

People often use the terms artificial intelligence (AI) and machine learning (ML) as synonyms, but this is not entirely correct. Machine learning is a subset of AI that focuses on the creation of computer algorithms that possess the ability to detect patterns in existing and often huge datasets. Machine learning uses various techniques for data extraction and data interpretation.

The most important ones are supervised and unsupervised machine learning. The main difference between the two? Supervised machine learning creates models that are able to make predictions based on data in the presence of uncertainty. Unsupervised machine learning determines hidden patterns or inherent data structures. It draws conclusions from data sets consisting of input data without labelled results.

A couple of real-world examples of machine learning in action are:

- The personalisation of customer journeys. Customers receive product recommendations based on the careful analysis of data, such as personal information, search behaviour or Facebook likes.
- Image recognition features used in dating apps, photo editing apps or user-authentication tools.
- Speech recognition software, like Apple's Siri or Google Nest.

AWS machine learning gives you access to the broadest and deepest set of machine learning services and cloud infrastructure support in today's market. This includes industry-specific solutions that meet the unique business needs of healthcare or industrial customers, or solutions like intelligent search, personalised recommendations, document analysis, machine translation, fraud detection and demand forecasting. With AWS machine learning, you'll have all these features at your fingertips.

"Machine learning is a subset of AI that focuses on the creation of computer algorithms that possess the ability to detect patterns in existing and often huge datasets."

The 4 main challenges of implementing machine learning

Although machine learning can benefit your business in many ways, properly implementing the technology comes with a number of challenges.

Challenge 1: Accessibility of data

Machine learning only produces valuable output if you feed it with raw data. And properly training machine learning algorithms requires huge amounts of data. Many organisations don't gather enough data or fail to make their data accessible, so their information becomes siloed and is not stored in the right places.

Challenge 2: Data security

Gathering data is far from the only challenge for organisations that want to make serious work of machine learning. Data security is an equally important point of attention. Differentiating between sensitive and insensitive data is essential to implementing machine learning correctly and efficiently. Store sensitive data by encrypting it and storing it on other servers or a place (for example, a private cloud environment) where the data is fully secured. Less confidential data can be made accessible to trusted team members.

Challenge 3: Finding the right business model

Machine learning only truly thrives in an agile IT environment. This means that an organisation has to be flexible in its policies and needs an agile and highly scalable IT infrastructure. AWS provides you with such an IT environment.

Challenge 4: Building the right talent pool

Fully understanding and implementing advanced machine learning technologies to their maximum potential requires specific expertise and skills. However, finding the right machine learning experts can be a daunting challenge, especially since the demand for experienced and talented data scientists has skyrocketed in recent years. This means that machine learning specialists are in a position to demand high salaries.
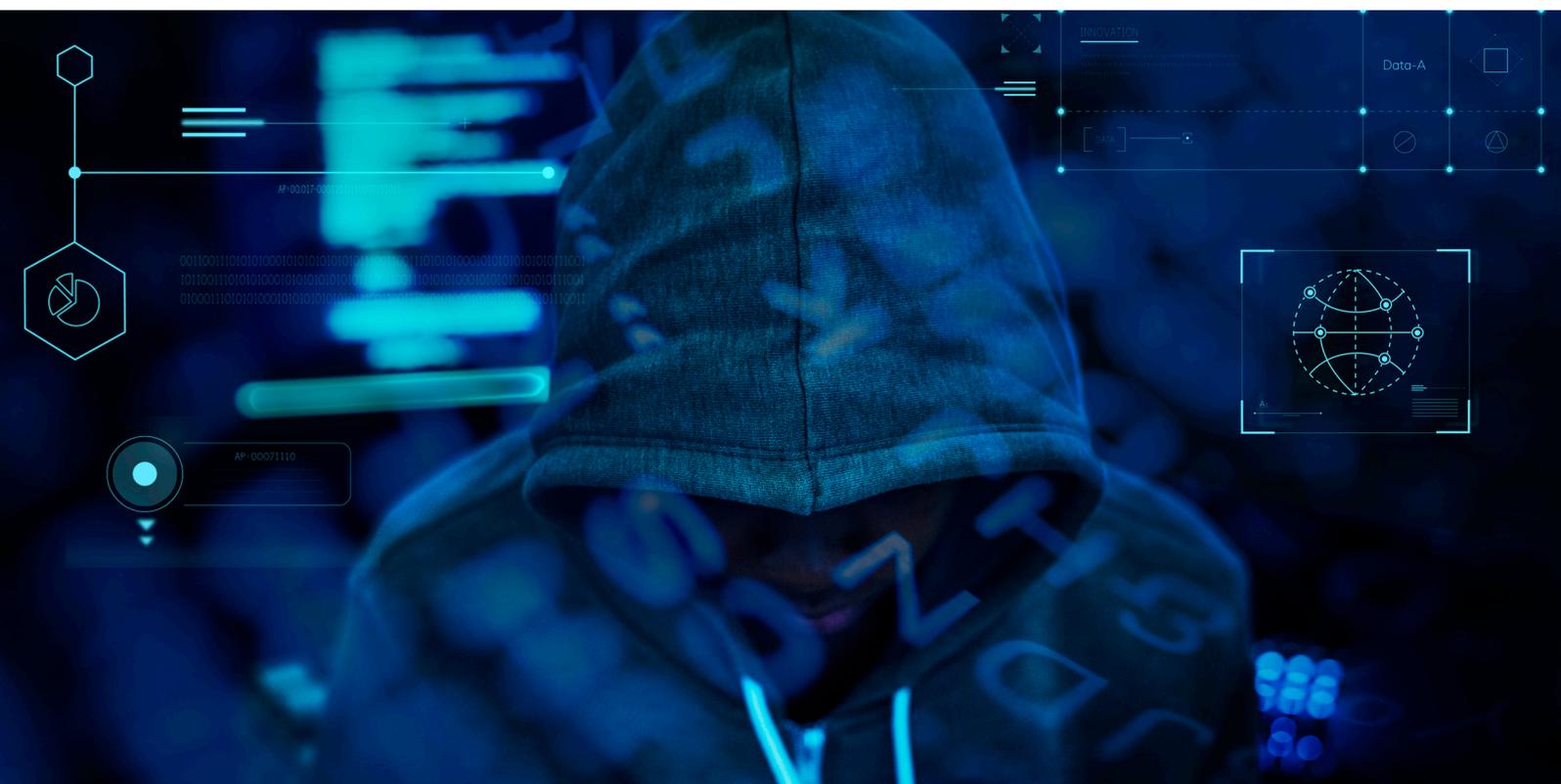
The 6 machine learning implementation steps

