

SeisSense™

SEG-Y Merging Platform

Efficient & Scalable SEG-Y File Integration

What is SeisSense™?

- A specialized platform designed for seamless integration and analysis of seismic data.
- Supports SEG-Y file handling, merging, quality control, and processing.

What is SeisSense™ SEG-Y Merging?

- **Transforming Seismic Data Integration with AI**
- **SeisSense™** SEG-Y Merging Platform is a cutting-edge solution for automated seismic data merging, QC, and seamless integration of multiple SEG-Y files.
- **Key Capabilities:**
 - Automated SEG-Y File Parsing & Header Standardization.
 - Dynamic Coordinate Reference System (CRS) Handling.
 - Advanced Trace Merging Algorithms for Large Datasets.
 - AI-Powered Quality Control & Data Validation.
 - Scalable Processing for Seamless Data Integration.
- **Designed for:** Oil & Gas operators, seismic processing teams, geophysical researchers, and exploration companies.
- **Outcome:** A fast, efficient, and accurate way to merge multiple seismic datasets, ensuring high-quality subsurface imaging and interpretation.



Challenges in Merging Multiple SEG-Y Files

- Inconsistent Header Formats
- Different Coordinate Reference Systems (CRS)
- Varying Data Resolutions & Sampling Intervals
- Handling Large-Scale Data Efficiently
- Data Gaps & Overlaps



SeisSense™ Approach to SEG-Y Merging

- Automated parsing and validation of SEG-Y headers.
- Standardizing CRS for uniform integration.
- Aligning data resolution and sampling intervals.
- Handling missing data using interpolation techniques.
- Optimized memory handling for large datasets.

Detailed Workflow for SEG-Y Merging



Data Ingestion:

Load multiple SEG-Y files.
Identify different data sources and formats.



Header Standardization:

Align trace headers, coordinates, and metadata.
Ensure consistency in survey data.



Resolution Adjustment:

Interpolate missing traces.
Normalize sampling intervals across datasets.



Data Cleaning & Filtering:

Apply denoising techniques.
Remove inconsistencies in merged traces.



Merging & Alignment:

Detect overlaps and stitch together datasets.
Preserve amplitude and phase information.



AI-Enabled QC & Verification:

Compare against baseline seismic surveys.
Identify and flag anomalies in merged data.



Export & Reporting:

Generate final SEG-Y file.
Provide visualization and metadata logs.

AI Enabled Quality Control (QC) After Merging



Attribute-Based QC:

Compare merged seismic attributes (amplitude, phase, frequency).

Cross-plot analysis of reflection characteristics.



Fault & Anomaly Detection:

AI models scan merged data for missing traces or distortions.

Highlights potential errors introduced during merging.



Well Tie & Synthetic Seismogram Comparison:

Ensure correlation between seismic and well log data.

Validate continuity across multiple SEG-Y files.

Key Features of SeisSense™

**Automated Header
Parsing &
Correction**

**Dynamic CRS
Transformation
Support**

**Customizable Trace
Merging Algorithms**

**Scalability for Large
Datasets**

**Interactive
Visualization & AI-
Driven Quality
Control**

**Minimizing Data
Loss During
Merging**

**Verification
Techniques for
Quality Assurance**

**Memory
Optimization for
Large SEG-Y Files**

**Comparison
with Traditional
SEG-Y Merging
Methods**

Feature	Traditional Merging	SeisSense™ Merging
Header Standardization	Manual	Automated
CRS Correction	Limited	Full Support
Large Dataset Handling	Time-Consuming	Optimized & Scalable
AI-Driven Quality Control	None	Integrated
Merging Accuracy	Prone to errors	High Precision
Post-Merge Reporting	Basic Logs	Full Visualization & Analytics

SeisSense™ Navigation:


Select an Option:

- Merge SEGY Files
- Visualization
- CRS Conversion
- Trace Analysis
- Attribute Extraction
- Well Log Correlation
- Seismic Mapping
- Reservoir Characterization
- Pre-Processing
- Noise Reduction
- Wavelet Analysis
- Fault Detection
- Structural Interpretation
- AVO Analysis
- Post-Processing
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- Seismic Inversion
- Seismic Facies Analysis
- Time-to-Depth Conversion
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- AI-Driven Interpretation
- Horizon Tracking
- Satellite Integration
- 4D Seismic Analysis
- Report Generation


i Merge multiple SEGY files while preserving metadata.

SeisSense™ - Insights for Precision Exploration

Merge SEGY Files

 Enter Input Folder Path:

D:\Seismic_AI\share\input

 Enter Output Folder Path:

D:\Seismic_AI\share\output

Files Detected for Processing:

	SEGY Files
0	file18.sgy
1	file19.sgy

 [Analyze Shot Times Before Merging](#)

Shot Times Before Merging


	File	Shot Times
0	file18.sgy	6646846 6646909 6646971 6647034 6647096 6647155 6647213
1	file19.sgy	6943878 6943848 6943818 6943788 6943759 6943729 6943700

