

Finding a better way to make smarter decisions

Decision Optimisation for Data Science Experience



Highlights

- Helps data scientists and operational researchers build and evaluate optimisation models in a unified, collaborative environment
- Speeds the process of building optimisation models, using visual dashboards and other tools to simplify the process of testing multiple scenarios
- Takes advantage of IBM Data Science Experience, which offers data scientists a comprehensive set of the tools they need to do their jobs.

With the battle to gain a competitive advantage growing more heated than ever, organisations are increasingly turning to data science to help them gain a competitive edge. As a result, data science has become much more than a tool for exploring data or simply gaining insight for proof-of-concept projects. It has now become a strategic imperative, tasked with supporting a broad range of business requirements along with virtually all aspects of analytics and application requirements.

At the same time, growing budget constraints continue to challenge business and IT (Information Technology) leaders to do more with less, pressing data science teams to operationalise their projects and demonstrate tangible results. To do so, however, those teams need access to the kinds of tools and techniques that will allow them to help drive innovation by providing the entire organisation with right insights at the right time to help support the business in making the right decisions.

Making it easier for data science teams to capitalise on prescriptive analytics

IBM® Decision Optimisation for Data Science Experience is a prescriptive analytics offering that is designed to help data scientists and operational researchers build and evaluate optimisation models in a unified, collaborative environment using advanced analytics to enhance operational applications.

It can also help business analysts configure and evaluate proof-of-concept applications, based on those models. And those same proof-of-concept applications make it possible for planners across the business from human resources to production or supply chain management, to evaluate the business quality of the models.



Decision optimisation defined

Decision optimisation combines mathematical and artificial intelligence techniques to help make complex business decisions - especially those with the potential to result in significant business disruption. It typically involves multiple decision variables, trade-off possibilities and complex constraints. Often used for planning, scheduling, pricing and other business applications, it supplements machine learning to help organisations around the world improve business operations and generate significant return on investment across a wide range of industries. While machine learning can be a very powerful technique for predicting likely outcomes, decision optimisation can play a critical role in helping businesses take the appropriate actions to boost business value.

Creating innovative business solutions

IBM Decision Optimisation for Data Science Experience is integrated with IBM Data Science Experience, which lets data science teams combine optimisation and machine learning techniques with model management and deployment capabilities - and other data science capabilities -to develop unique solutions that can help improve operational efficiency.

While machine learning models can provide accurate forecasts, IBM Decision Optimisation for Data Science Experience can take those forecasts a step further, recommending optimal solutions to meet business goals by considering available decision variables, trade-offs and constraints. And those analytic techniques can lend an important competitive edge to decision making.

Easily demonstrate the business value of optimisation

One thing we all know about data science is that it can take a long time - relatively speaking. It can take weeks, for example, to set up the right model to fit both the business analyst's requirements and the available data. That can be especially frustrating when you're working with analysts who've become accustomed to getting the answers they want with a single keystroke.

From business insight to business action

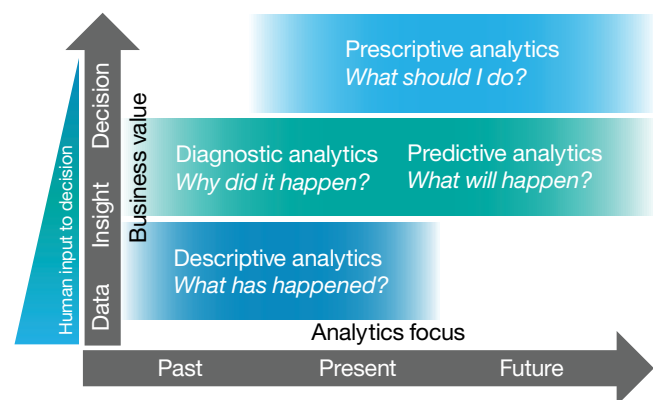


Figure 1. Prescriptive analytics plays a critical role in the data analytics process, providing the guidance that helps businesses make reliable decisions. By combining predictions and additional inputs, it can provide valuable recommendations about what to do next. And decision optimisation is a big part of what makes prescriptive analytics work.

IBM Decision Optimisation for Data Science Experience can speed the process, turning out optimisation models quickly. It uses visual dashboards and other tools to simplify the process of testing multiple scenarios. Plus, you can easily create an optimisation model by coding in Python or using the built-in modeling assistant. Next, you can take advantage of the IBM Data Science Experience platform to deploy the model and optimisation engine as a microservice - which business users can then access from their applications.

Faster time-to-value

You can quickly solve a wide range of optimisation models by taking advantage of IBM CPLEX solvers, which organisations in many industries are using to run their mission-critical decision-making applications. IBM CPLEX solvers deliver the power necessary to solve very large, real-world optimisation problems, along with the speed required for today's interactive decision optimisation applications.

How optimisation works

If you want to predict something, it's likely that you also want to prescribe some type of action to take in response to that prediction. Decision optimisation works in much the same way as predictive analytics.

At first, the decision optimisation process needs to gather and process various sets of data. Typically, decision making involves several considerations, including:

- Goals or objectives - such as reducing costs or increasing satisfaction
- Business constraints -such as resource capacity or scheduling issues
- Key performance indicators - to assess the solution and weight the importance of specific decision criteria.

After accounting for the organisation's business goals, you need to define what makes one solution better than another. For example, you might want to give priority to total cost, or to revenue streams or service levels.