So, how do you successfully embed machine learning in your business, AWS workflows and daily processes? Be sure to go through the following 6 steps.

Step 1: Prepare your data

It all starts with preparing your data, since information is the fuel that powers machine learning processes. Let's say you want to get better insights into customer behaviour to offer people personalised content and products. Then start by downloading the necessary datasets from our Amazon Simple Storage Service (Amazon S3) storage location. You can upload the data to your own S3 bucket by following the **procedures in this topic**.

Step 2: Create a training datasource

You have now successfully downloaded the right datasets to your storage service location. The next step? Creating a training datasource in your Amazon S3 location. A datasource is an Amazon Machine Learning (AML) object that contains the location of your input data (the source) and the important metadata that tell you more about that input data.

If you want to create a datasource, you have to provide the following information:

- The Amazon S3 location of your data, as well as permission to access this data.
- The schema. This contains the names of the attributes in the data and the attribute type (either numeric, text, categorical or binary).
- The name of the attribute that harbours the answer that you want Amazon ML to learn to predict. This is known as the target attribute.

You can find a step-by-step overview that shows you how to create a training datasource by following this **link**.

Step 3: Create a machine learning model

After you have successfully created a training datasource, you can use it to build and train a machine learning model. The model is used to make predictions that will allow you to make better, more informed and highly data-driven business decisions. A machine learning model is basically a collection of patterns that Amazon recognises during the training process. Click here to find out more about the technical steps that allow you to create a machine learning model.

Step 4: Review the machine learning model's predictive performance and set a score threshold

Now that you have created your machine learning model, it's time to test its efficiency. Is it up to the task? To do this, you can use Amazon's AUC metric. Amazon ML interprets the AUC metric to tell you if the quality of your model is adequate for your desired machine learning applications. The model creates numeric prediction scores and converts these scores into a score threshold. Learn how to review your model's predictive performance by following **this link**.

> **"It all starts with preparing your data, since information is the fuel that powers machine learning processes."**

Step 5: Use the machine learning model to generate predictions

The moment of truth has arrived: your machine learning model is ready to generate detailed predictions. Amazon Machine Learning allows you to generate two types of predictions: real-time and batch predictions. Real-time predictions apply to single observations that AML generates on demand. They are ideally suited for mobile apps, websites and other applications that need to use results interactively. Batch predictions are different and consist of multiple predictions for a group of observations. **Read here** for more information on how to experiment with prediction-making in AWS.

