

# Experienced Eye

Automated Feature Selection and  
Curve Prediction Just Got Better in IP

Andy McDonald

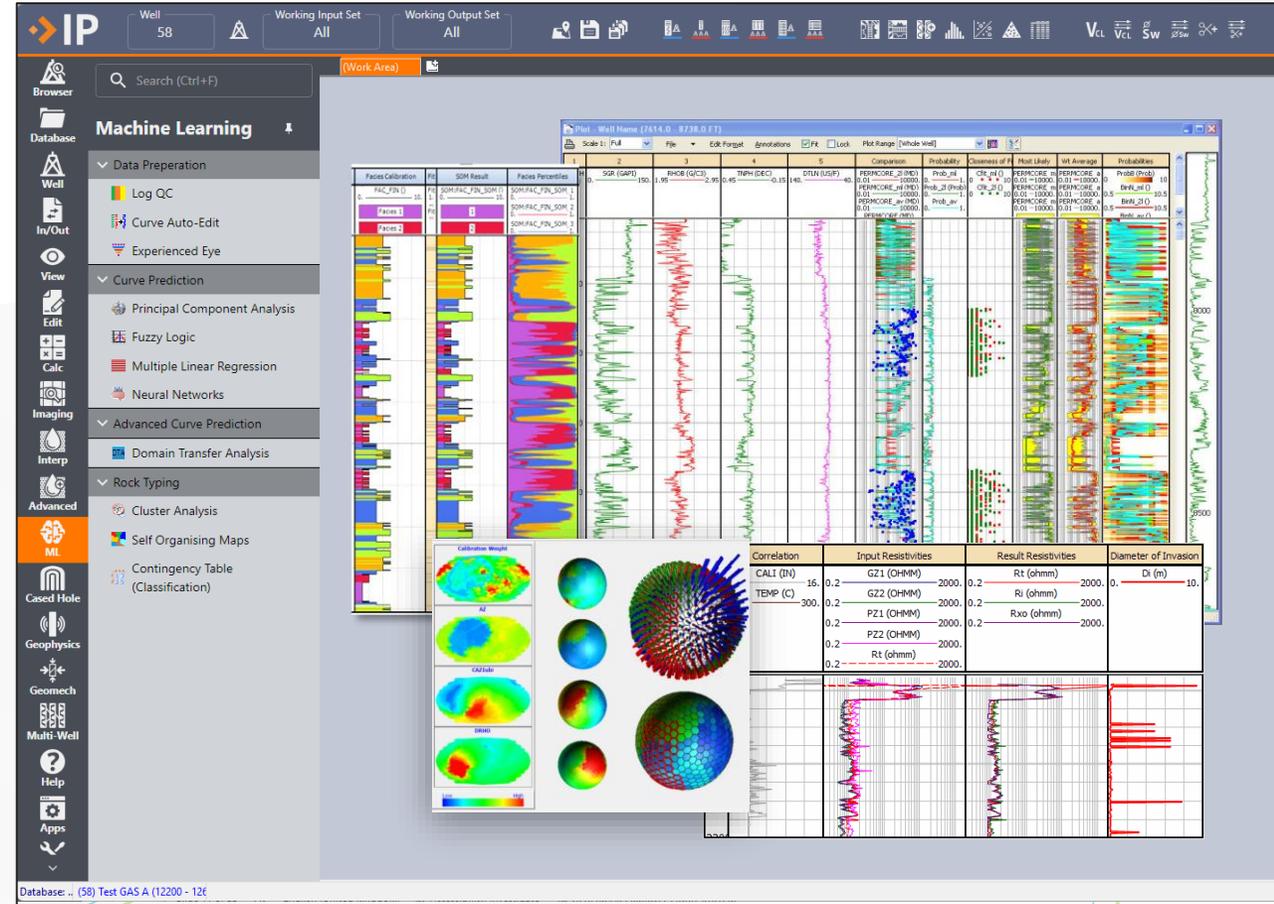
*Product Champion: Machine Learning and Python*

# Agenda

- Introduction
- Overview of Feature Selection
- What is Experienced Eye and how does it work?
- Latest changes to Experienced Eye in IP 2025 Update 3
- Questions

# Introduction

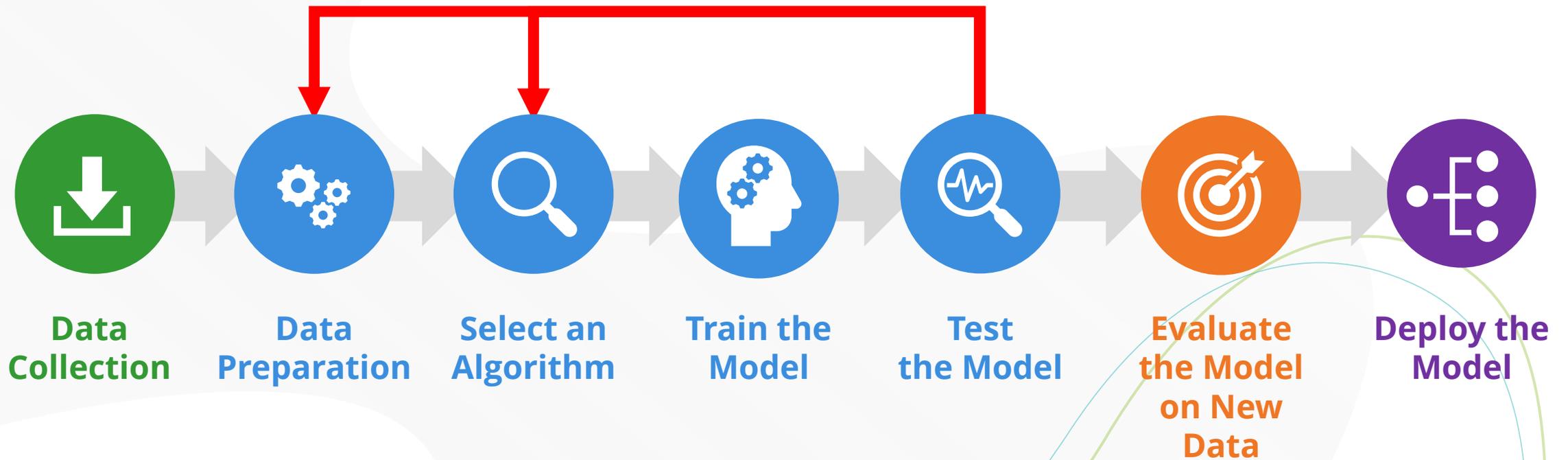
- Geoactive Ltd is a company with a big history
- Our Products:
  - **Interactive Petrophysics (IP)**
  - **Interactive Correlations (IC)**
- Company name changes:
  - **PGL > Senergy Software > LR Digital > Geoactive**
- Despite company name changes, our team and products have been consistent over 25 years
- Interactive Petrophysics (IP) is a market leading Subsurface data interpretation software package
- Its multi-discipline and for the lifetime of your wells



