Kriging interpolation in seismic attribute space applied to the South Arne Field, North Sea - DTU Orbit (08/03/2019)

**Kriging interpolation in seismic attribute space applied to the South Arne Field, North Sea**

Seismic attributes can be used to guide interpolation in-between and extrapolation away from well log locations using for example linear regression, neural networks, and kriging. Kriging-based estimation methods (and most other types of interpolation/extrapolation techniques) are intimately linked to distances in physical space: If two observations are located close to one another, the implicit assumption is that they are highly correlated. This may, however, not be a correct assumption as the two locations can be situated in very different geological settings. An alternative approach to the traditional kriging implementation is suggested that frees the interpolation from the restriction of the physical space. The method is a fundamentally different application of the original kriging formulation where a model of spatial variability is replaced by a model of variability in an attribute space. To the extent that subsurface geology can be described by a set of seismic attributes, we present an automated multivariate kriging-based interpolation method that is guided by geological similarity rather than by the conventional distance measure in XYZ space. Through a case study, kriging in attribute space is used to estimate 2D porosity maps from a number of well logs and seismic attributes in the Danish North Sea. Cokriging provides uncertainty estimates that are dependent on the primary data locations in space, whereas kriging in attribute space provides uncertainty estimates that reflect subsurface geological variability. The North Sea case study demonstrates that kriging in attribute space performs better than linear regression and cokriging.

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