Paper SD07

Oracle Analytics Cloud

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ORACLE ANALYTICS CLOUD

This presentation will show the visual, analytic and machine learning capabilities of the Oracle Analytics Cloud.
Oracle Analytics Cloud can be used with all types of clinical, metadata and operational data, empowering users with comprehensive capabilities from self-service data discovery to powerful predictive analytics.
Oracle Analytics Cloud unites Machine Learning, Artificial Intelligence and service automation in an autonomous platform that delivers personalized, proactive analytics anytime, anywhere with powerful mobile capability. Users can bring the power of analytics to any data, enabling every process, decision, and action to be data-driven.
Configurable dashboards enable users to quickly analyze and manage activity across the entire system, enabling team members to capture insights and comments to create interactive stories to share across the organization.
Users can select interactive visualizations and automatically create advanced statistical calculations to reveal the insights in their data, and build, analyze and apply machine learning models in simple, easy to use workflows.

A NEW WAY TO WORK

The nature of business is changing, and with that change comes a new way to compete. Keeping up with the demands of today's tech-savvy workforce means having a method for creating value and running quickly.
A centralized analytics platform where IT plays a pivotal role should be a fundamental part of your business analytics strategy. The combination of both business-led and IT-led initiatives is the sweet spot for innovation, to deliver speed and simplicity to your users while maintaining the highest standards for data quality and security.
Built for the cloud, Oracle Analytics Cloud is the centre-piece of Oracle Analytics. Oracle Analytics Cloud empowers business users with governed self-service analytics capabilities for data preparation, visualization, augmented analysis, and natural-language processing.
Oracle Analytics Cloud can be used with all types of clinical and operational data, empowering users with comprehensive capabilities, from self-service data discovery to powerful predictive analytics.
Oracle Analytics Cloud's governed self-service experience enables Oracle Analytics users at enterprises around the world to drive faster insights and optimize business results.
Uniting machine learning, AI, and service automation in an autonomous platform that delivers personalized, proactive analytics anytime, anywhere with powerful mobile capability. Users can bring the power of analytics to any data, enabling every process, decision, and action to be data-driven.

Figure 1 shows a simple, interactive dashboard representing Trial Recruitment and Medical History

