WELLINSIGHT

PERFORM WITH **AIQ**

Artificial Intelligence-based Borehole Image Interpretation

POWERING A **SUSTAINABLE** TOMORROW

AI-based Borehole Image Interpretation

WellInsight interpretation uses supervised computer vision techniques for automatic dip picking which allows complex pattern recognition, repeatability, reliability and reduction of cost and time.

The baseline model used in **Well**Insight can segment a borehole image into different geological or drilling related features using a lightweight and fast model.

WellInsight **includes:**

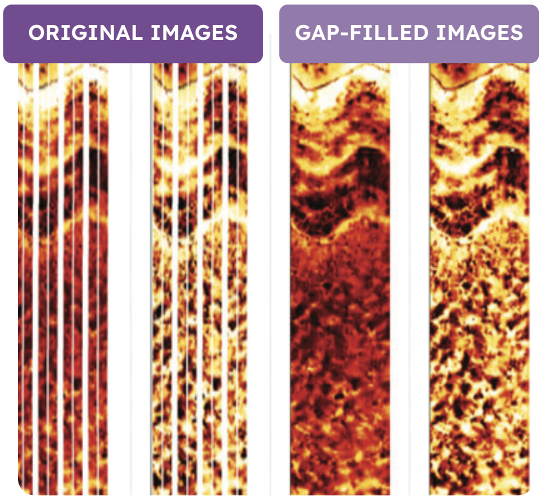
- Navigation tools for vertical, deviated and horizontal wells.
- Horizontal display of well logs and dips.
- Display of well trajectory based on survey data.
- Statistical visualization includes:
    - Rose diagrams
    - Histograms
    - Cross-Plot
- Graphical interface for data ingestion, visualization and to run AI algorithms.
- A module for the preprocessing of image logs that contain an Intelligent Gap Filling tool.
- A manual interpretation tool to quality control automatic interpretation.

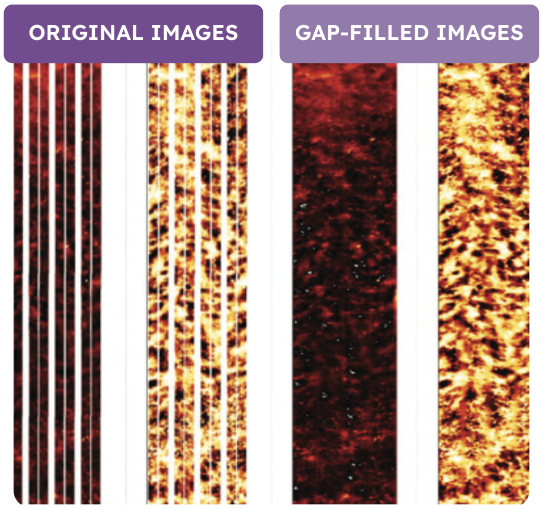
Borehole Image Preprocessing

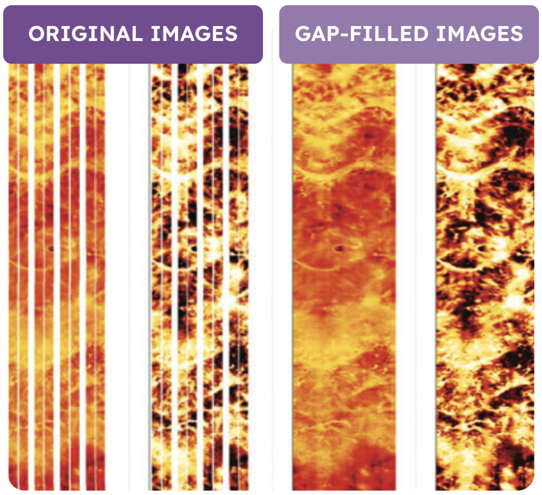
Using novel network architecture which combines U -Net and Non-local module, Pre-processing computations fill the gaps between borehole image data as well as applying calibration and image normalization.