 Merge SEGY Files

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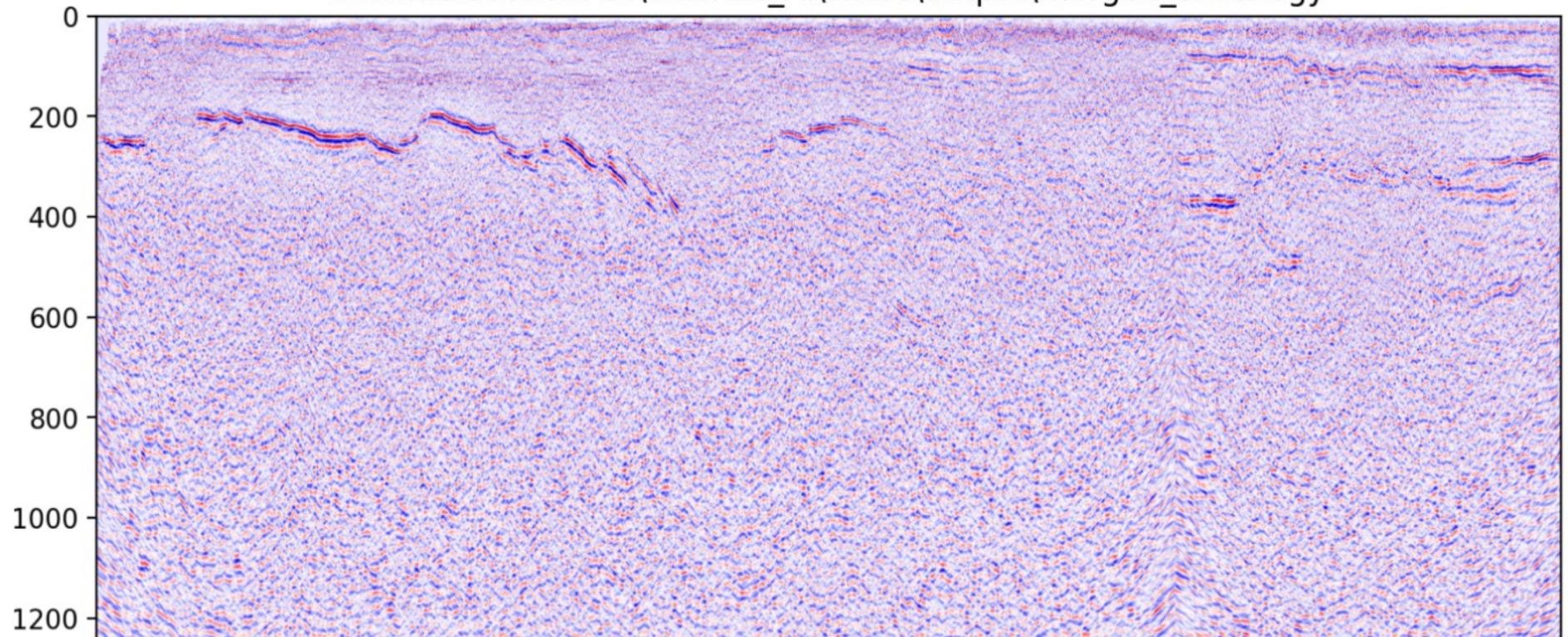
 Graphical representation of seismic traces and attributes.

SeisSense™ - Insights for Precision Exploration

Visualization

Visualize Merged File

Seismic Section: D:\Seismic_AI\share\output\merged_shots.sgy



SeisSense™ Navigation:

Select an Option:

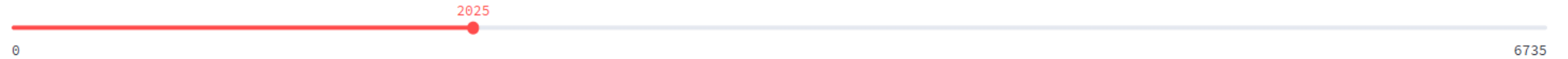
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i Analyze seismic traces for noise patterns, gaps, and inconsistencies.

Trace Analysis

Analyze individual traces from the merged SEG-Y file.

