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Making things happen

Component Modelling

MODELCRAFT

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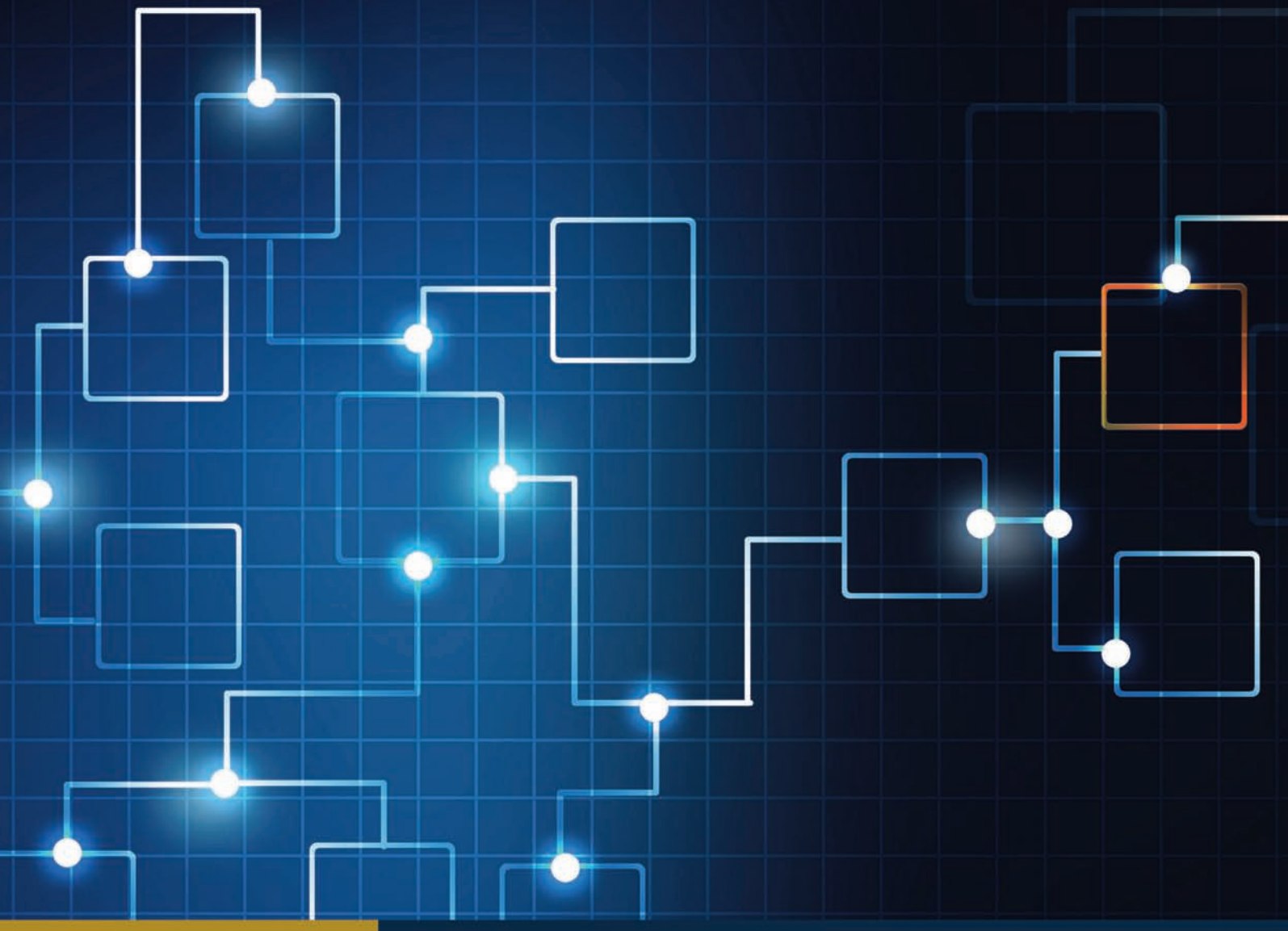

Proprietary solutions

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Why ModelCraft™?

ModelCraft™ is an automated machine learning and component-based modelling tool that allows simplifying and industrializing the development and validation of advanced analytics models

ModelCraft™ has intuitive components for data processing, advanced analytics model development and interpretability. It allows users to connect to any data repository and to generate modelling workflows in a visual manner and without the need for programming.

