

**What colour were the engine
driver's socks?**

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Attributes

Calculation

Classification

Supervised

Unsupervised

Calibration



Post-stack

Vertical differentiation

1st derivative

2nd derivative

?meaning

Horizontal integration?

Amplitudes (Reflectivity?)

Hilbert attributes

(Envelope

Phase

Frequency

etc)

Horizontal differentiation

Coherency / Similarity /

Continuity

Dip

Vertical Integration

Acoustic impedance

Hilbert attributes

Q

Coherency



Pre-stack and/or multicomponent

Amplitudes (Reflectivity?)
Intercept, Gradient
P, S reflectivity
Fluid factor
Hilbert attributes

Horizontal differentiation
Coherency
Dip

Vertical Integration
P, S impedance
Elastic impedance
 $\lambda\rho, \mu\rho$
 λ, μ, ρ
F-log
“lithology, porosity”
Hilbert attributes

Coherency



Rock properties

Lithology

Net-to-gross

Thickness

Porosity

Permeability

Water saturation



Shape properties

Channels

Fans

Lobes

Bars

Fault blocks

Edges



How independent are the attributes?

From scalars (amplitudes) to multi-dimensional vectors

Does the statistical method assume attributes are independent?

If attributes are correlated with each other, is it because they are not independent (and therefore one should be down-weighted) or is it because they are independent evidence of the same property?

(Like rules of evidence)



How relevant are the attributes?

Do we need a logical connection between attribute and property?

Does it make sense to predict porosity from seismic amplitudes?

Does it make sense to predict porosity from coherency?

Does it matter?

Data at one level used to predict properties at another?

Number of attributes vs number of data points (wells)

Spurious correlations



Neural network

Elementary, my dear Watson

What are the thought processes?

What are the weights given to each attribute?

Does it matter?



Should we adopt the pot or the kettle approach?

**Pot: accommodating, unquestioning, liberal,
statistical, lateral**

Throw it all into the pot

**Kettle: rigid, focussed, conservative,
deterministic, logical**

Rigour