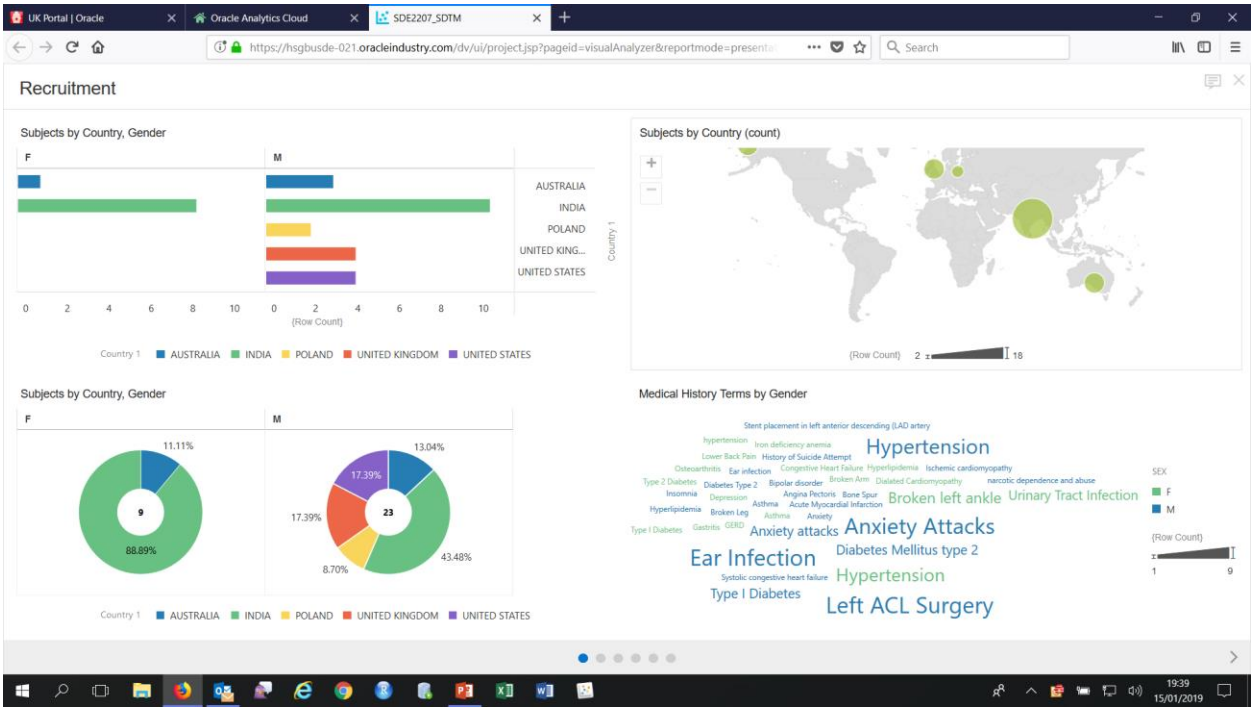

Figure 1 – Trial Recruitment Dashboard.

A COMPLETE ANALYTICS SOLUTION

1. Autonomous - Uniting machine learning, AI, and service automation in an autonomous platform that delivers personalized, proactive analytics anytime, anywhere.
2. Collaborative - Amplifying human insights to conquer the barriers of complex interactions and information overload.
3. Connected - Bringing the power of analytics to any data, enabling every process, decision, and action to be data-driven.
4. Complete - Empowering everyone with comprehensive capabilities, from self-service data discovery to powerful predictive analytics, enterprise-class reporting, and easy what-if analysis.

Figures 2 and 3 show Discrepancy analysis and dashboards across sources (Electronic Data Capture, Central Coding and Data Management Workbench validation checks and manual discrepancies)

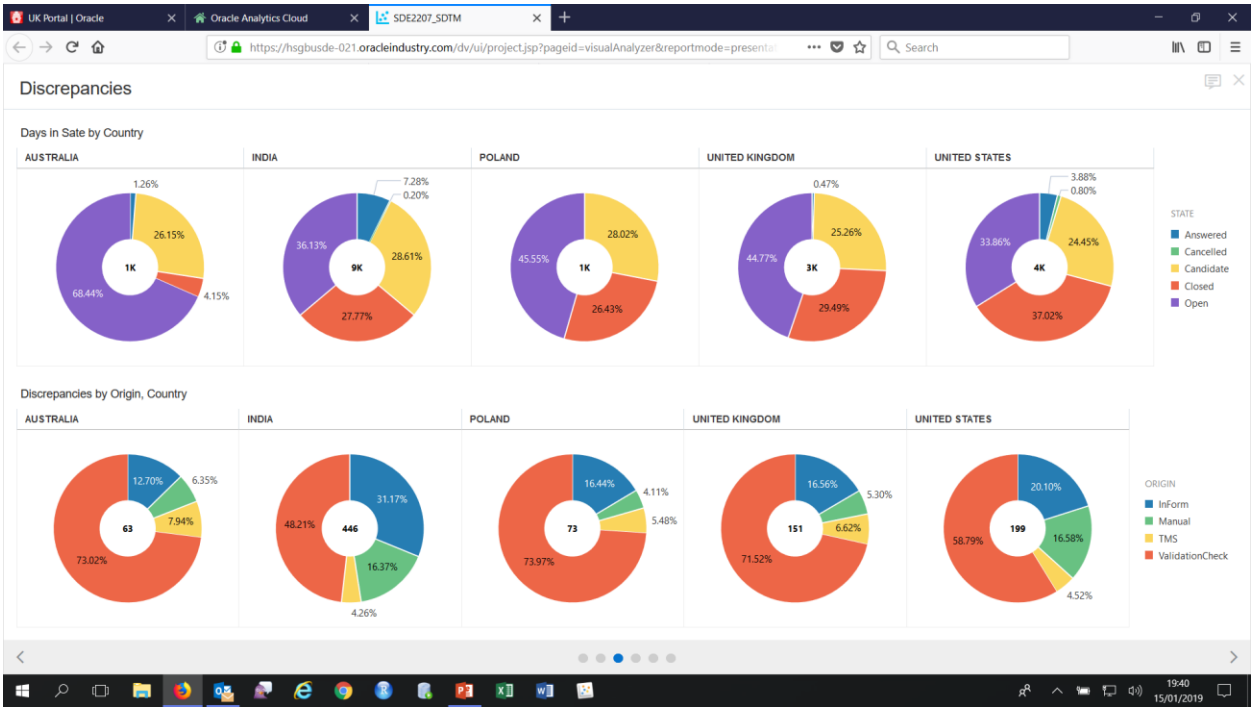

Figure 2 – Data Discrepancy Dashboard.