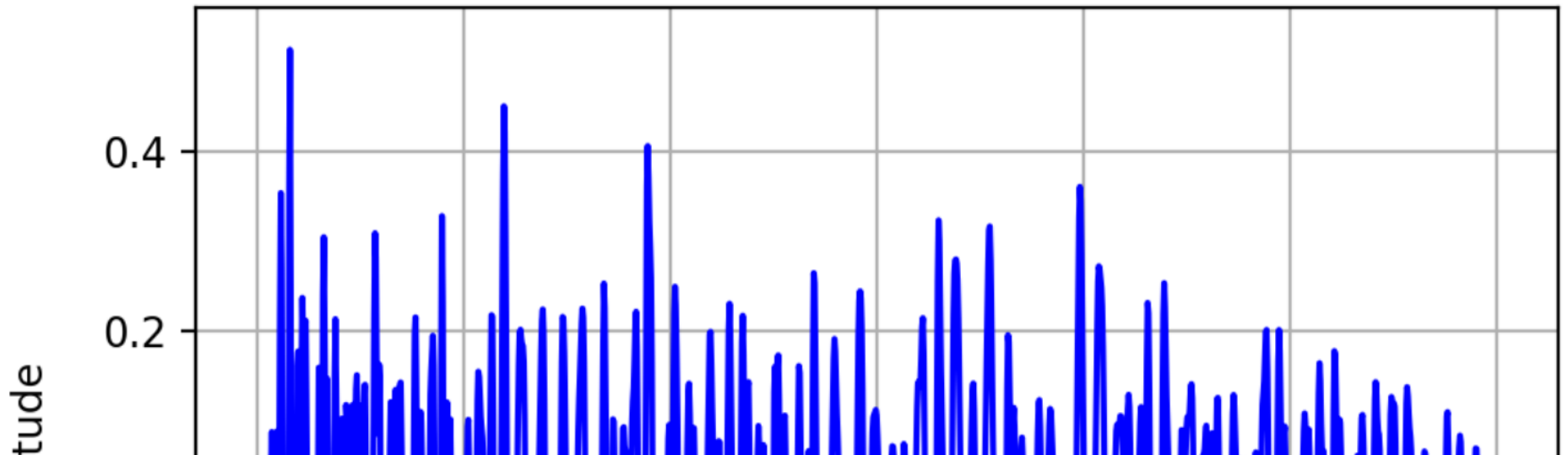
Select Trace Number



Trace 2025 Statistics:

- ◆ Min Amplitude: -0.41
- ◆ Max Amplitude: 0.51
- ◆ Mean Amplitude: -0.00

Trace 2025 Amplitude Plot



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i Extract important seismic attributes such as RMS amplitude, variance, etc.

Attribute Extraction

Extract key seismic attributes such as amplitude, phase, frequency, and coherence.

Select Attribute Extraction Method

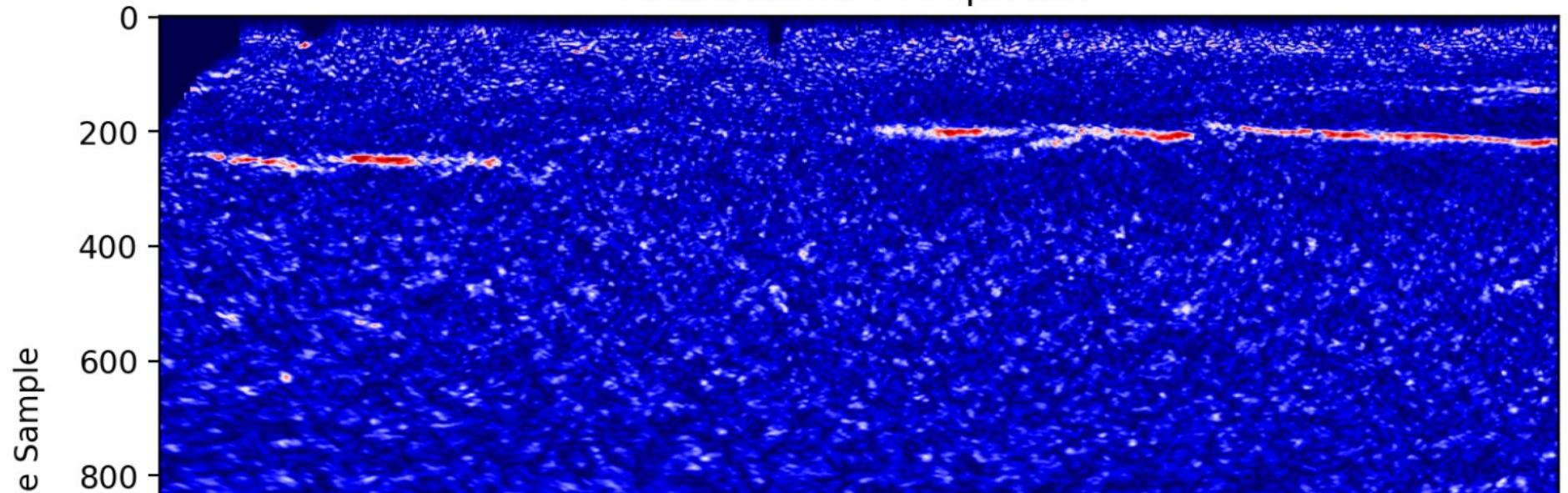
Choose Seismic Attribute

Instantaneous Amplitude

Select Trace Range



Instantaneous Amplitude



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AI-powered analysis of reservoir properties for better exploration.

Reservoir Characterization

Analyze seismic data to estimate reservoir properties such as porosity, permeability, and water saturation.