“

“Machine Learning is increasing in popularity within the geoscience domain and has many benefits to automating and improving petrophysical interpretations”

# Simple ML Workflow



Exploratory Data Analysis

Data QC and Repair

Feature Selection

# Feature Selection

Feature selection is the process of identifying and selecting the most relevant features (or variables) from a dataset to build a more efficient and effective machine learning model.

**Features = Well Logging Curves**

# Benefits of Feature Selection



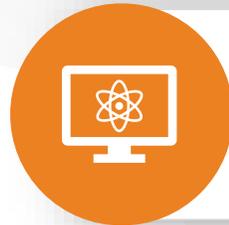
## Reduces Training Times

Less input data to train models



## Improves Interpretability

Fewer features can make models easier to understand



## Reduces Overfitting

Less chance model memorising training data



## Improves Prediction Accuracy

More data does not mean better models

# Feature Selection

Target  
Curve



**Porosity**

Gamma

Density

Neutron

Sonic Compr.

Sonic Shear

Caliper

Sigma

Clay Vol.

Res. Deep

Res. Shallow

Res. Micro

Associated  
Reference  
curve or  
'features'  
available



## How to Choose?

Option 1

Domain Expert + Trial & Error



Option 2

Automated Feature Selection Methods:

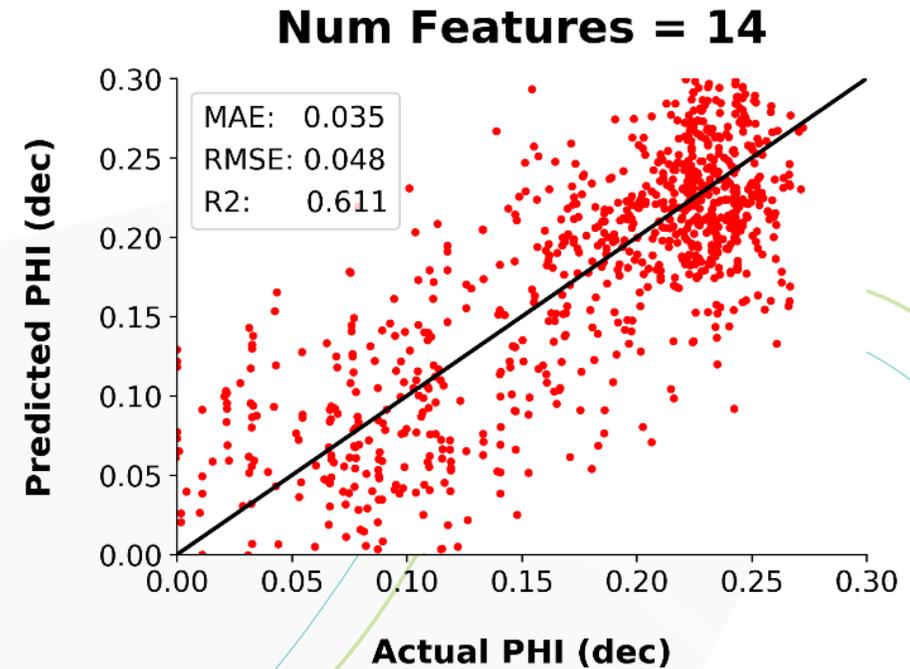
e.g

- Pearsons Correlation
- Backward Feature Elimination
- Experienced Eye

# Feature Selection Example

## Features

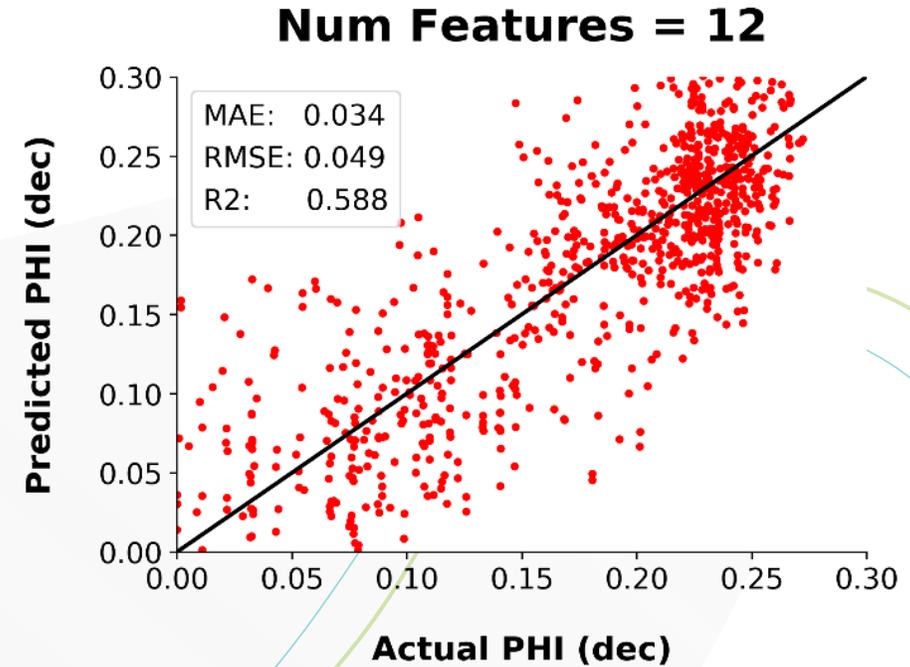
RHOB	PEF
RS_L10	C1C2
GR	C1C3
NPHI	C1C4
DT	C1C5
DRHO	GASX
CALI	ROPA



