

The Mine Planning Problem: from the Discrete to the Continuous Framework

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Abstract:

We present the long-term mine planning problem. The general problem can be essentially formulated as follows: given an estimation of the value distribution in situ, one needs to schedule that portions of the mine have to be extracted at each time-period. The aim of the planning is to define the economic sequence of extraction, satisfying logical, physical, and capacity constraints.

In the discrete case, this approach gives rise to very large binary linear optimization problems, but here we propose a mathematical framework based on continuous functional analysis. Instead of the usual discrete block models, we apply a continuous approach that allows for a refined imposition of slope constraints associated with geotechnical stability. The framework is posed in the function space of real-valued Lipschitz functions on a bounded domain, generating constrained optimization problems in functional spaces.