MACHINE LEARNING MODEL DEPLOYMENT WITH IBM WATSON STUDIO CODE

Phase 5 – Development part 2

MACHINE LEARNING MODEL DEPLOYMENT:

Deploying a machine learning model, known as model deployment, simply means to integrate a machine learning model and integrate it into an existing production environment where it can take in an input and return an output.

Deployment spaces allow you to create deployments for machine learning models and functions and view and manage all of the activity and assets for the deployments, including data connections, data refinery flows, and connected data assets.

IBM WATSON IN MACHINE LEARNING:

Watson Machine Learning provides a full range of tools and services so that you can build, train, and deploy Machine Learning models. Choose the tool with the level of automation or autonomy that matches your needs.

IBM Watson Studio empowers data scientists, developers and analysts to build, run and manage AI models, and optimize decisions anywhere on IBM Cloud Pak for Data. Unite teams, automate AI lifecycles and speed time to value on an open multicloud architecture.

Bring together open source frameworks like PyTorch, TensorFlow and scikit-learn with IBM and its ecosystem tools for code-based and visual data science. Work with Jupyter notebooks, JupyterLab and CLIs — or in languages such as Python, R and Scala.

IBM Watson Studio – Details

AutoAI for faster experimentation

Automatically build model pipelines. Prepare data and select model types. Generate and rank model pipelines.

Advanced data refinery

Cleanse and shape data with a graphical flow editor. Apply interactive templates to code operations, functions and logical operators.

Open source notebook support

Create a notebook file, use a sample notebook or bring your own notebook. Code and run a notebook.

Integrated visual tooling

Prepare data quickly and develop models visually with IBM SPSS Modeler in Watson Studio.

Model training and development

Build experiments quickly and enhance training by optimizing pipelines and identifying the right combination of data.

Extensive open source frameworks

Bring your model of choice to production. Track and retrain models using production feedback.

Embedded decision optimization

Combine predictive and prescriptive models. Use predictions to optimize decisions. Create and edit models in Python, in OPL or with natural language.

Model management and monitoring

Monitor quality, fairness and drift metrics. Select and configure deployment for model insights. Customize model monitors and metrics.

Model risk management

Compare and evaluate models. Evaluate and select models with new data. Examine the key model metrics side-by-side.

BENEFITS:

Optimize AI and cloud economics

Put multicloud AI to work for business. Use flexible consumption models. Build and deploy AI anywhere.

Predict outcomes and prescribe actions

Optimize schedules, plans and resource allocations using predictions. Simplify optimization modeling with a natural language interface.

Synchronize apps and AI

Unite and cross-train developers and data scientists. Push models through REST API across any cloud. Save time and cost managing disparate tools.

Unify tools and increase productivity for ModelOps

Operationalize enterprise AI across clouds. Govern and secure data science projects at scale.

Deliver explainable AI

Reduce model monitoring efforts by 35% to 50%.[1] Increase model accuracy by 15% to 30%. Increase net profits on a data and AI platform.

Manage risks and regulatory compliance

Protect against exposure and regulatory penalties. Simplify AI model risk management through automated validation.

HOW IT'S USED:

MLOps

Watson Studio provides a collaborative platform for data scientists to build, train, and deploy machine learning models. It supports a wide range of data sources enabling teams to streamline their workflows. With advanced features like automated machine learning and model monitoring, Watson Studio users can manage their models throughout the development and deployment lifecycle.

Decision optimization

Decision optimization streamlines the selection and deployment of optimization models, and enables the creation of dashboards to share results and enhance collaboration.

Visual modelling

With easy-to-use IBM SPSS-inspired workflows, you can combine visual data science with opensource libraries and notebook-based interfaces on a unified data and AI platform.

NLP with Watson

The Watson Natural Language Processing Premium Environment gives Watson Studio users instant access to pre-trained, high-quality text analysis models in over 20 languages. These models are created, maintained and evaluated for quality in each language by experts at IBM Research and IBM Software.

Automated development

With AutoAI, beginners can quickly get started and expert data scientists can speed experimentation in AI development. AutoAI automates data preparation, model development, feature engineering and hyperparameter optimization.

AI governance

AI governance automated tools and processes enable organizations to better direct, manage and monitor AI workflows. By tracing and documenting the origin of data, models, associated metadata and pipelines they are able to provide transparent and explainable analytic results. Operationalize AI effectively by managing risks, AI policies and regulations with custom workflows and dynamic dashboards.

PRODUCT IMAGES:

AI lifecycle automation

Explore relationships by building models with AutoAI.
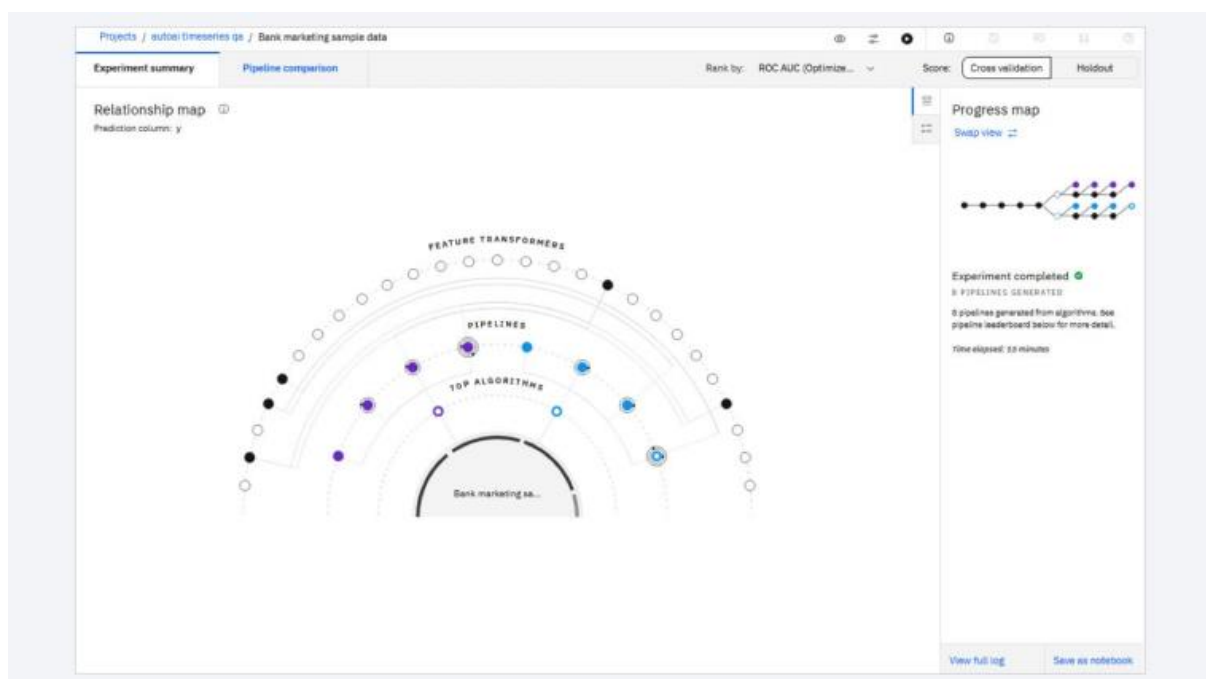
CASE STUDY:

From one year to six weeks:Highmark Health teams with IBM to accelerate AI in urgent times.

Working with [IBM's Data Science and AI Elite team](#), organizations such as [Geisinger Health System](#) have made tremendous leaps forward using inpatient clinical data to build models to predict – and prevent – sepsis mortality. Identifying which sepsis patients are at greatest risk can help providers prioritize care – and stave off risky, costly inpatient admissions. With the increasing urgency facing today's healthcare institutions, there's more ground to cover. At Pittsburgh-based [Highmark Health](#), the second-largest integrated healthcare delivery network in the country, a team of data scientists and researchers realized they could build a model from a source of patient information that might prove even more effective in time-critical cases: insurance claims data.

It was an unexplored area for model building – a first-of-a-kind pursuit which, as promising as it sounded, would require Highmark to predict acute events months in advance using claims data from millions of members across multiple siloed data sources.

[Brittany Bogle, IBM Senior Data Scientist and healthcare lead](#) had significant expertise in similar data science engagements with other U.S. healthcare providers, so she knew the Highmark scenario well. But this time around the team had a new, integrated platform at their disposal that could handle Highmark's complex and varied data sets – and even better – unite data scientists, architects and engineers who were collaborating on this first-of-a-kind project.

That new platform was [IBM Cloud Pak® for Data](#) with components for data modernization, DataOps and AI lifecycle automation including:
- [IBM Data Virtualization](#)
- [IBM Watson Knowledge Catalog](#)
- [IBM Watson Studio, an enabler of ModelOps](#)
- [Explainable AI and Model Monitoring](#) in [Cloud Pak for Data](#)

In a six-week proof of concept, Curren Katz, Highmark's Director of Data Science R&D, teamed with Bogle and IBM to build a model, then score and identify patients likely to develop sepsis. The goal was to work within a three-month window for ingesting the claims data, giving clinical management teams time to develop action plans for intervention and hopefully, keep patients at highest risk out of the hospital.

"When we were building this, other people in the company heard about it and were talking about stories of people they knew and friends and relatives – so we really thought we had hit on a very important topic," said Katz.

While Katz and her team were no strangers to building models, getting to the deployment stage caused some angst among Highmark's most senior data scientists. Previously the organization's architecture made the work cumbersome and clunky – stretching out for months, even up to a year. But with the new platform taking care of the heavy lifting, the IBM team turned over a deployed model in only a few short days. "The (IBM) data science elite team wanted to show me that this was possible and that I could tell our stakeholders across the company that we were going to have this model ready to deploy and ready to go into the clinical systems," said Katz. "We wanted our care managers, nurses, and doctors to be able to access the findings and incorporate that into their work and reach out to patients. I think it was within a couple of days that IBM came back with a deployed model and I was kind of shocked." Katz and Bogle agreed that the early skepticism about tackling some of the biggest problems in healthcare quickly dissolved as the new platform enabled swift model deployment. The newly launched platform gives Katz the power to scoop up new research findings and contributors as COVID-19 evolves, changes and unveils new data.

"And that's what this felt like: A platform where we can draw on all of the expertise in our company and build solutions that get ahead of problems, that give us insights into the future that we can act on," said Katz. "That's how we're going to free people to be their best. And I think that's where healthcare overall is really going forward: Keeping people healthy and being a partner in doing that."

Advantages:
- *Eliminates data silos.*
- *Provides trusted data source and reduces data preparation by cataloguing all the attributes in one place*
- *Integrates insights into the application workflow.*
- *Enables monitoring of insights for bias, trust and transparency.*
- *Reduced Highmark's AI development and deployment lifecycle from 12 months to six weeks.*