# Feature Selection Example

## Features

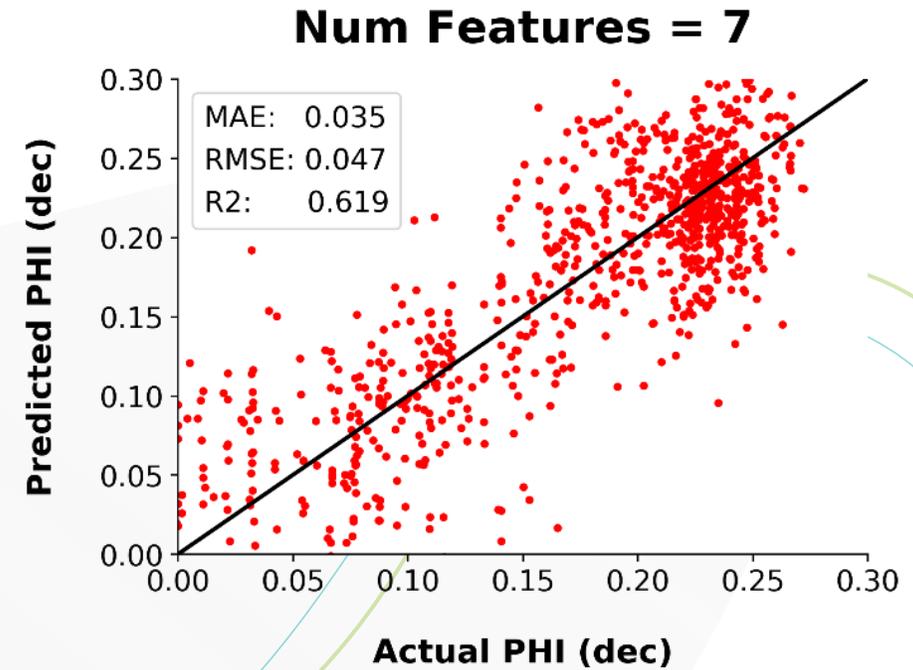
RHOB	PEF
RS_L10	C1C2
GR	C1C3
NPHI	
DT	C1C5
	GASX
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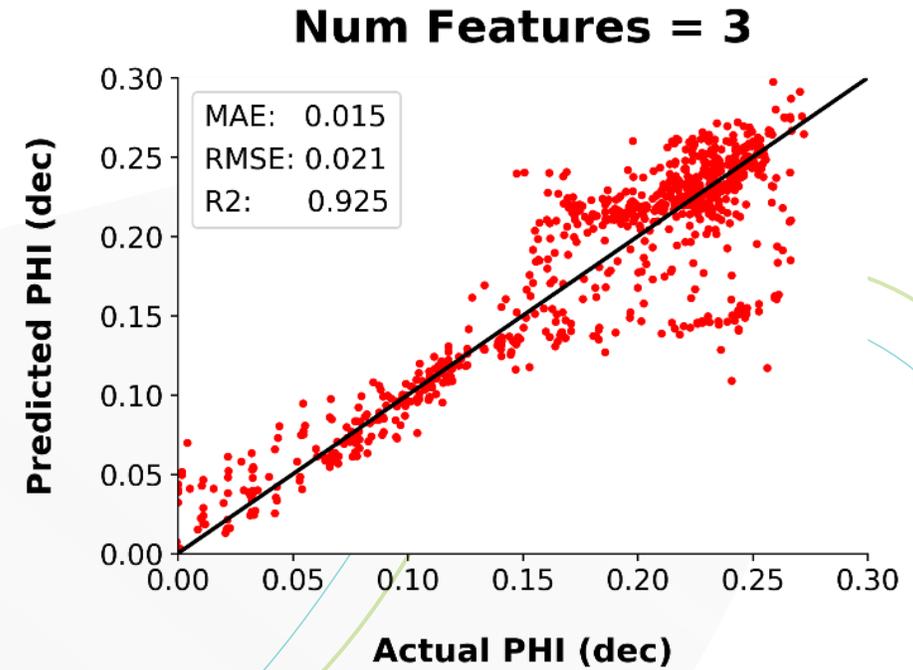
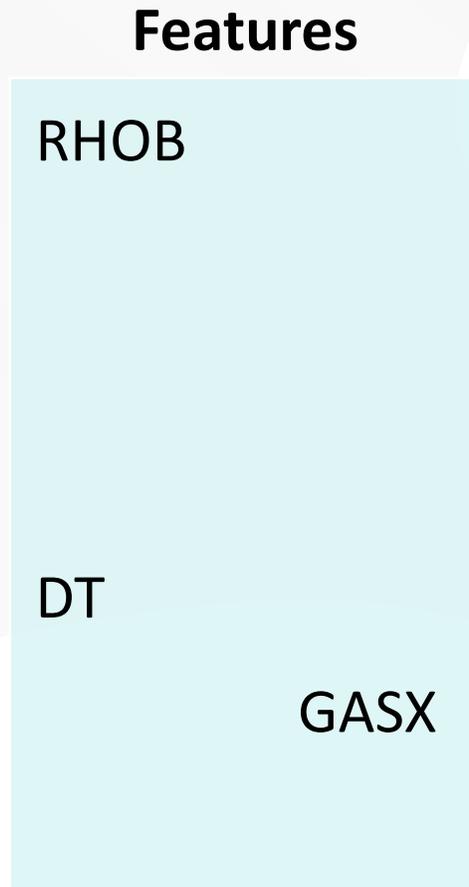
# Feature Selection Example