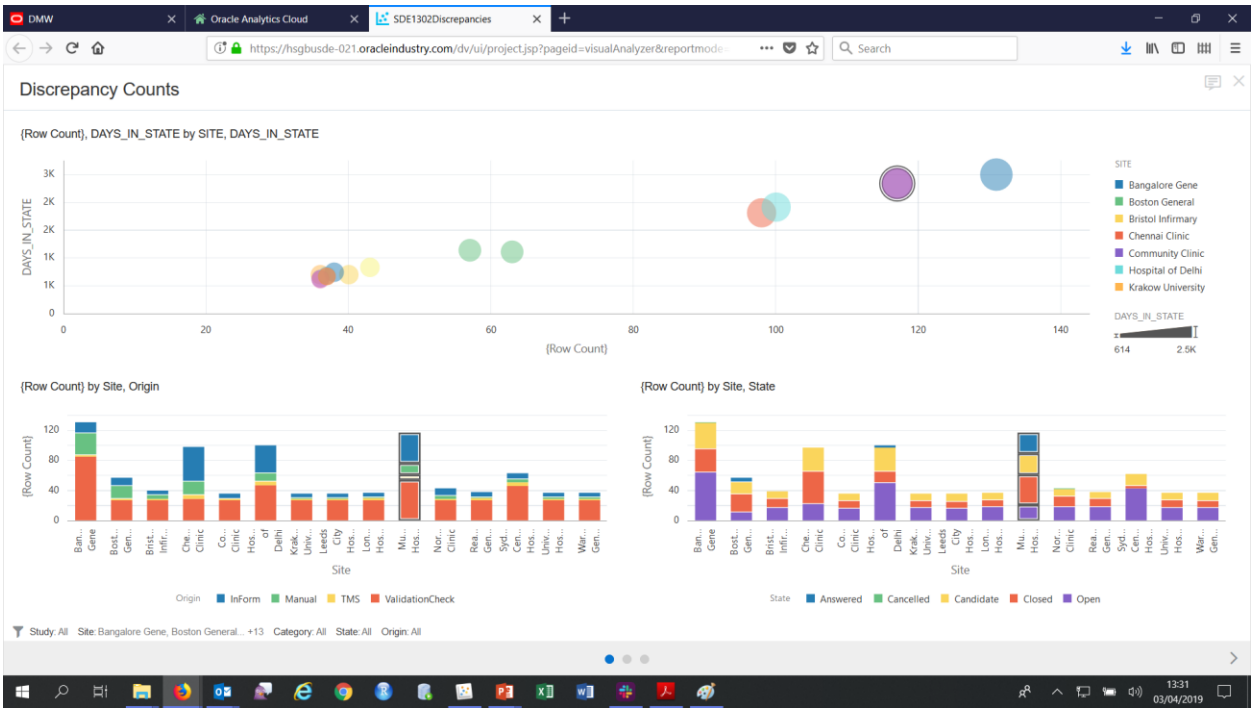

Figure 3 – Data Discrepancy Analysis.

UNCOVER NEW OPPORTUNITIES WITH DATA

Advancements in analytics technology are creating new opportunities for you to capitalize on your data. Modern analytics are predictive, self-learning, and adaptive to help you uncover hidden data patterns. They are intuitive as well, incorporating stunning visualizations that enable you to understand millions of rows and columns of data in an instant. Modern business analytics are mobile and easy to work with, and they connect you to the right data at the right time, with little or no training required.

