A STUDY OF NOVEL APPROACHES FOR IMPROVED PREDICTION OF PILLAR STABILITY IN UNDERGROUND MINES

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Doctor of Philosophy

By

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Chapter 6

CONCLUSION

From the present research work which has been processed through various machine learning tools, the following conclusions have been drawn:

- The Random Forest machine learning algorithm has been found to be best in performance prediction of pillar stability with an accuracy of 83.3%, AUC of 0.920, and MCC of 0.740.
- Ranking of different features based on fuzzy rough feature evaluator showed the maximum rank value of 0.04185 for the pillar width to pillar height ratio which denotes the supremacy of the input parameter.
- The PCA technique has selected W/H and UCS as the two important parameters affecting Pillar Strength. On the other hand, the SSE technique has selected UCS and W and H as the three important parameters.
- The R^2 for PCA in predicting pillar strength was observed as 0.86, and the root mean square error was found as 0.112. Similarly, for SSE, it was 0.84 and 0.123, respectively.
- PCA has a better ability to predict the pillar strength. The validation performed on the proposed model by PCA and SSE showed that we can express a higher level of statistical assurance on the proposed models.
- PCA has better accuracy in predicting Factor of safety (FoS). The comparison curve for FoS strengthens the result that the PCA has higher assurance in the prediction of FoS than SSE.

Recommendations and Future suggestions:

Some pillars are built to fail, while others must remain steady for the duration of their lives. A mine pillar's primary function is to sustain the surrounding rock mass for a set amount of time while mining is carried out. The strength of a mine pillar and the load exerted on it must be considered in order for it to accomplish its intended function To improve the findings reported in this thesis, one might investigate the dependability of these models for predicting pillar stability. It is suggested that the model be tested using a larger and more balanced pillar stability database. To improve the model output, additional ground type and structural geology parameters might be incorporated into these models. The other artificial intelligence methods like backpropagation, neural network, etc. can be used for the prediction of pillar stability.