## Features

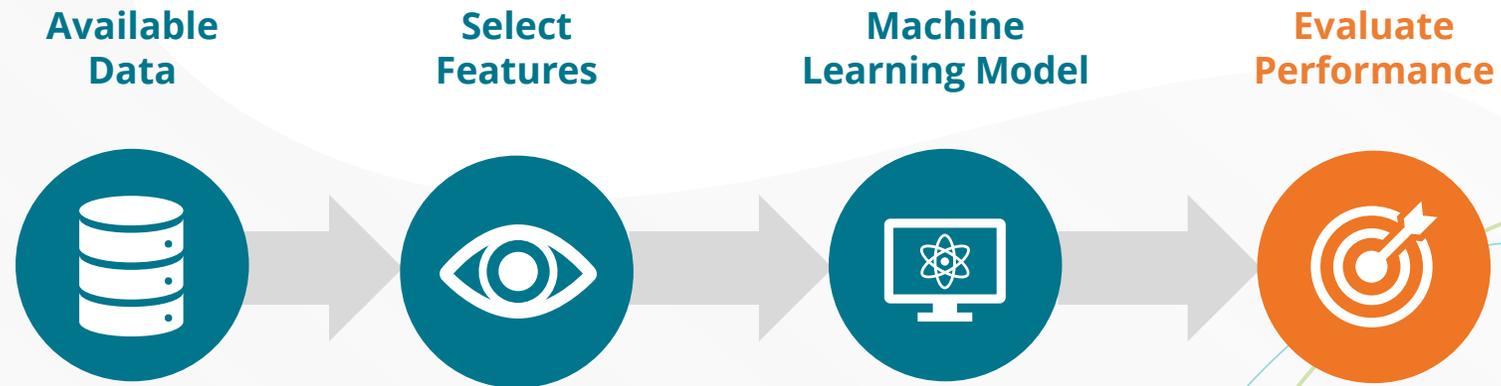
RHOB	PEF
RS_L10	
GR	
DT	
	GASX
CALI	



# Feature Selection Example



# Challenge: Comparing Features and Models



## Running:

3 Feature Selection Methods

3 Machine Learning Models

6 Different Groups of Inputs (Top 3 – Top 8 Ranked Features)

**54**  
Separate Runs

# Experienced Eye

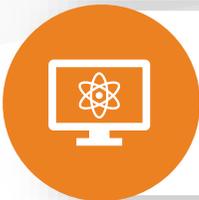
# Experienced Eye IP Module (IP 2023-25)



New module - developed from the ground up



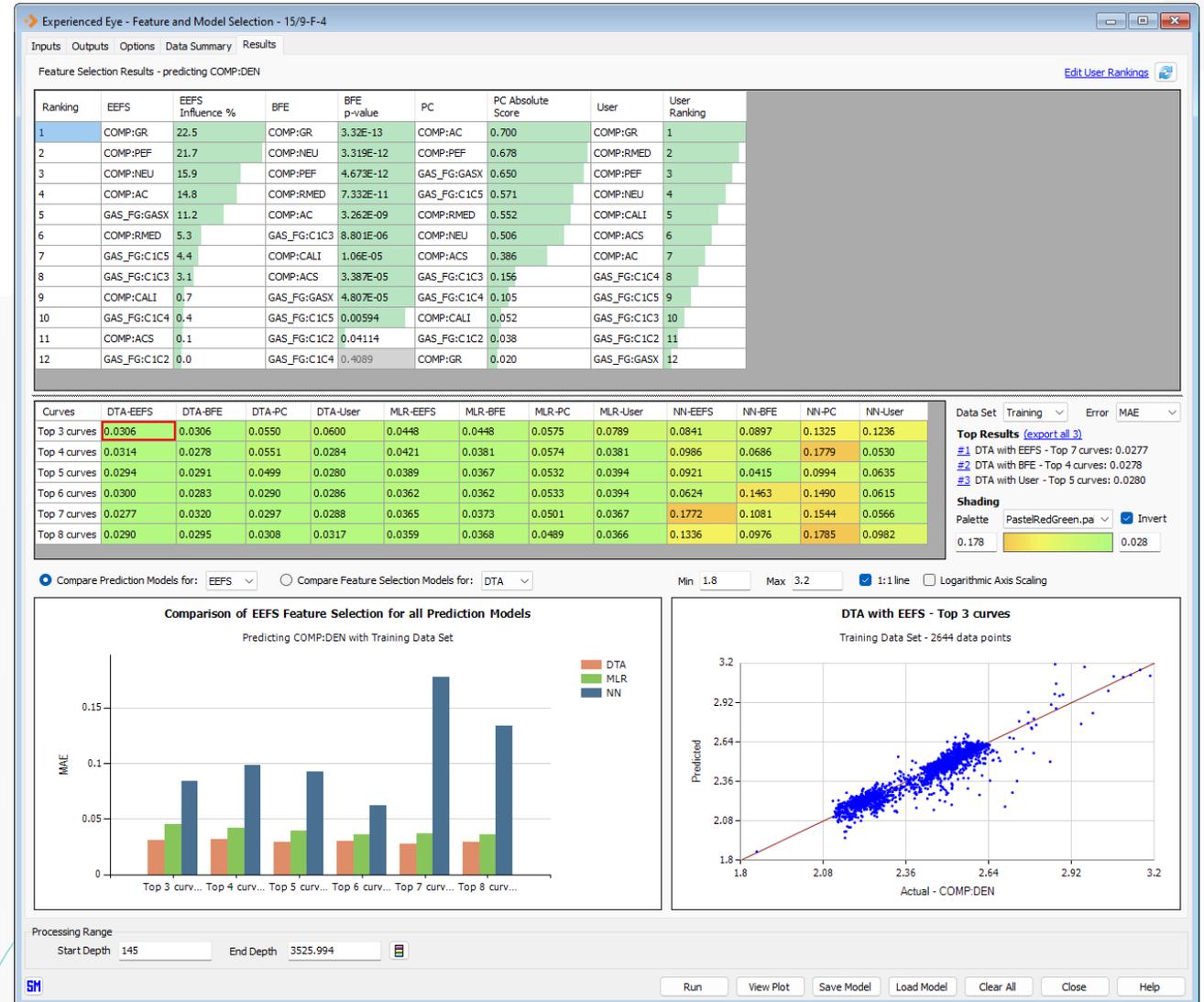
Interactive results grid to visualise model performance