T.K. Anand, senior vice president of AI, Data Analytics and Cloud at Oracle explains: "No individual works with data in isolation. We can no longer accept a world where IT and business have diverse sets of analytics tools that are disconnected from each other. This is a new vision, product experience, and commitment to customer success that will enable us to collaborate with our entire ecosystem and deliver a new era of enterprise analytics".

Configurable dashboards enable you to quickly analyze and manage activity across the entire system, and team members can capture insights and comments to create interactive stories to share across the organization. Users can select interactive visualizations and automatically create advanced calculations to reveal the insights in their data, and build, analyze and apply machine learning models in simple, easy to use workflows.

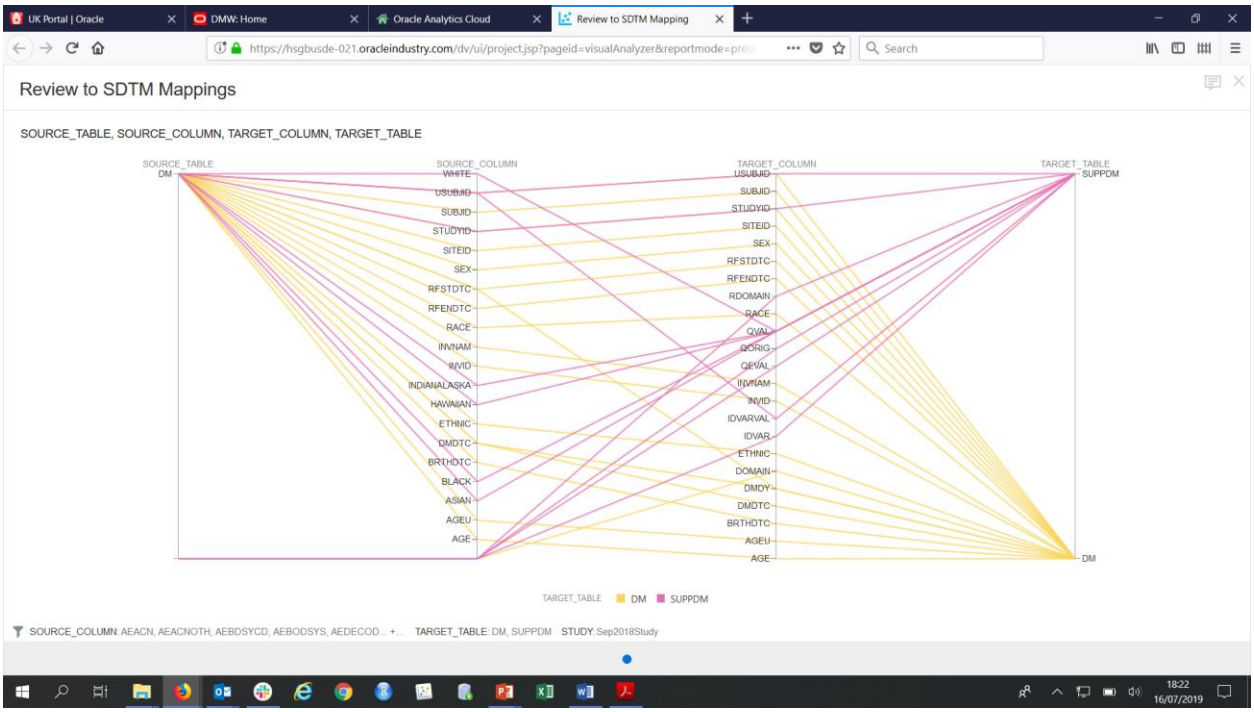

Figure 4 – Data Transformation Traceability Report.

VISUALIZE AND ENHANCE YOUR DATA

You want to see the data signals before your competitors do. Analytics provides the ability to see a high-definition image of your business landscape. Oracle Analytics Cloud can connect directly to relational and big data sources, Clinical Trial Management and Safety systems, and can access data across multiple sources from Oracle Health Sciences Data Management Workbench. Complex statistics and data driven forecasting can be added using a right mouse click. Bringing these data sources together and enriching the data in Oracle Analytics Cloud, you can quickly understand the value of the data and share your data story with colleagues, all in a matter of minutes.