ModelCraft™ thus responds to industry needs such as:

- Incorporating advanced machine learning algorithms into the modelling process in a simple and intuitive way, such as gradient boosting, elastic nets, ensemble models, random forests, support vector machines or neural networks, among others.
- Industrializing and accelerating the modelling process, reusing codes and reducing the time spent on routine and repetitive tasks.
- Facilitating access to advanced modelling techniques for non-specialist teams.
- Improving the performance, traceability and comparability of models.
- Enabling model interpretability and automating model documentation.
- In short, improving the model development and validation processes, and enabling the creation of advanced challenger models.

In addition, ModelCraft™ has been developed in the cloud and natively uses auto-scalability and parallel computing capabilities.

Thanks to this, ModelCraft™ tool accelerates the transition to component-based modelling, which is more efficient, more interpretable, more accessible and lowers model risk.

Structure of ModelCraft™

ModelCraft™ has two work areas: the data management panel and the modelling panel

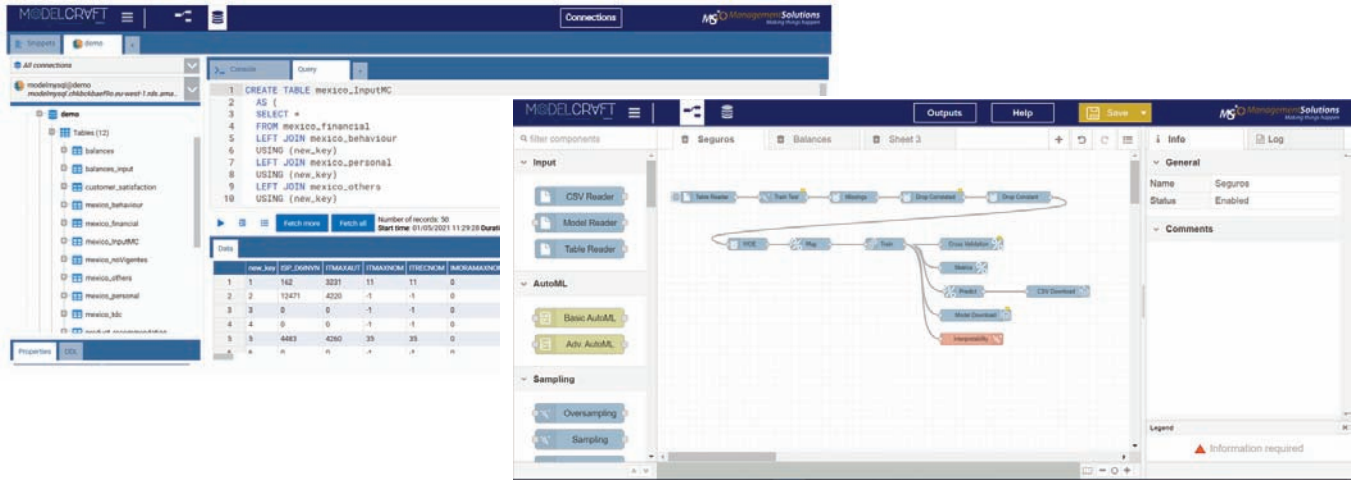
The data management panel allows users to connect to any database and extract, merge and load tables using the SQL language. Through the component-based modelling panel, users are able to perform exploratory data analysis, prepare data for modelling, and train and interpret advanced machine learning algorithms.

01 Data management

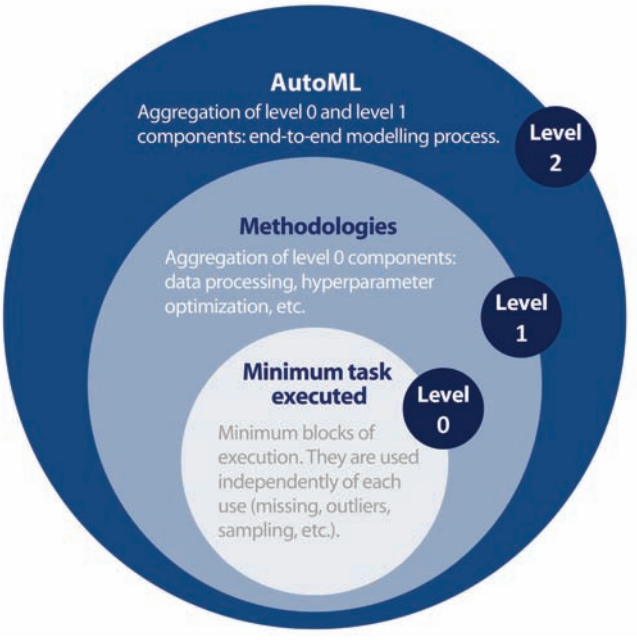
- Database management
- Simultaneous connection to different data repositories in different languages (postgresql, mariadb, mysql, oracle, terminal, etc.)
- SQL programming