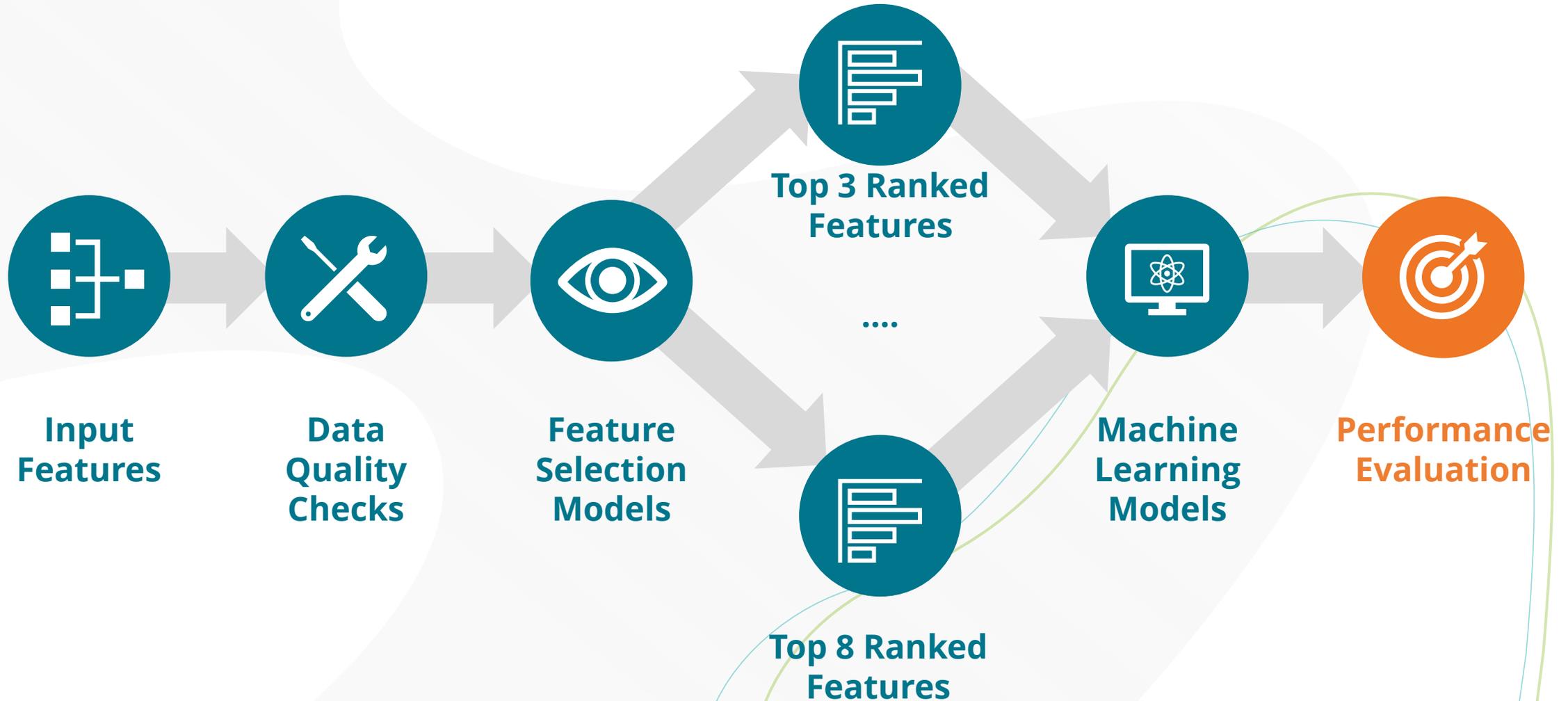
Easily compare different curve choices and models



Automated and streamlined process for curve prediction



# Experienced Eye Module Workflow



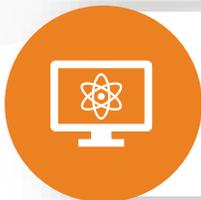
# Multi-Well Experienced Eye IP Module (IP 2025)