1. Visual Stories - Combine data from Clinical Data Warehouses, Clinical Trial Management and Safety systems to create powerful visual stories.
2. Interactive Dashboards - Configurable dashboards enable you to quickly analyze and manage activity across the entire system.
3. Advanced Analytics - Select interactive visualizations and automatically create advanced calculations to reveal the insights in your data.
4. Workflow - Formalize collaboration and share approved machine learning models across a wide audience.

Figures 5 and 6 show Actigraph and Patient Dropout data including Multivariate Outliers, Trend Lines and Seasonal ARIMA forecasting.

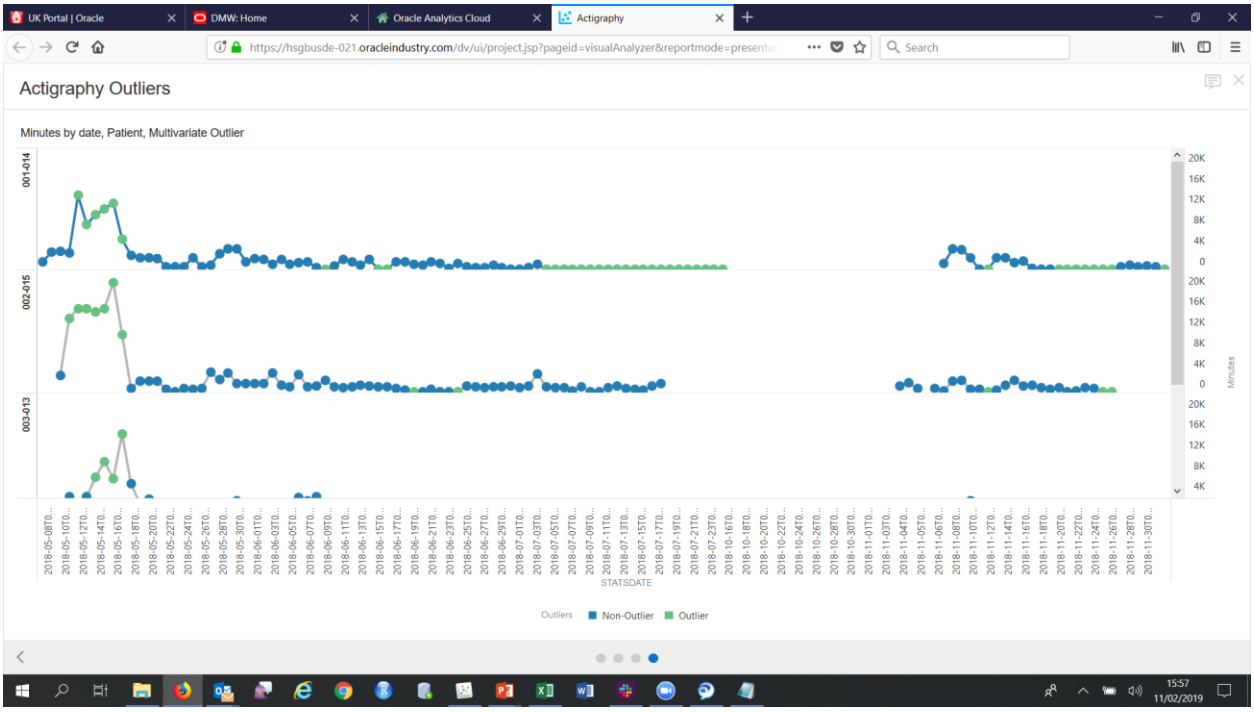

Figure 5 – Actigraphy Data (via Oracle Health Sciences mHealth Connector) with Multivariate Outliers.