Select Reservoir Property to Analyze

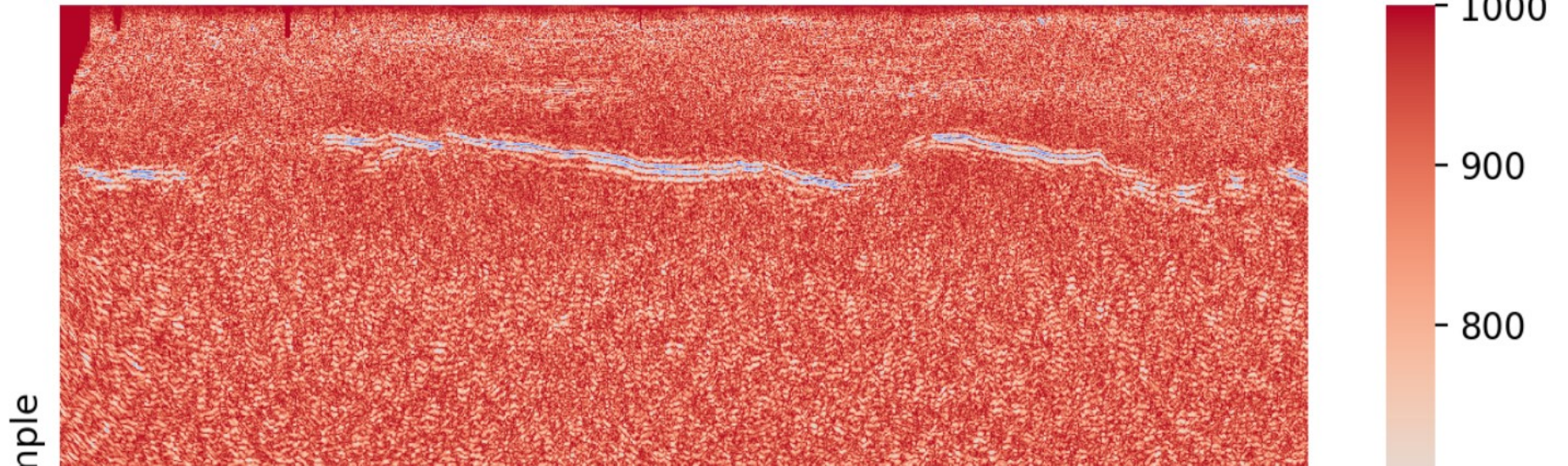
Choose Property

Permeability (K)

Select Trace Range



Reservoir Permeability (K) Estimation



Platform Interface

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i Prepare seismic data by applying filters and corrections before interpretation.

Select Pre-Processing Method

Choose Pre-Processing Method

Bandpass Filtering

Select Trace Range



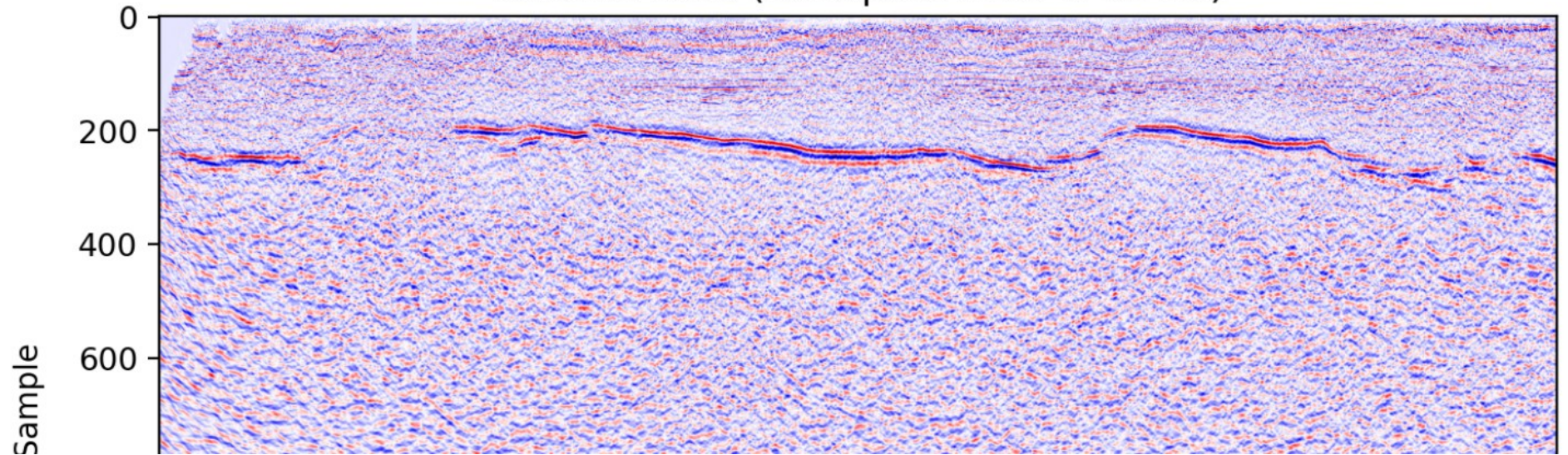
Low Cut Frequency (Hz)

5

High Cut Frequency (Hz)

62

Seismic Data (Bandpass Filter 5-62 Hz)



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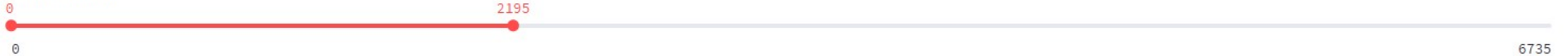
i Denoise seismic data using advanced filtering techniques.