Bring in multiple wells from your project



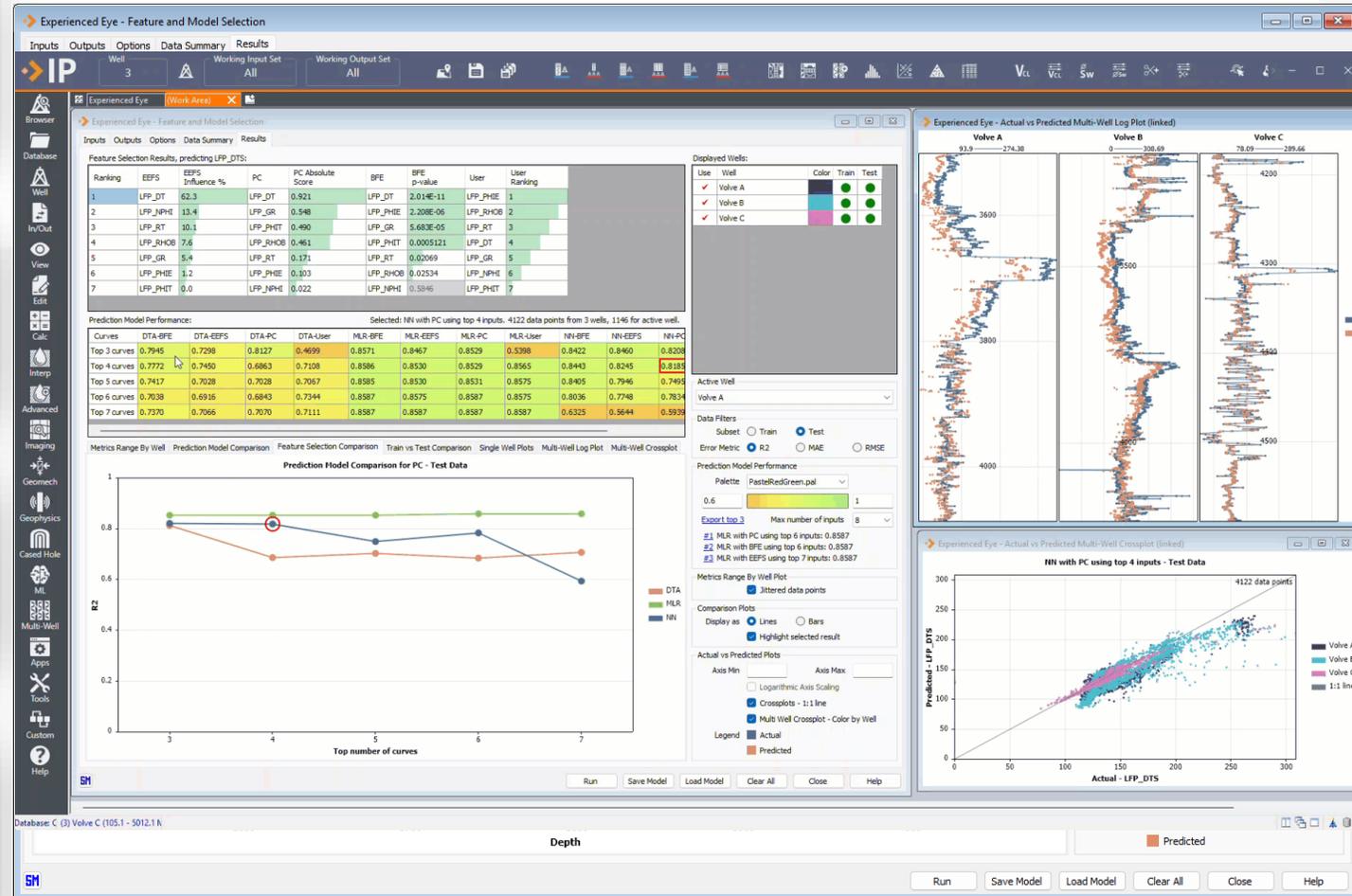
Powerful interactive data visualisations



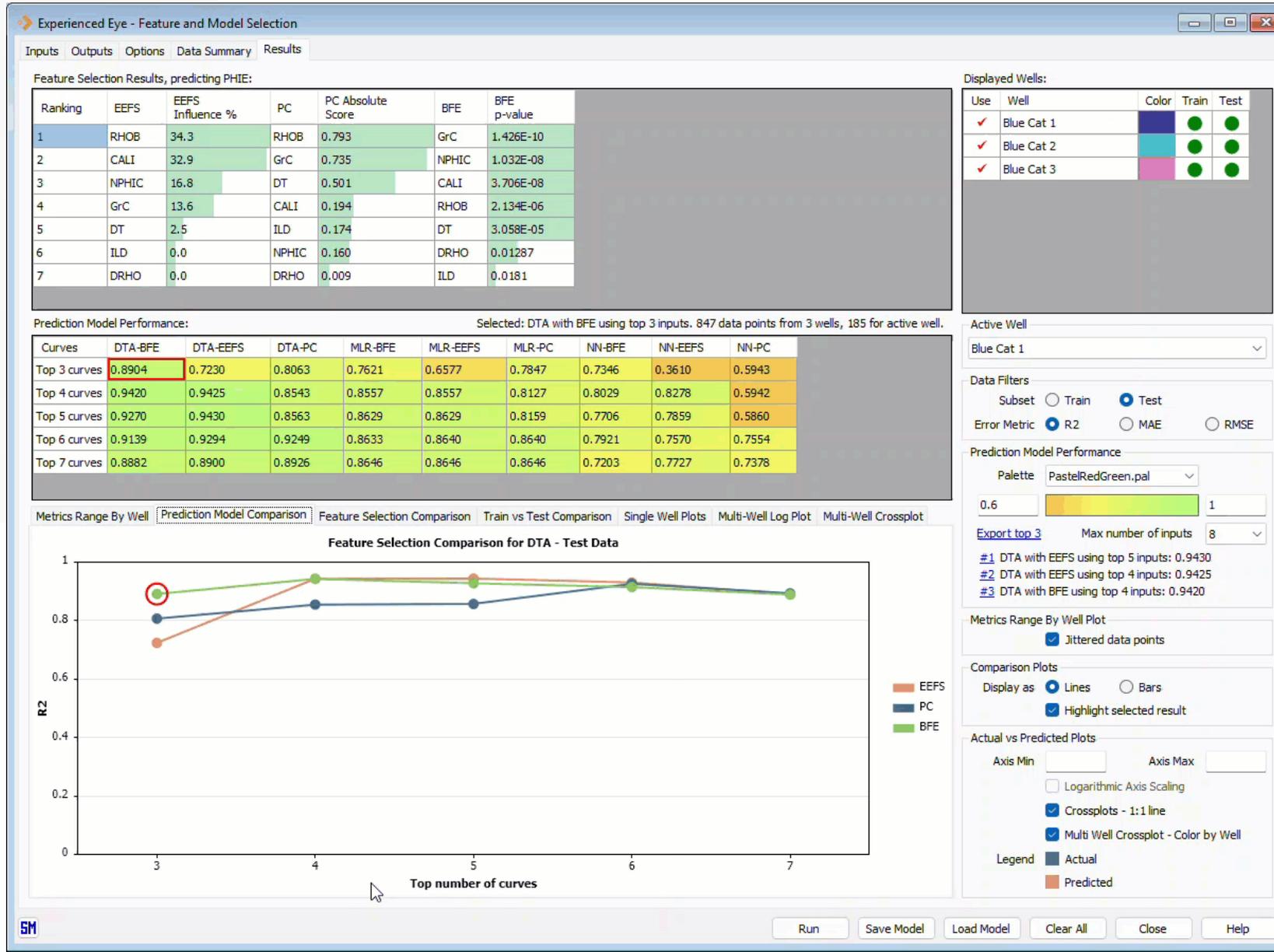
Major speed improvements via multi-threading