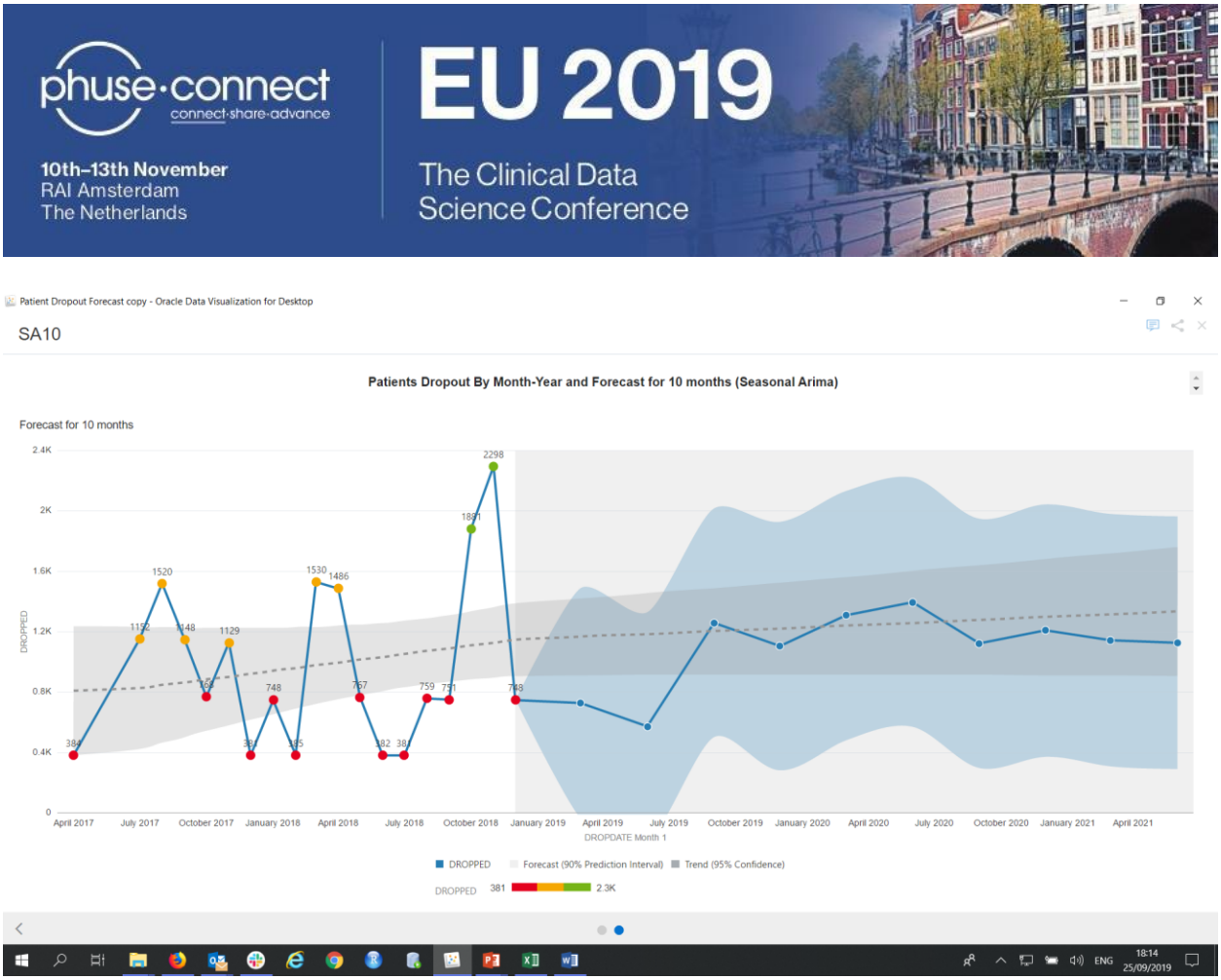

Figure 6 – Seasonal Arima and Linear Trend Forecasts of Patient Dropout Rate.

GAIN INSIGHT WITH OUT OF THE BOX MACHINE LEARNING

Machine Learning is a branch of Artificial Intelligence that allows computer systems to learn directly from examples, data, and experience. Machine Learning in Oracle Analytics Cloud allows users to make algorithmic predications based on data.

In the world of clinical trials, mobile devices and real-world data (RWD) sources can dramatically increase the amount and complexity of data collected, which can be difficult to manage. Machine Learning can be used to improve the quality, reliability, and availability of data by utilizing historical information to train Machine Learning algorithms, providing automated insights.

Figures 7 and 8 show the relative performance (confusion matrix) of two of the out of the box Machine Learning algorithms in OAC, predicting disease outcome from breast cancer tumor image measurements.