Now it's time to bring in an expert to build a model to consume the inputs. The model is simply a representation of what can and can't happen in the business world. Just as a data scientist or statistician might build a data stream, an operations researcher or an industrial engineer typically builds an optimisation model. IBM Decision Optimisation for Data Science Experience offers several modeling examples and tutorials to help simplify the process.

Once the model is built and loaded with the input data to create a problem instance, it is passed on to the optimisation engine. Residing at the heart of the process, the engine uses advanced algebraic procedures to determine the best possible option - out of the millions (if not billions) of possibilities. The engine then identifies the options that it deems most likely to result in meeting the selected goals. IBM Decision Optimisation for Data Science Experience incorporates powerful IBM CPLEX solvers to help solve optimisation models with millions of constraints and variables.

Data scientists can then share graphical dashboards with business analysts who will validate the benefits of the models. From there, the business user can review the likely results of a given solution and change the inputs to create 'what-if' scenarios. Once the alternative outcome is calculated, the user can compare the two solutions. Users can repeat the process multiple times, if they like, until they're satisfied with one of the solutions. At that point, they can submit it for execution.

The platform that pulls it all together

When sourcing the tools they need, today’s data scientists often turn to open source technologies. But while those technologies can offer both innovation and value, they can also make it difficult for data scientists to assemble different open source capabilities into a single functioning environment. The result is a disjointed collection of tools, filled with silos and bottlenecks. And in the end, both collaboration and productivity often suffer.

Fortunately, there’s a better solution. The IBM Data Science Experience is an interactive, collaborative platform that offers data scientists a complete set of the tools they need to do their jobs. It draws from open source and IBM technologies and provides data science teams with access to a community of peers. So they can collaborate and take advantage of shared resources - including data sets, notebooks and articles - using Jupyter Notebooks, RStudio and Spark with a growing set of IBM innovations for data scientists. What’s more, Data Science Experience offers users scalability and a high level of security, making it highly adaptable to a broad range of applications.

The IBM Data Science Experience

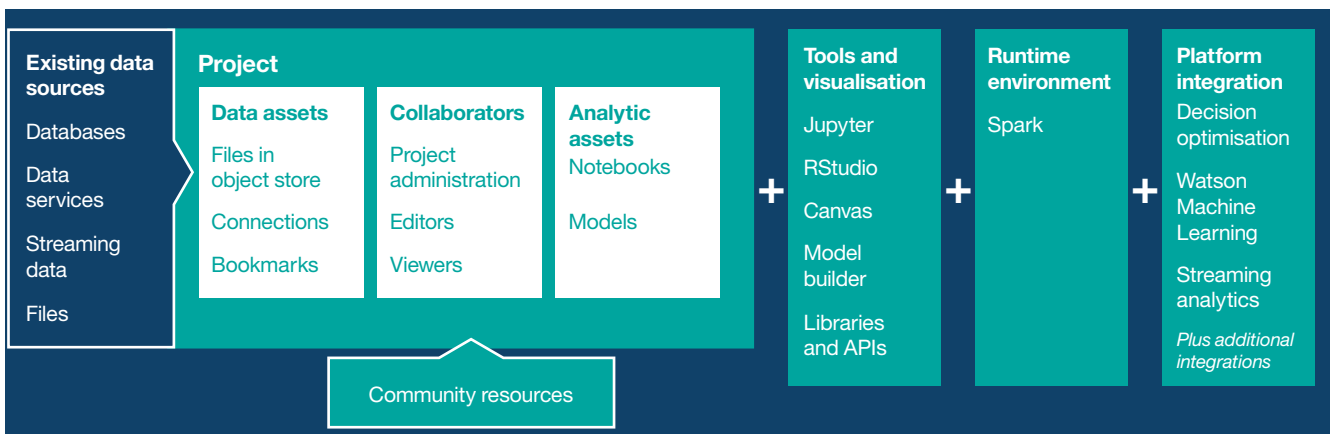


Figure 2. IBM Data Science Experience provides the environment and tools to help solve your business problems by collaboratively analysing your data. It integrates a full range of data science capabilities, including predictive and prescriptive technologies, within a unified environment. The Data Science Experience architecture is focused on the project - which is also how you organise your resources for solving a business problem. When you create a project for analysing data, you associate it with a compute engine and storage and then add collaborators, data assets and analytic tools. You can also add bookmarks to important resources and associate other services with your project.

Why IBM?

IBM Decision Optimisation solutions represent more than 25 years of IBM experience in the field as a proven provider of optimisation technology. They incorporate highly powerful mathematical programming and constraint programming engines to address a broad range of business problems across domains. In addition, IBM has one of the world's largest groups of operations research, IT cloud and industry solutions experts across product teams, IBM Research and IBM Global Business Services. This combined expertise helps ensure leading-edge product development and support for our users. From integrating with the IBM SPSS Modeler predictive analytics engine to running cloud-based optimisation algorithms and facilitating user collaboration and powerful visualisations in an intuitive user interface, IBM Decision Optimisation solutions provide a comprehensive end-to-end solution for some of the most complex challenges imaginable.

For more information

To learn more about how IBM Decision Optimisation for Data Science Experience can help your organisation take advantage of its data to elevate and enhance its decision-making processes, please contact your IBM representative or IBM Business Partner, or visit the following website:

ibm.com/decisionoptimization

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