

## **Harnessing data complexity - How machine learning applies all project data for accurate resource modelling**

A recent review of resource reports lodged to statutory bodies found geological models with over-smoothed or unrealistic lithological boundaries, many of which do not represent geological appearance in the field, pit or underground drive.

The underlying data is often too complex or messy to be incorporated into the resource model and is thus a simplification of reality, to the detriment of the mining operation and its shareholders. Volumes can be over- or under-estimated and subsequent grade predictions can be misplaced, combining to cause over- or understatement in resource reporting to stakeholders and statutory authorities.

Domain models can be improved with new modelling techniques such as machine learning. However, with poor data or improper use of machine learning techniques, the conclusions can be just as misleading as with current techniques.

Machine learning rarely offers a single 'right' outcome, rather a range of possible outcomes from the data provided. But importantly it can take advantage of the full richness of data for more informed models. Machine learning also provides confidence in its predictions so that uncertainty in the resultant models can be quantified and passed through for risk assessment during mine planning and operation.

This paper will discuss the factors accentuating complexity in deposit modelling: data diversity, structural controls, chemistry, data volumes, process workflows and external non-geological constraints.

A case study will illustrate the risk of reducing or ignoring complexity, which can result in an overly simplified geological model.

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