Improved algorithms



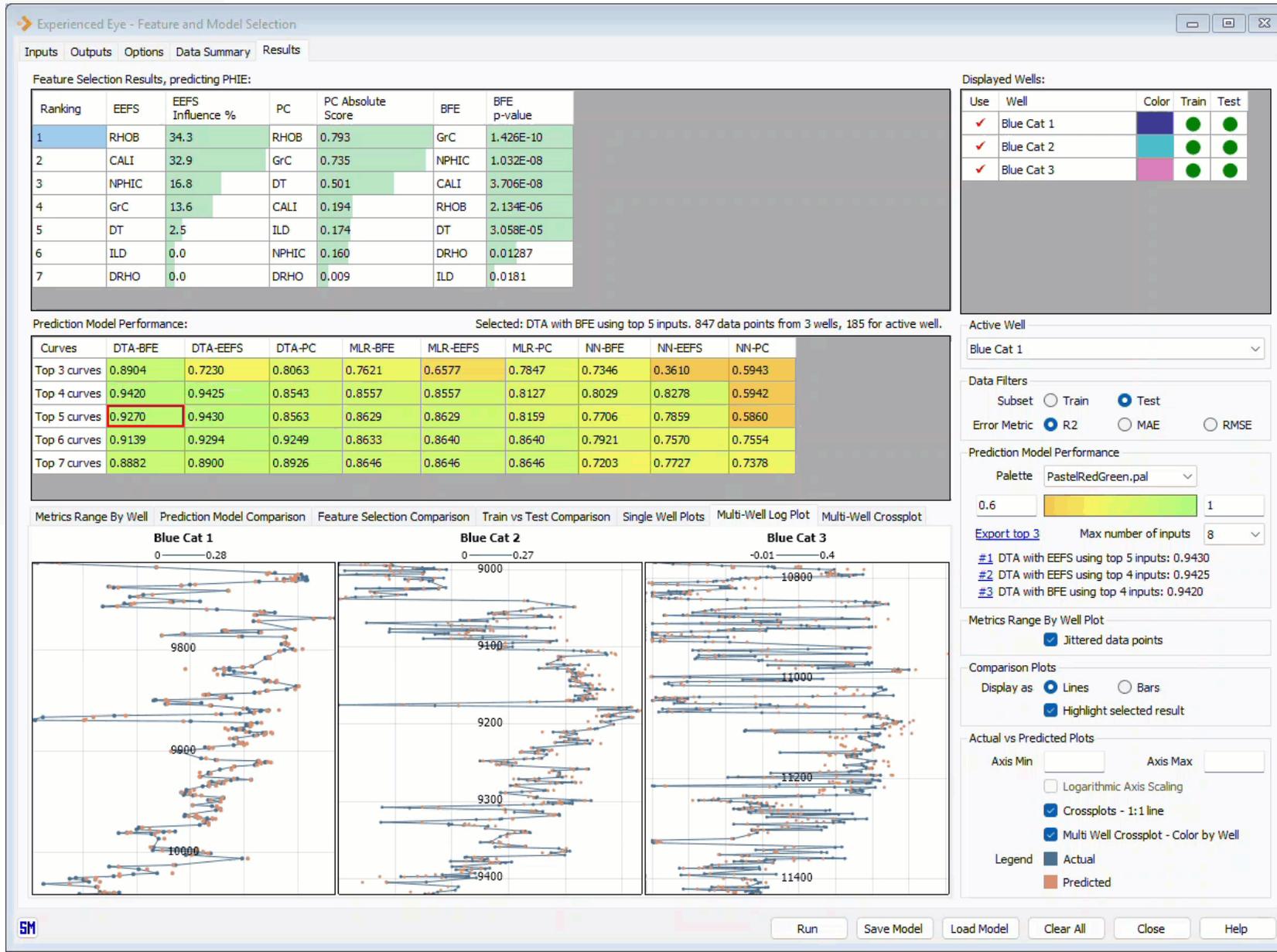
# Compare Performance of FS and ML Models