Select Noise Reduction Method

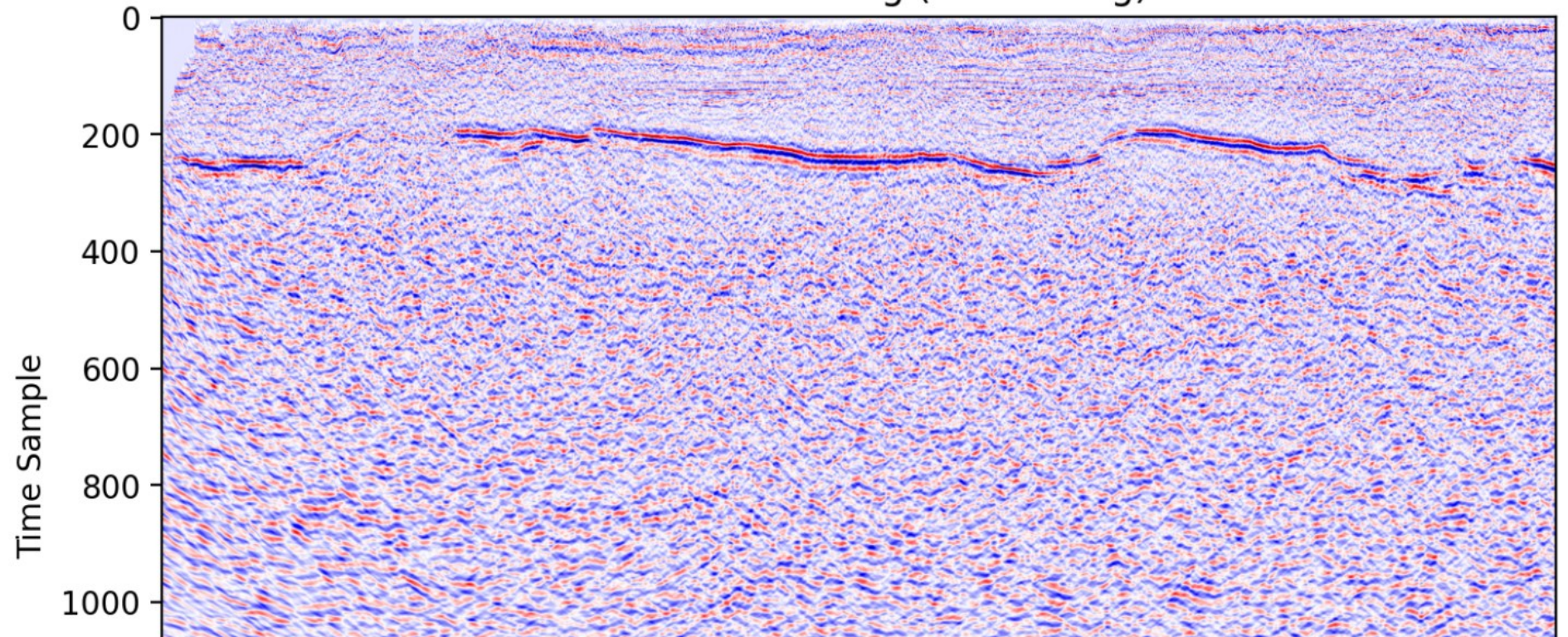
Choose Noise Reduction Method

Gaussian Filtering

Select Trace Range



Gaussian Filtering (Smoothing)



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i Study seismic wavelets to improve seismic resolution and interpretation.

Wavelet Analysis

Perform wavelet-based analysis on seismic traces for signal decomposition and filtering.

Select Wavelet Type & Parameters

Choose Wavelet Transform

Continuous Wavelet Transform (CWT) 

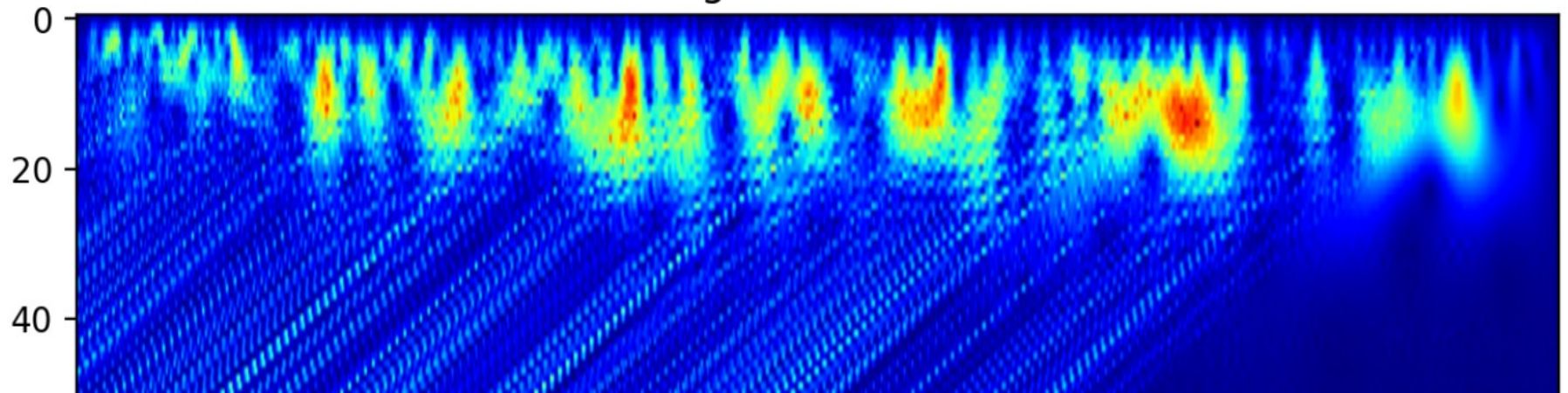
Select Wavelet

Morlet 

Select Trace Number



CWT Scalogram - Morlet Wavelet



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i AI-based fault detection using edge detection and deep learning models.