02 Modelling

- Data processing and EDA
- Modelling components and advanced machine learning algorithms
- Interpretability and automatic reporting components



In turn, the modelling components are structured in three levels of depth: from level 0 (minimum executable task, such as outliers detection or model training) to level 2 (aggregation of components to build an end-to-end modelling process).



Functionalities of ModelCraft™

ModelCraft™ has a library of predefined components for developing the full modelling lifecycle

Input, connection and download

Input data reader with different formats and delimiters
Model reader in .pkl format
Database connection components (cloud, RDS)
Download of models, files and reports

Database management

Simultaneous connection to different data repositories in various languages (postgresql, mariadb, mysql, oracle, terminal, etc.)
SQL data processing (generation of tables, data manipulation and retrieval, table traversal, etc.)
Import and export of files

Sampling

Sampling algorithms
Training, test and validation samples
Algorithms for processing highly unbalanced data

Feature engineering

Binning algorithms
Correlation analysis
Variable selection and elimination
Missing variables analysis and imputation
Outlier analysis and treatment
Calculation of weight of evidence
Encoding techniques

Visualizations

Model comparison and selection of the optimal model
Exploratory data analysis
Representation of histograms, pie charts, etc.
Analysis of database structure
Calculation of descriptive statistics

Model training

Hyperparameter search techniques
Ensemble methodologies
Genetic algorithms
Training of supervised and unsupervised models
Neural networks

Performance and prediction

Mapping of criteria to training samples, validation and testing
Calculation of metrics and KPIs
Out-of-time analysis and backtesting
Predictions
Model validation

Interpretability

Variable importance analysis
Branch & bound algorithms
Surrogate model building
Univariate and bivariate analyses
Interpretable trace of the entire development process
Automatic generation of a complete model report

Automated machine learning

Generation of user-created components, including free code, in real time
Determination and optimization of the critical path between components
Encapsulation of components in three levels of depth
Access to Python and R code generated by each component

Features of ModelCraft™

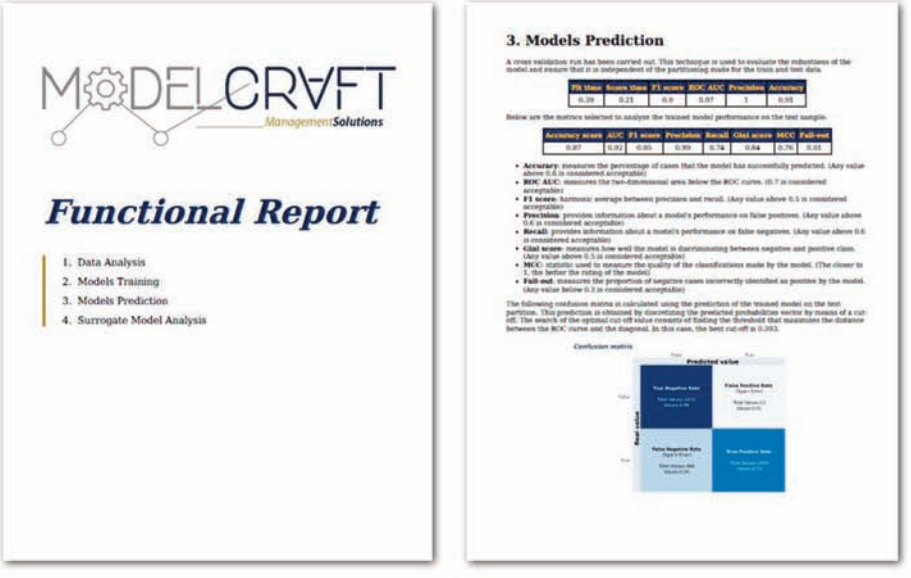
ModelCraft™ enables the application of machine learning techniques in an intuitive and robust way, and it is deployed as a simple, flexible and scalable technology