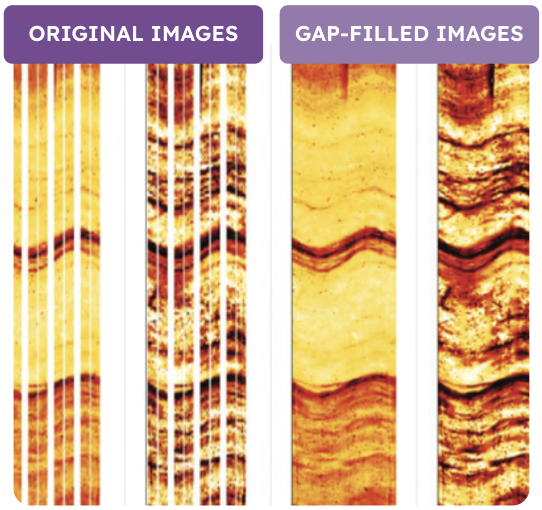
Preprocessing image provides Geoscientist a 360° borehole image independently from its lithology heterogeneity which in turn facilitates image visualization and feature identification when applying AI-based interpretation.

Gap-filled pad-based Borehole image providing **360° visualisation of the borehole**







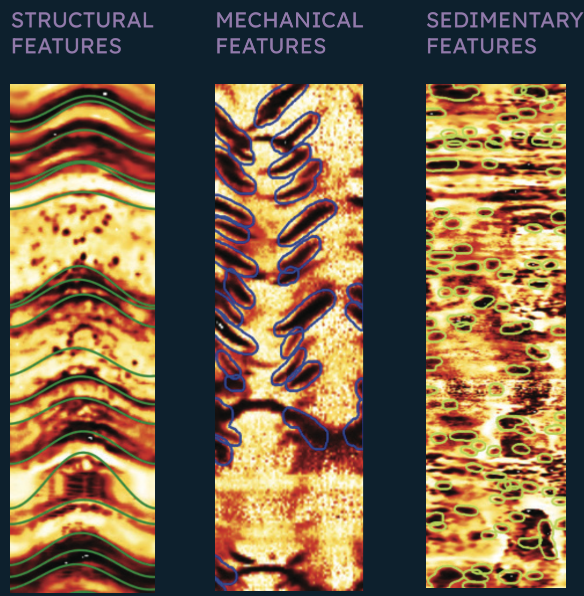


AI based Borehole Image Interpretation

The **Well**Insight picking tool is an automated AI engine which interprets borehole images with at least the same level of accuracy of an experienced human geologist.

Composed of different trained algorithms, **Well**Insight picking automatically detect and classify geologica lfeatures from borehole images.

The interpretation workflow, based on machine learning (ML) and supervised computer vision, requires the manual annotation of visible features from borehole images for a given set of wellbores. The trained model is then used to make automatic prediction for unseen wellbores or portions of them.



Three dynamic images with different features picked and identified by **Well**Insight algorithms.

Geological features are classified in three main families: Structural, Mechanical and Sedimentary features.

Feature Detection

The feature detection consist to two main steps:

1

Deep Learning Model

Applied to perform supervised segmentation along the borehole image allowing the pixel-wise identification of relevant features.

A Features map is then created providing the user with a visualization of what features the model has detected.

2

Sinusoids Fitting Algorithms

Performed to identify the dip magnitude and azimuth direction of each feature.