SeisSense™ - Insights for Precision Exploration

Fault Detection

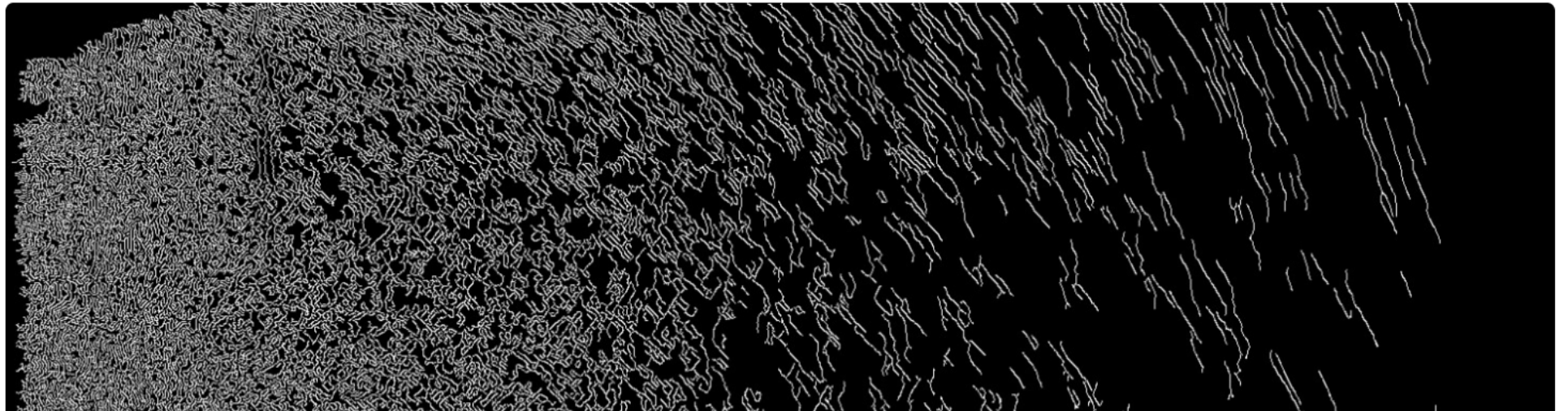
Identify fault structures using Edge Detection and Deep Learning (U-Net CNN).

Select Fault Detection Method

Choose Method

Canny Edge Detection

Select Trace Range



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i Interpret structural features like folds and faults in seismic data.

SeisSense™ - Insights for Precision Exploration

Structural Interpretation

Analyze seismic structures such as faults, folds, and stratigraphic features.

Select Structural Interpretation Method

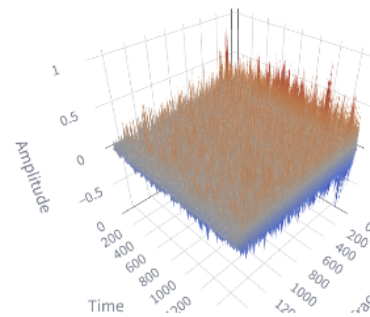
Choose Structural Interpretation Method

3D Structural Visualization

Select Trace Range



3D Structural Visualization



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i Final corrections and enhancements on seismic data before analysis.

Post-Processing

Enhance seismic data quality through filtering, normalization, and smoothing.

Select Post-Processing Method

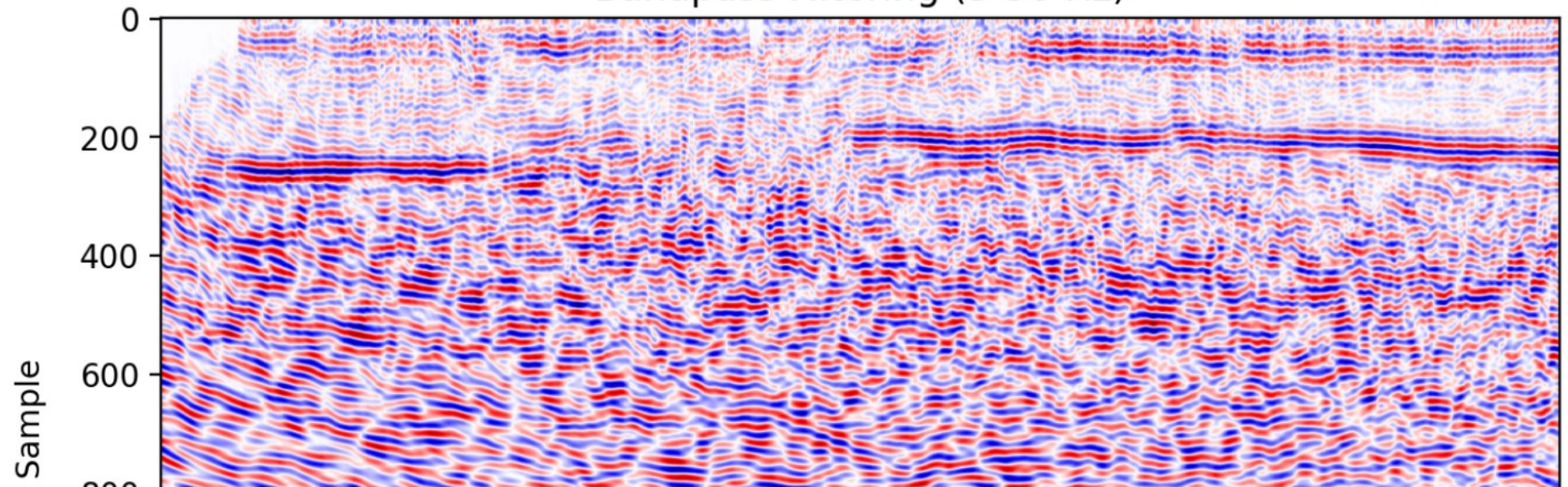
Choose Post-Processing Method

Bandpass Filtering

Select Trace Range



Bandpass Filtering (5-50 Hz)



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i Build velocity models for seismic depth conversion and migration.