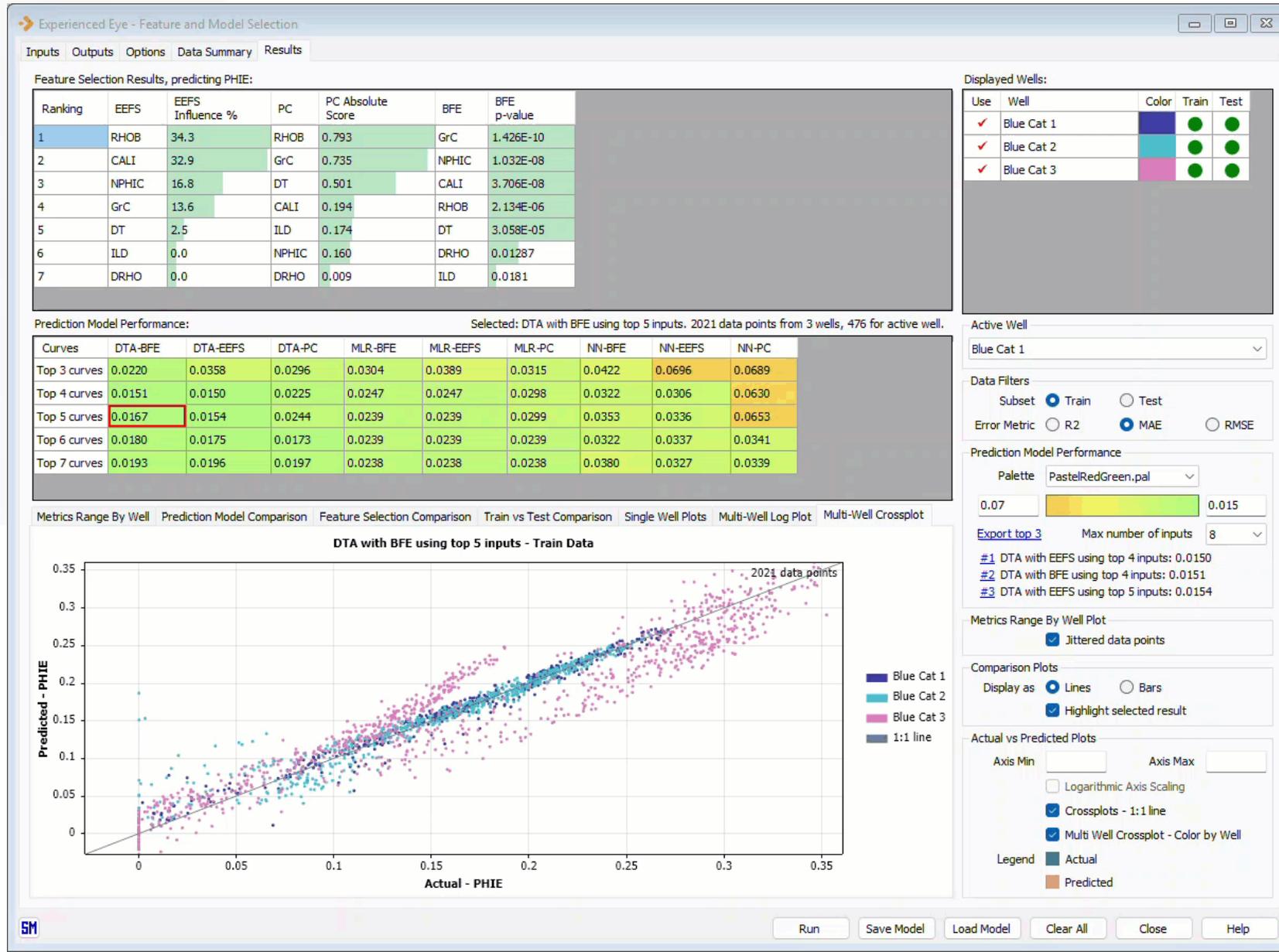
# Evaluate Model Performance on a Well-By-Well Basis



# Compare Multiple Wells Side by Side



# Explore Multi-Well Performance



# Export Final Models

Experienced Eye - Feature and Model Selection

Inputs Outputs Options Data Summary Results

Feature Selection Results, predicting PHIE:

Ranking	EEFS	EEFS Influence %	PC	PC Absolute Score	BFE	BFE p-value
1	RHOB	34.3	RHOB	0.793	GrC	1.426E-10
2	CALI	32.9	GrC	0.735	NPHIC	1.032E-08
3	NPHIC	16.8	DT	0.501	CALI	3.706E-08
4	GrC	13.6	CALI	0.194	RHOB	2.134E-06
5	DT	2.5	ILD	0.174	DT	3.058E-05
6	ILD	0.0	NPHIC	0.160	DRHO	0.01287
7	DRHO	0.0	DRHO	0.009	ILD	0.0

Displayed Wells:

Use	Well	Color	Train	Test
✓	Blue Cat 1	Blue	●	●
✓	Blue Cat 2	Light Blue	●	●
✓	Blue Cat 3	Pink	●	●

Prediction Model Performance:

Curves	DTA-BFE	DTA-EEFS	DTA-PC	MLR-BFE	MLR-EEFS
Top 3 curves	0.0222	0.0359	0.0293	0.0318	0.0382
Top 4 curves	0.0135	0.0134	0.0228	0.0240	0.0240
Top 5 curves	0.0155	0.0136	0.0193	0.0230	0.0230
Top 6 curves	0.0156	0.0164	0.0193	0.0230	0.0230
Top 7 curves	0.0191	0.0197	0.0193	0.0230	0.0230

Open Selected Model  
Export Selected Model to file...

Metrics Range By Well Prediction Model Comparison Feature Selection Comparison Train

DTA with EEFS using top 4 in

Domain Transfer Analysis

Input Discriminators / Zone Options Run Model

	Use	Default	Log	Well	Well	Well	Well
	Curve	Name		1	2	3	4
Well	→	↓		(8) Blue Cat 1	(9) Blue Cat 2	(10) Blue Cat 3	
Curve to Predict	→	✓	PHIE	RESULTS:PHIE	RESULTS:PHIE	RESULTS:PHIE	
Input Curve 1	→	✓	RHOB	RHOB	RHOB	RHOB	
Input Curve 2	→	✓	CALI	CALI	CALI	CALI	
Input Curve 3	→	✓	NPHIC	NPHIC	NPHIC	NPHIC	
Input Curve 4	→	✓	GrC	GrC	GrC	GrC	
Input Curve 5	→						
Input Curve 6	→						
Input Curve 7	→						
Input Curve 8	→						
Use Well	→		for Model Build	✓	✓	✓	
Zone Set	→		for Model Build				
Show Plot			for Model Build	Show Plot	Show Plot	Show Plot	
Top Interval			for Model Build	9713	8990	10763	
Bottom Interval			for Model Build	10043	9423	11433	
Use Well	→		for Model Run	✓	✓	✓	
Top Interval			for Model Run	9713	8990	10763	
Bottom Interval			for Model Run	10043	9423	11433	
Show Plot			for Model Run	Show Plot	Show Plot	Show Plot	
Discriminator	→		Crv 1				
Discriminator	→		Crv 2				

Advanced Well Select Get Depths from Zones  Use Custom Plot Format

SM Report Multi-Well Plot Reset form Load model Save model Close Help

# Summary

The latest Interactive Petrophysics (IP) update brings powerful additions to the Experienced Eye module



**Multi-Well Aware** allows you to work with multiple wells in your database to build more reliable and accurate models specific to your field/project



**Flexibility** to select specific wells for training or testing, or combine them and use random point selection



**Powerful Interactive Visualisations** make it easier to explore the results from various feature selection and machine learning combinations



**Speed improvements** make the process of model selection more efficient and enhances productivity

# Questions



Thank you

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