Step 6: Clean-up

The last step in the implementation process is the clean-up. It consists of deleting the data that is stored in Amazon S3 after you have gone through the implementation process, and it allows you to keep your digital workspace clean. Follow **these steps** to complete the data clean-up process.

"Amazon Machine Learning allows you to generate two types of predictions: real-time and batch predictions."
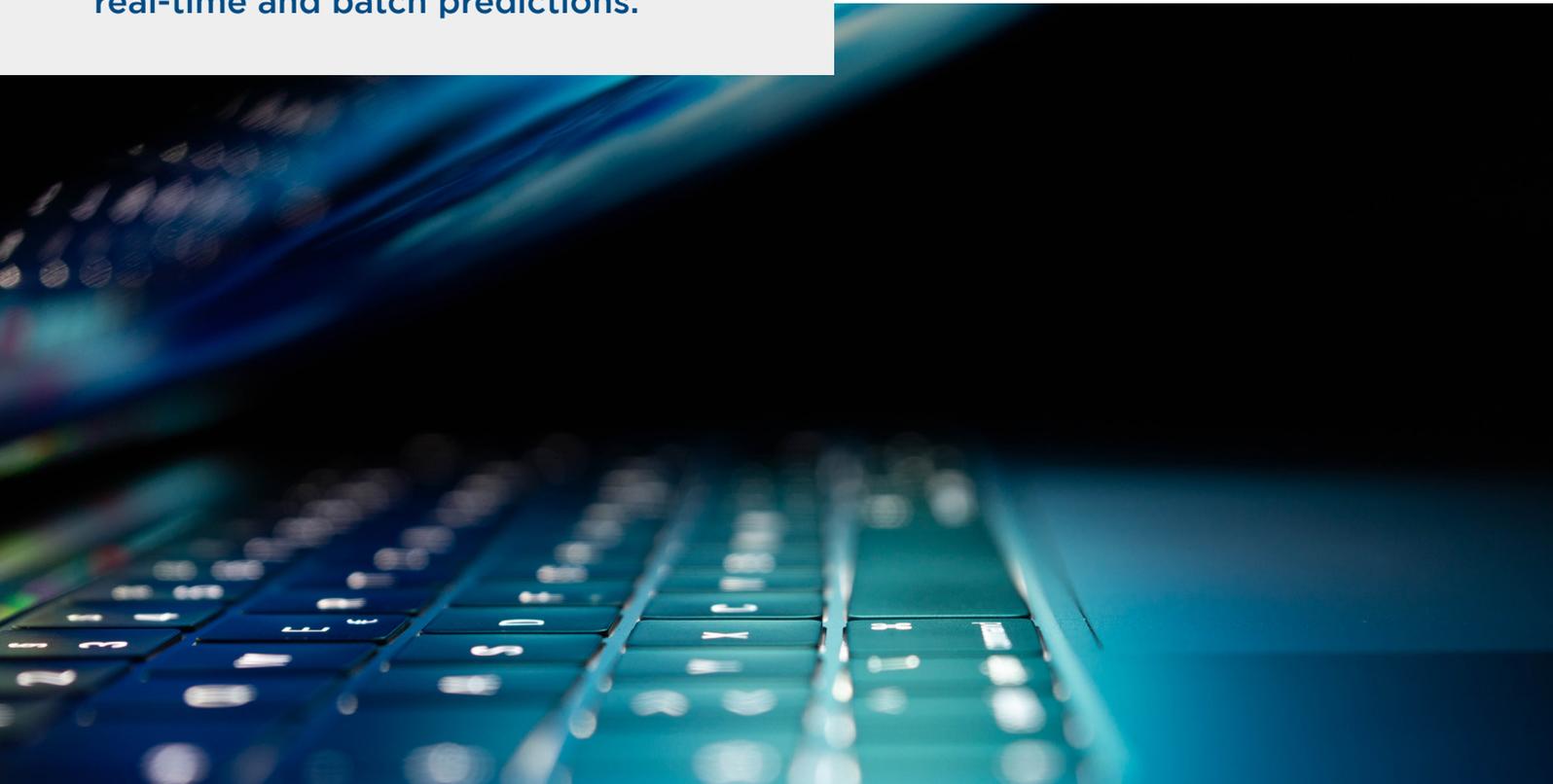
How does Global Knowledge help?

When it comes to AWS and AML, Global Knowledge possesses a lot of expertise. We offer specialised training courses on the subject. Our course 'Machine learning with AWS' is an excellent example.

Would you like to reap the benefits of machine learning with AWS? Then don't hesitate to contact us. Just give us a ring at 0118 912 1929, send an email to info@globalknowledge.co.uk or use our live chat. We would be happy to make your acquaintance.

CONTACT US