Velocity Model Building

Compute and visualize interval and layer-based velocity models from seismic data.

Select Velocity Model Type

Choose Velocity Model Method

Dix Interval Velocity

Select Trace Range



Dix Interval Velocity Model



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i Convert seismic reflection data into quantitative rock property models.

Seismic Inversion

Perform seismic inversion techniques to estimate subsurface properties from seismic traces.

Select Inversion Type

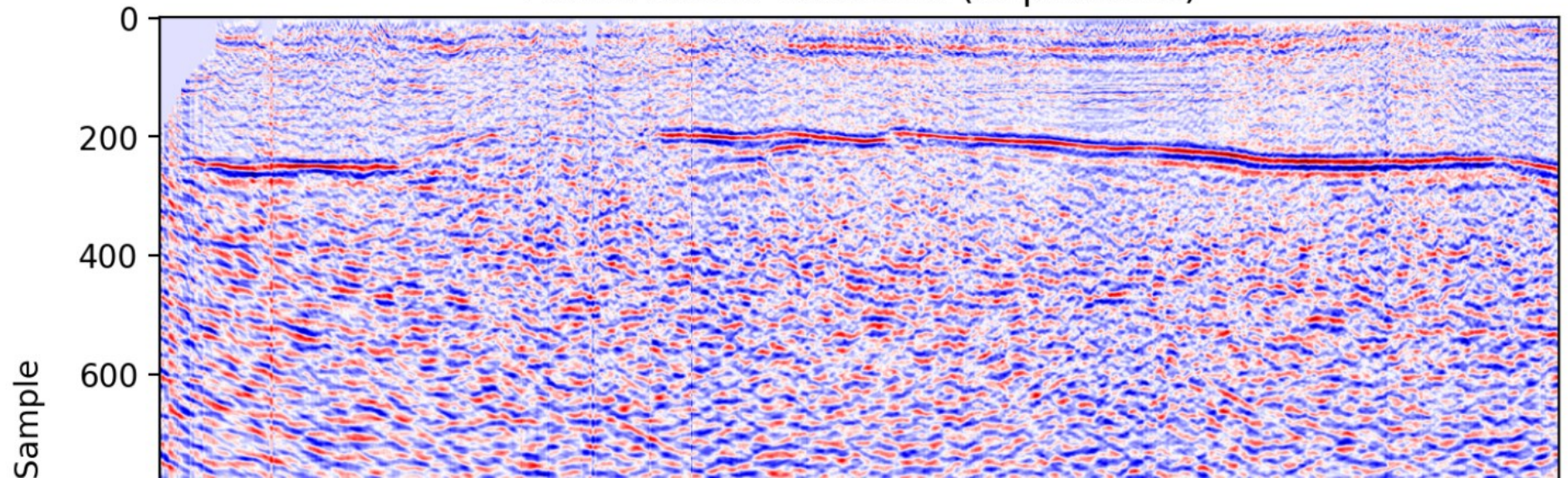
Choose Seismic Inversion Method

Model-Based Inversion

Select Trace Range



Model-Based Inversion (Impedance)



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i Classify seismic facies using AI and machine learning techniques.

Seismic Facies Analysis

Classify seismic facies using AI-based clustering and PCA.