User

- **Ease of use:** the ModelCraft™ interface allows the visual buildup of modelling flows and gives access to all parameterization in an organized way.
- **Customization:** users can create their own components, design their own modelling flows and access the generated Python and R codes.
- **Explainability:** ModelCraft™ can generate an automatic summary of the model, its variables and its complete development process at the click of a button, describing the decisions made by the user (e.g. the model's hyperparameters) and by the algorithms (e.g. the exclusion rationale for each variable).
- **Traceability:** the interface offers full traceability of the developments made, allows access to all the code, and provides logs and traceability functionalities.
- **Optimized code:** each component in ModelCraft™ has been optimized to maximize computational power, using libraries available from the most advanced programming environments.
- **Evolution:** ModelCraft™ is constantly evolving and adapting to the needs of the industry; for example, the probability of default (PD) calculation has already been added to the ModelCraft™ component library, and LGD and CCF will be added shortly.
- **Integration:** ModelCraft™ integrates natively with two proprietary Management Solutions tools: **ModelCraft Integrator™**, for putting models into production through a model and rule manager that interacts with operational systems, and **ModelCraft Monitor™**, for periodic monitoring and backtesting of models.

IT

- **Deployment flexibility:** ModelCraft™ can be deployed either as an on-premise tool or as software-as-a-service (SaaS) in the cloud, according to customer needs.
- **Scalability and parallel computing:** ModelCraft™ is scalable and takes full advantage of parallel computing capabilities, allowing the processing of large volumes of data and executions with a high computational load.
- **Easy deployment:** the designed architecture allows ModelCraft™ to be deployed in a very short time, including an analysis of customer needs, their configuration preferences and necessary customizations.
- **Reduced support:** ModelCraft™ requires reduced IT support, and maintenance includes the deployment of new releases.