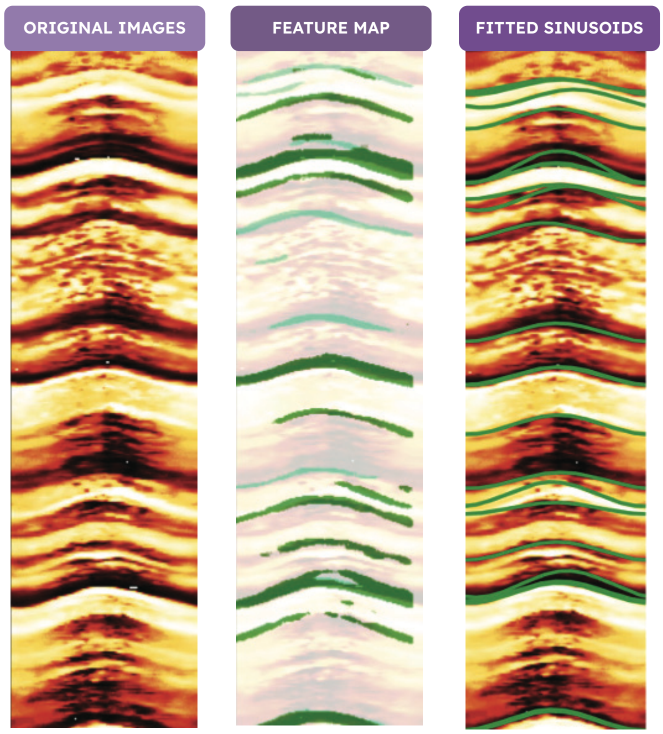


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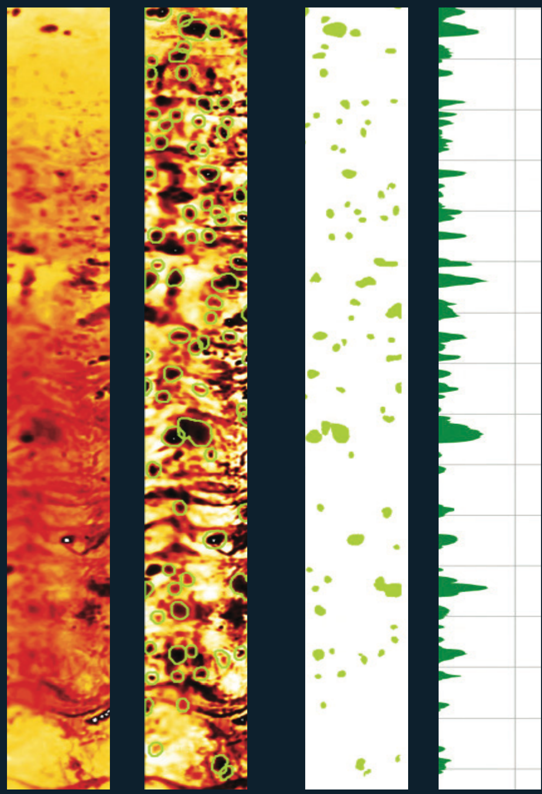
Image Porosity Partitioning

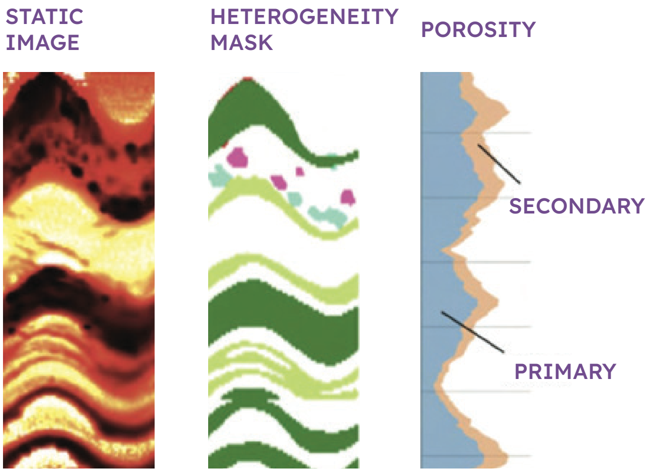
The main factor contributing to the heterogeneous nature of carbonate reservoir is patchiness due to areas of different porosity caused by diagenetic processes or change in litho-facies.

The borehole image is used across the full wellbore to calculate the contribution of rock matrix and heterogeneities to the total porosity and subdivide it into primary and secondary porosities.

WellInsight is transformed into porosity image using only static image with normalized pixel values.

For each row in the static image, pixels are classified as “heterogeneity” if they belong to a heterogeneity region, otherwise they are classified as “matrix”.





Borehole static image is used with pixel values normalized between 0 and 1 across the full well to calculate the contribution of matrix and heterogeneities to the total porosity. Primary porosity refers to the porosity related to the matrix, while secondary porosity is related to all the heterogeneity regions extracted through the semantic segmentation module.

The result is a porosity vs depth plot, log in which the secondary porosity is stacked on top of the primary porosity to better highlight its relative contribution.

Our Company

AIQ is an Abu Dhabi-based technology pioneer focused on leveraging data to drive AI-powered transformation of the Energy sector towards a more sustainable future. Formed as a joint venture between global energy company ADNOC and UAE AI specialist Group 42, AIQ is developing AI and ML solutions that unlock value across the entire supply chain of the Energy sector.

Training

Training sessions are provided by our team to help you become an expert with our solution.