Select Facies Analysis Method

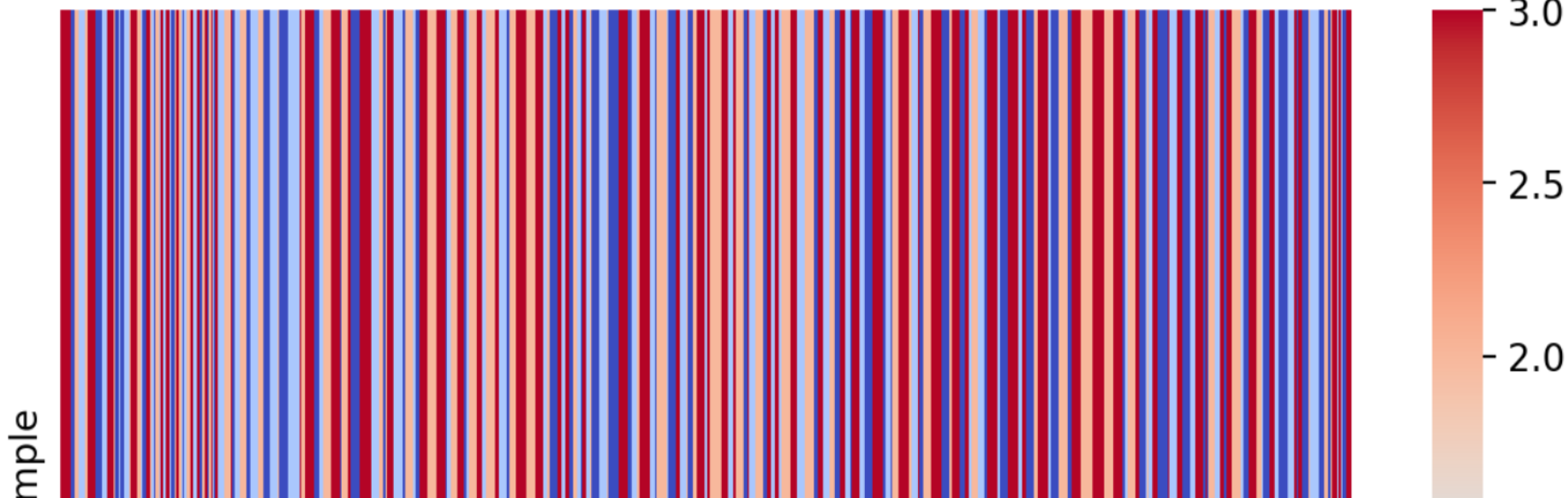
Choose Facies Classification Method

PCA + K-Means Clustering

Select Trace Range



Seismic Facies (PCA + K-Means Clustering)



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i Automatically track seismic horizons across datasets.

Horizon Tracking

Automatically and manually track seismic horizons.

Select Horizon Tracking Method

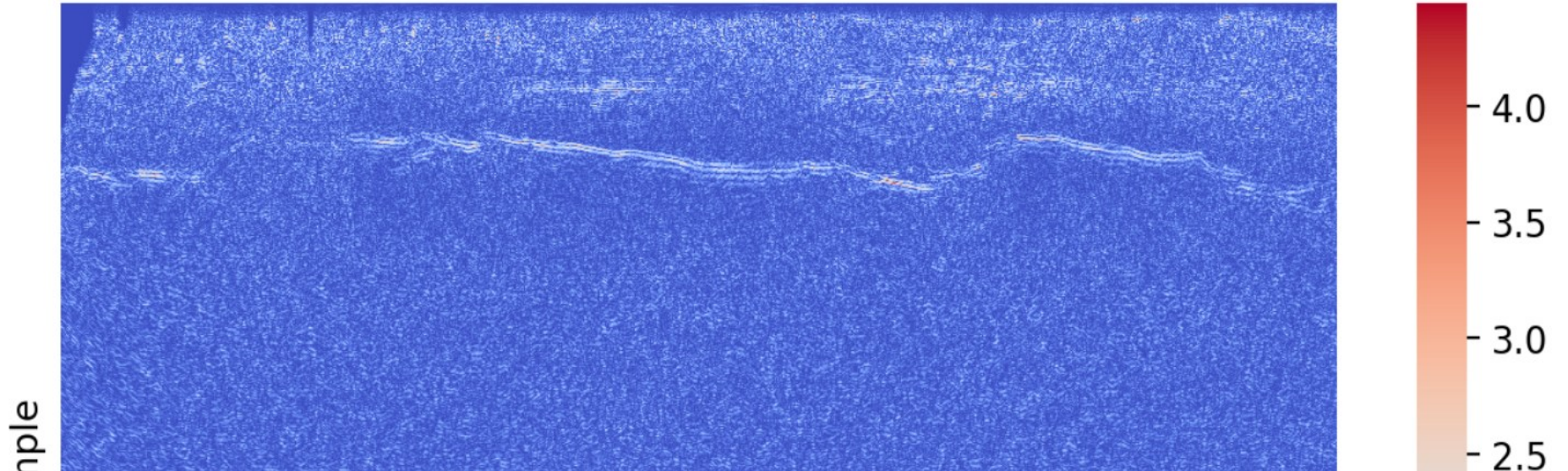
Choose Horizon Tracking Method

Edge Detection (Gradient-Based)

Select Trace Range



Horizon Tracking (Edge Detection - Sobel)



Applicable Use Cases of SeisSense™

Oil & Gas Exploration

- Integrating regional seismic surveys.

Geophysical Research & Academia

- Comparing historical and modern seismic data.

Reservoir Characterization

- Merging seismic cubes for detailed subsurface imaging.

Environmental & Geohazard Analysis

- Earthquake prediction and hazard mapping.

Deployment & Integration

Deployment Options:

Cloud-based AI Processing.
On-premise HPC Integration.
Hybrid AI Model Deployment.



Integration Capabilities:

Connects with Petrel, OpendTect, DecisionSpace.
Supports SEG-Y, LAS, and other geophysical formats.
Custom APIs for seamless data ingestion.

Why Choose SeisSense™ SEG-Y Merging?

- **Automated Workflow:** Eliminates manual efforts in merging multiple seismic datasets.
- **Scalable Data Processing:** Handles large-scale SEG-Y files efficiently with optimized memory usage.
- **High-Precision Data Alignment:** Ensures trace continuity and seamless dataset integration.
- **AI-Driven Quality Control:** Detects inconsistencies, missing traces, and ensures data integrity.
- **Industry-Standard Compatibility:** Works seamlessly with Petrel, OpendTect, DecisionSpace, and other geophysical software.
- **Operational Efficiency:** Reduces data processing time by 50%, enhances integration accuracy, and optimizes seismic interpretation workflows.
- **Business Impact:** Reduces redundant data acquisition, improves exploration efficiency, and enhances decision-making in seismic data analysis.

Thank You

Driven by Data. Designed for Industry.

