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Multidisciplinary 3D Modeling with Machine Learning and Database Integration: A Novel Framework for Static and Dynamic Analysis

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Abstract

Objective: A methodology to establish a cutting-edge, multidisciplinary database system for 3D static and dynamic models, integrating diverse data sources with robust access control mechanisms. This platform will ensure data consistency, accuracy, and integrity across reservoir disciplines, fostering collaboration among geologists, geophysicists, modelers, and reservoir engineers.

Methodology: Our approach involves implementing a database system with access control mechanisms based on data classification and team member roles. This system integrates multiple data sources, enabling efficient data communication, controlled data flow, and minimized risk of data corruption. Advanced machine learning (ML) algorithms will analyze and predict complex relationships between data sources, enabling informed decision-making and optimizing reservoir modeling outcomes.

The system will utilize ML algorithms to:
Identify patterns and relationships between data sources
Predict missing data and fill gaps in the dataset
Analyze and visualize complex data relationships
Provide recommendations for data-driven decision-making

Results and Conclusions: Our database repositories enable seamless data sharing among asset teams, capturing assets with detailed action records. Knowledge-capturing tools associate relevant information with data objects, and integrated ML algorithms will refine predictions and recommendations over time.

Value Addition: Implementing this system drives operational excellence, enhancing decision-making and efficiency. It retains critical knowledge and ensures data integrity, providing predictive insights, automating tasks, and optimizing reservoir modeling for improved accuracy and efficiency:
Improved accuracy and reduced uncertainty in reservoir modeling
Increased efficiency and productivity in data analysis and interpretation
Enhanced decision-making and optimized reservoir performance
Better knowledge management and retention of critical information

This strategy empowers teams to work smarter, innovate freely, and drive exceptional outcomes through

collaboration and data-driven decision-making. By leveraging advanced ML algorithms and a robust database system, we can optimize reservoir modeling outcomes, reduce uncertainty, and drive business success.