ASSESSMENT OF INTERPRETATION UNCERTAINTY OF SPATIAL DOMAINS USING BAYESIAN APPROXIMATION.

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In the mining industry, code compliant reporting standards for public announcements have been developed setting minimum standards for public reporting of Exploration Results and Mineral Resources. These include an assessment of the quality and confidence in the data and work carried out since public reporting aims to provide information that is Material, Transparent and Competent to investors.

There are four phases required to estimate a Mineral Resource (Preparation, Investigation, Model Creation and Validation), and estimation is highly dependent on the accuracy of the Preparation stage which is a result of the quality of the geological interpretation given for the mineralisation process and current spatial location. This interpretation seeks to spatially define geologically homogenous areas in the resource (spatial domains), corresponding to a single statistical population with a single orientation, where possible. In the estimation workflow, the creation of the spatial domain presents a challenge in terms of assessing the uncertainty in the geological interpretation often due to the manual and subjective expert opinion interpretation, used to guide its creation. Mineralisation with overprint events can also prove problematic. Spatial domains created through implicit modelling can also benefit from uncertainty assessment of predicted classification of drillhole intercepts.

A method has been developed using Bayesian Approximation to assess interpretation of drillhole intercepts to spatial domains, using available quantitative and qualitative data. In a pilot study, portable XRF measurements were used parallel to visually logged data to test if pXRF multivariate data could also help assess interpretations where there is limited qualitative data, quantitative data or questionable visual logging.

Mining generates Big Data and Bayesian analysis provides efficient methods of handling Big Data. Only with smart, reliable processes will Futuremining benefit from big data.

This paper is a call for excellence in establishing analytical reliability so Futuremining can benefit from ‘Big Data’.

Key Words: Bayesian, Spatial Domain, Uncertainty, pXRF & Big Data