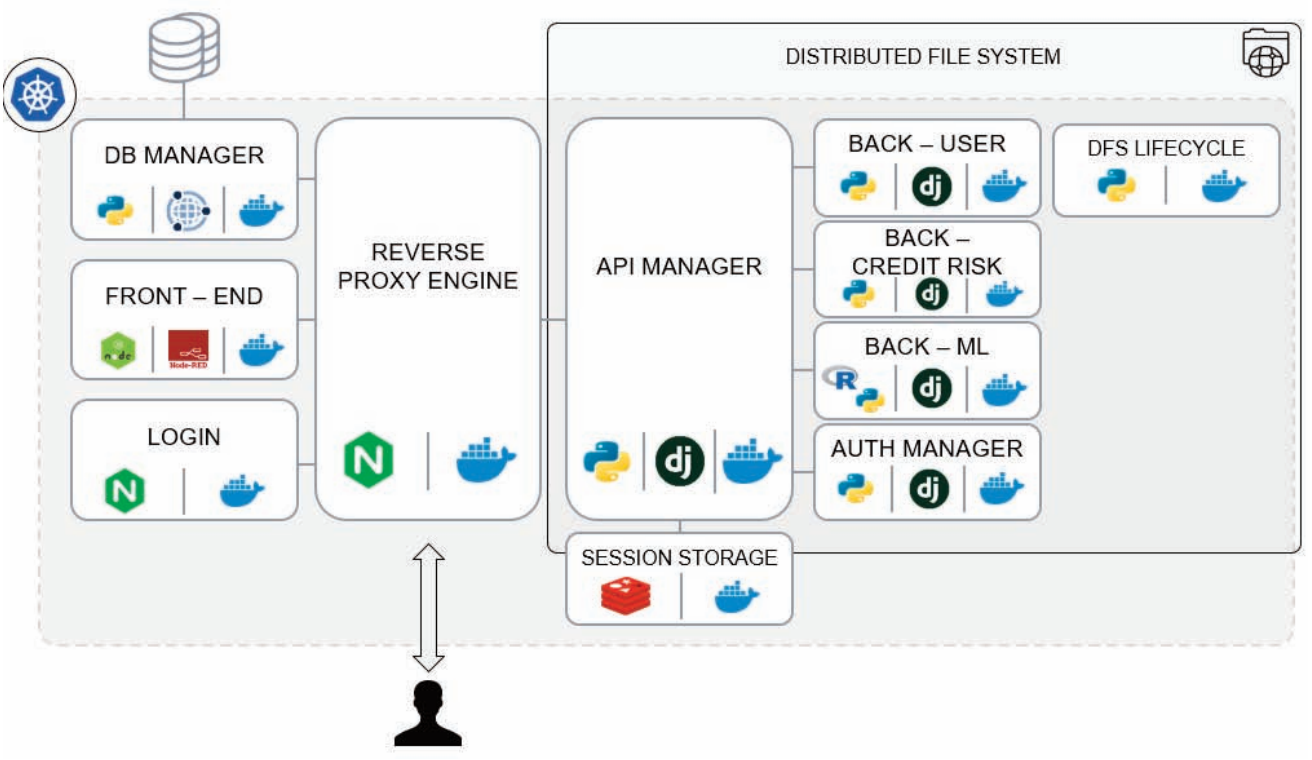


Example of a model report automatically generated by ModelCraft™.

IT ARCHITECTURE

ModelCraft™ has been developed cloud-natively, using a Kubernetes-based architecture that enables rapid deployment of the component library and a visual programming frontend

The ModelCraft™ architecture is focused on different stacked component libraries, allowing the use of the components as microservices, and includes a user, storage and execution manager.



CREDENTIALS

Management Solutions has extensive capabilities and references in the field of advanced modelling, combined with in-depth knowledge of technology and business processes.

Management Solutions provides differential value in the field of advanced modeling:

- It has extensive experience in the development, validation and implementation of models and algorithms applied to multiple business areas in different industries and sectors.
- It has quantitative capabilities and resources with a high degree of knowledge and specialization (two thirds of its staff are STEM).
- Specifically, it has teams of data scientists who carry out projects in artificial intelligence and machine learning, as well as an R&D team dedicated to the practical application of AI applied to management.
- It has developed a Chair in Big Data and Analytics together with the Universidad Politécnica de Madrid, where it develops lines of research on modelling techniques and artificial intelligence. This has allowed it to develop ModelCraft™ and to keep it up to date with the latest advances in modelling and computing.

Thanks to these differential values, Management Solutions implements ModelCraft™ in all its industries and in all the countries where it operates.

Management Solutions
Leading business consulting services firm

Management Solutions is an international consulting Firm whose core mission is to deliver business, risk, financial, organization, technologies and process-related advisory services.

Management Solutions currently has a multidisciplinary team (functional, mathematical, technical and systems integration) of 2,500 professionals, and operates through 32 offices (15 in Europe, 16 in the Americas and 1 in Asia) from where we serve customers operating in over 40 countries in Europe, the Americas, Asia and Africa (Senegal, Equatorial Guinea, etc.).

Europe	Madrid, Barcelona, Bilbao, Coruña, London, Frankfurt, Paris, Amsterdam, Copenhagen, Oslo, Warsaw, Zurich, Milan, Rome, Lisbon
Americas	New York, Atlanta, Pittsburgh, Boston, Birmingham, Houston, San Juan de Puerto Rico, Mexico City, San José, Medellín, Bogota, Quito, Sao Paulo, Lima, Buenos Aires, Santiago de Chile
Asia	Beijing

We create value propositions for our clients and commit to their effective implementation to exceed client expectations, becoming their trusted partners

Management Solutions´ differentiating factor lies in its in-depth knowledge of the businesses in which its clients operate and in its high degree of sector-specific and functional specialization.

To ensure full coverage of its clients´ needs, Management Solutions structures its value proposition by industry and line of activity, bringing together a wide range of skills.

Industries

- *Financial Institutions (Banking and Insurance)*
- *Energy*
- *Telecommunications*
- *Consumer and Industry*
- *Government*
- *Construction*

Services

- *Strategy*
- *Sales and Marketing Management*
- *Transformation: Organization and Processes*
- *Risk Management and Control*
- *Management and Financial Information*
- *New Technologies*

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Management Solutions is an international consulting Firm whose core mission is to deliver business, risk, financial, organization, technologies and process-related advisory services.

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