Machine Learning in Resource Geology: Why Data Quality is Critical

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ABSTRACT

The Nova-Bollinger Deposit is magmatic sulphide nickel-copper-cobalt deposit hosted in the Albany Fraser Orogen, approximately 160km east-northeast of the town of Norseman in Western Australia. Since mining commenced in 2016, the Nova Operation (Nova) has mined and processed 5.63Mt of ore grading 2.04% Ni, 0.86% Cu and 0.07% Co to 31 December 2020.

The 2020 update of Nova-Bollinger JORC Code Mineral Resource estimate (MRE) was completed by using well known implicit modelling and estimation software. The MRE is modelled on data from ~386km of predominantly diamond core drilling, with drilling having nominal grid spacing of 12.5 by 12.5m throughout the mineral resource volume. Twenty-two domains were modelled from the data using implicit wireframing tools that incorporated strings generated from underground mapping where available.

During 2021, a new machine learning (ML) application was trialled to compare the ML results to the current workflow Nova for modelling estimation zones. The ML application was provided with the same drill hole data used for the current MRE to determine if a similar result to the implicit modelling could be achieved, and if a practical estimate could be prepared.

ML requires a different approach to overcoming the usual challenges caused by inconsistencies in drill hole data. Compared to the industry standard approaches of wireframing or implicit modelling, where the modeller usually makes many subjective choices to produce the estimation zone model, ML offers a more objective 'hands-off' process to determining the connectivity of estimation zones defined in drill holes. This paper details the results of the ML modelling trial at Nova and the lessons learnt along with ideas for future work.