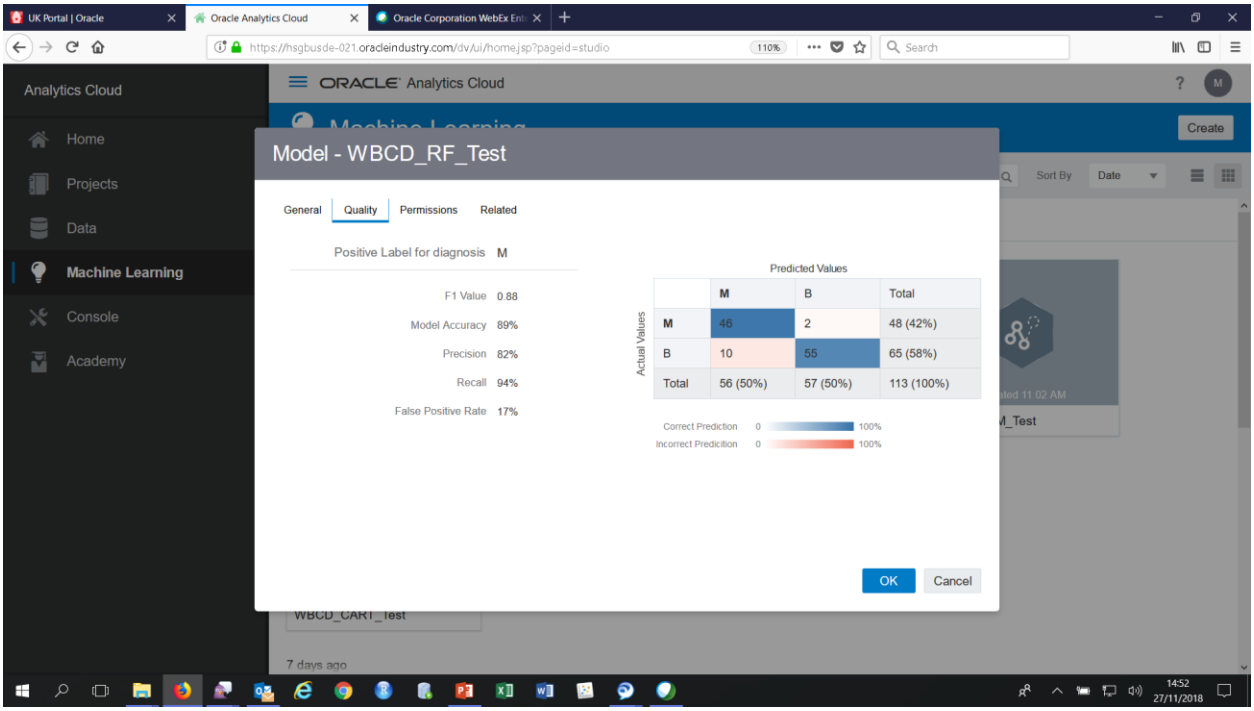

Figure 7 – Machine Learning (Random Forest).

