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Point of view

Advanced Analytics on Top of **OSDU Data Platform**

Rising Problem of Oil and Gas Upstream Data Volumes - Storage, Migration, and Transmission

The E&P industry is currently undertaking major automation and digital transformation steps to boost efficiencies and reduce costs. One of the biggest challenges in this transformational effort is efficiently managing large volumes of upstream datasets. The decision to drill every Oil and Gas well is based on the end-to-end interpretation of terabytes of subsurface data, including seismic, regional geology, petrophysical and offset well analysis. These datasets are typically stored in several formats such as binary, flat, and often in software-specific proprietary files. This leads to major challenges in the interoperability between different domain teams like interpretation, well planning, and production. As a result of these data silos, the Oil and Gas Field development programs become time intensive and slow. Traditional data storage and discovery methods cannot be implemented on an as-is- basis and need to be customized for the O&G sector.

To address the challenges of data silos, numerous key O&G industry experts worked collaboratively to create a standards-based, cloud-native data platform called the OSDU™ Data Platform. Many Oil and Gas majors are now adopting the OSDU Data Platform for their subsurface datasets for the inherent benefits of flexibility, scalability, and cost-effectiveness.

What is OSDU Data Platform

It is a highly flexible, Data–standards Based, technology-agnostic, cloud-native data platform typically built for the Oil and Gas Upstream Industry. The focus is to remove data silos by separating the data from the applications and making it discoverable and usable across the O&G chain. The first commercial release was done in March 2021 as the Mercury (R3) release.

OSDU Intelligent Wrapper for Analytics

The main objectives of the OSDU data platform are to reduce overall cycle time through integrated workflows and increase scalability by leveraging cloud technologies. An intelligent wrapper that provides a comprehensive insight into these datasets is essential for effectively utilizing such centralized data platform services. Sophisticated statistical tools such as Principal Component Analysis (PCA), K-Mean, Neural Network, etc., can be leveraged to extract more from the data and lead to faster decision making. Such methods are limitless and can be extended beyond Data Clustering, Data Dimensionality reduction, Artificial Intelligence, and Machine learning. These tools can be effectively leveraged in removing the noise and establishing relationships and patterns between various data attributes. These workflows can then be applied to the oil and gas data set at different levels of user interest.

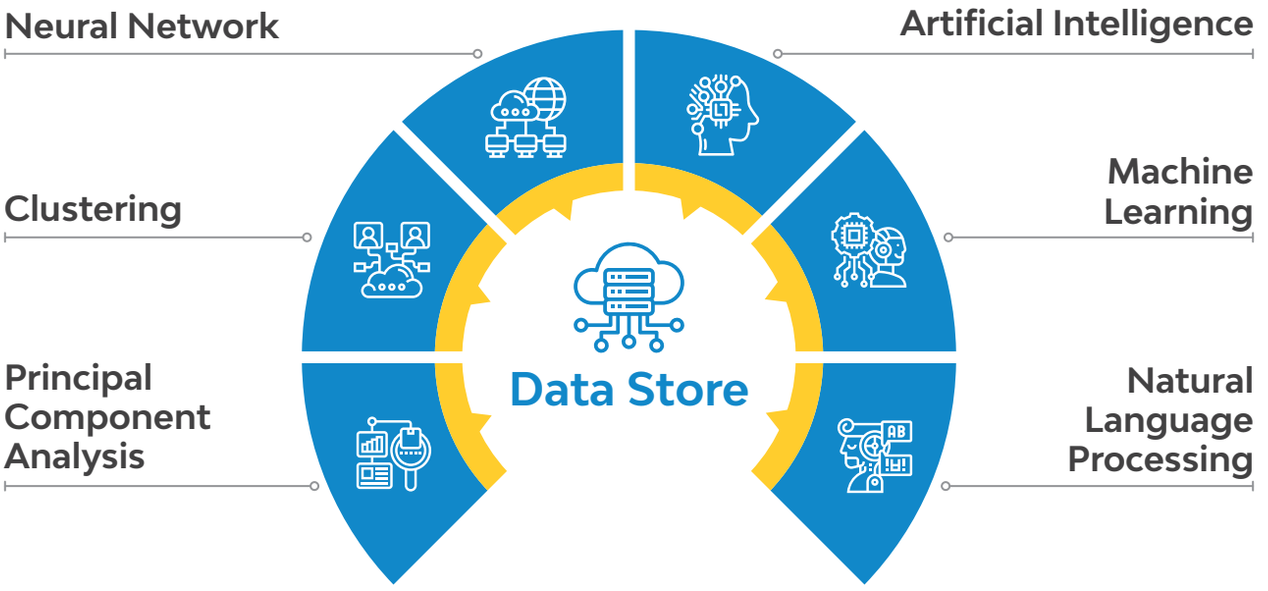

Figure 1: Various Statistical Tools

A few examples of the statistical workflows are provided below:

Utilization of These Statistical Methods

- **Data Discovery**

  The Exploration and Production workflows require various datasets at various stages of the work process. Availability of the right dataset is critical to completing the ongoing processes. The primary objective of the Data Discovery Workflow is to enable the user to retrieve the right data at the right time. Efficient and intuitive data discovery and retrieval system will reduce the margin of error and improve efficiency.

  The users can use advanced NLP-based searches for Data Discovery. NLP-based search algorithms will intelligently assist the end-user retrieve datasets based on metadata content. The user doesn't need to give comprehensive information to find the intended data set.

- **Data Models**

  Missing data is a critical issue in older O&G fields. These missing vintage datasets are typically lost or have never been recorded in the field. These datasets can be recreated using Statistical Data models or Machine and Deep Learning Algorithms.

  Statistical Data Models are based on empirical relationships and can enable the user to re-create the missing data. Machine and Deep learning algorithms are applied to develop the attribute mapping when no direct relationships can be established.

  These dynamic data transformations are used to fill the gaps in the recorded dataset.

- **Data Grouping/Classification**

  Data classification and grouping are critical when the dataset within an organization is large and requires a focused search for regular usage. The data may be classified based on various metadata attributes like spatial position, type, and size. The data can also be grouped based on business rules, usage, data QC reports, etc.

  This Classification helps provide the right dataset to the user and suggests an offset dataset.

Business Cases for Such Intelligent Wrapper

An intelligent wrapper on top of the OSDU data platform will help accelerate the business workflows. A few real-life examples are tabulated below:

- **Calculation of Field Data Maturity to estimate the exploration maturity of a given area**

  Identifying the data density and quality of a certain location provides the user a maturity map that can be leveraged to carve out sweet spots (hydrocarbon-bearing areas) for further exploration.

- **Advance Data Search capability for executing end-to-end workflows**

  This functionality will enable the user to identify the right dataset relevant to the implemented business process. A suggestive algorithm will also help the user identify offset data and similar data for reference that can be leveraged to reduce uncertainties.

- **Filling missing data gaps using artificial datasets**

  AI-ML-based algorithms can be utilized to artificially generate Petrophysical logs like Vshale, Vclay, Porosity, Permeability, lithology, etc., using the Static and Dynamic relationships of the various recorded data from offset well. These artificial datasets will enable the user to calibrate the seismic dataset based on drilled well information.

- **Prediction of geological, drilling parameters and production forecasts based on drilled well datasets**

  - Lithology and well markers can be predicted based on various well logs and seismic data. This is critical to creating an effective structural model of the study area.
  - AI-ML based algorithms can be used to analyze historical datasets to predict Oil and Gas production rates. This is critical for optimizing field surface facilities and earmarking budget.
  - Optimize drilling efficiency by optimizing NPTs and instrument performance and failures based on previous drilling datasets.

Conclusion

The digital transformation of the E&P industry depends a lot on a holistic and integrated approach for various workflows across the upstream domain. OSDU data platform provides a perfect platform where the end users can collaborate traditional Petrophysical Applications with modern analytical solutions. This de-coupling of data and applications consuming subsurface data gives the E&P industry a huge advantage by creating an eco-system of fundamental flexibility in seamless connectivity and integration in operation and workflow designing. This brings a new scope of innovation in Visualization, Data Analytics, faster responses, Cost reduction, and Global data access. We are now moving to an era where digital transformation and innovation in E&P industries will help us sail through the current challenges and achieve a quantum leap in performance and efficiency.

About the Author

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Biplab has 12+ years of consulting experience in the Upstream Oil and Gas Industry. He has worked on delivering projects on conventional and unconventional well data interpretation, pore-pressure modeling, shallow hazard analysis, offset well analysis, well location, and pad optimization. His areas of expertise include Geo-scientific Data Interpretation, Drilling Performance Monitoring, Well Cost and Resource Estimation, Production Monitoring, and Flow Assurance.