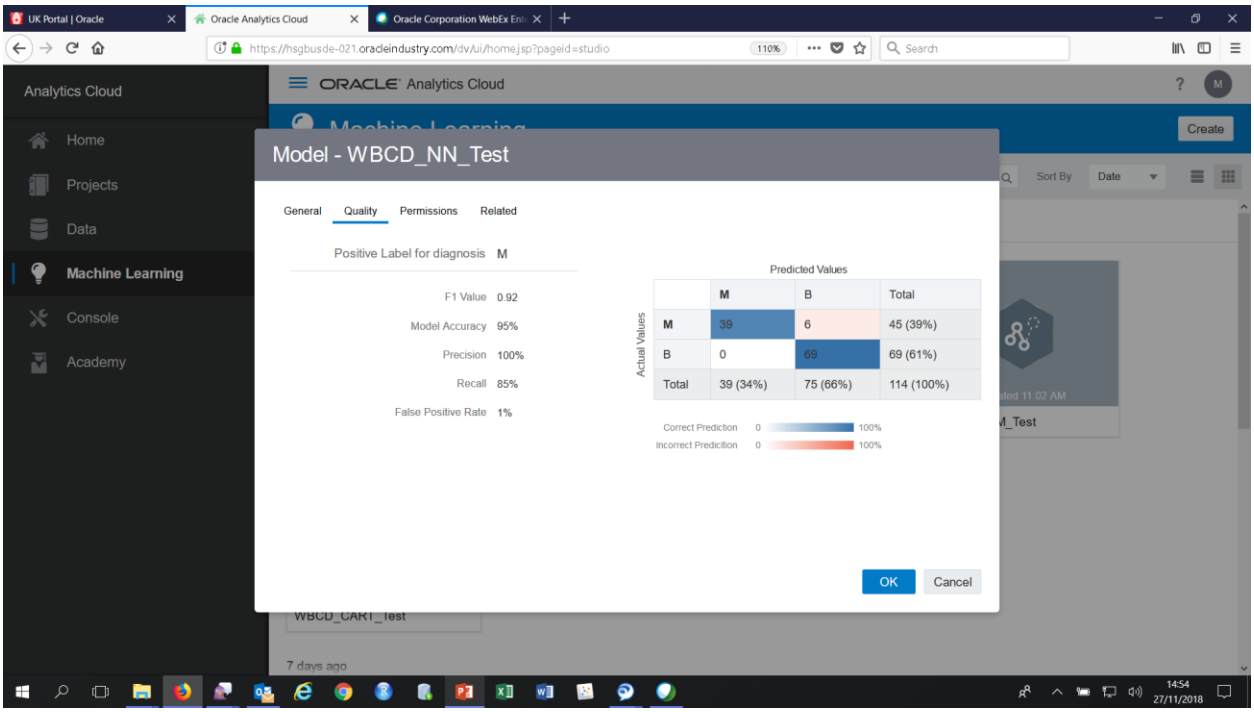

Figure 8 – Machine Learning (Neural Network).

MACHINE LEARNING IN HEALTH SCIENCES

MACHINE LEARNING AND SAFETY DATA

Within pharmacovigilance, more than 60 percent (60%) of drug safety experts plan to use Artificial Intelligence to improve the speed and security of adverse event case processing. Bruce Palsulich, VP of Safety Product Strategy, Oracle Health Sciences says: “Fortunately, adverse event processing is becoming faster and smarter with the help of Artificial Intelligence and the cloud. Both technologies are helping drug safety experts to improve quality and accuracy in the handling of the data they work with and drive down their reporting costs”.

MACHINE LEARNING AND HEALTHCARE DATA

The likelihood of heart disease can be classified into five distinct values: absent, less likely, likely, highly likely, and present. A multi-classification Machine Learning algorithm can be used to create a model that will use classification to predict the likelihood of heart disease in other patient populations. This project, training data and Machine Learning model can be downloaded from the Oracle Analytics Library.

MACHINE LEARNING AND CLINICAL DATA

Clinical data scientists have trained and applied Machine Learning workflows over transformation metadata to improve the quality of mappings. Our team used the Oracle Analytics Cloud to explore model training and application to analyze the quality and consistency of historical, study-data-tabulation-model (SDTM) mapping. These approaches can improve the quality and understanding of clinical trial data and identify trends that analysts could have missed. As with all Machine Learning approaches, the ability to interpret and report on the models is critical.

THE POTENTIAL FOR INNOVATION IN HEALTH SCIENCES

Cloud technologies have transformed clinical trial sponsors’ access to technologies and processing types. Databases and indexed data stores now complement each other, bringing transactional clinical data together with real world data. These data can enable Advanced Analytics and Machine Learning. Data analysis is becoming more visual, and more predictive, as the number of data sources increase, and data volumes increase exponentially.
It’s clear that the process of evaluating large amounts of data from multiple sources for insight could overwhelm even large teams of skilled data scientists. In clinical research, Advanced Analytics and Machine Learning approaches can help the industry to analyze the ever-increasing complexity of today’s clinical trials, manage continuous data collection from emerging data sources such as mobile devices, streamline safety case processing tasks, and verify consistency across data transformations. As the industry embraces these new technology approaches, ever more areas of health sciences research will benefit from Advanced Analytics and Machine Learning.

REFERENCES

https://www.oracle.com/solutions/business-analytics/roadmap.html
https://www.oracle.com/solutions/business-analytics/data-visualization/library-overview.html

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