

Project Description: Hot water based bitumen production process from mineable oil sands is extremely complex in nature and high sensitive to variability of oil sands ores. Understanding ore processability and developing a sensible marker for ore processability have been proven to be a very challenging task. In addition to processing variables such as temperature, hydrodynamics, process water chemistry and chemical additives, ore characteristics, such as bitumen content, connate water content and chemistry, fines and content and more importantly types of fines plays a decisive role in determining the processability of oil sands ores.

The current research is aimed at understanding the processability of mineable oil sands ores using Principal Component Analysis (PCA) and Support Vector Machine (SVM). PCA and SVM are Pattern Recognition based methodology in machine learning, providing an advantage in data-driven decision making. Such methodology has been shown to deliver many economic benefits in sectors such as health care, financial services and customer relation management. In this research, a novel machine learning algorithm is developed to understand the processability of oil sands ores. Due to limited access of bitumen recovery data, the methodology is, as an example, applied to an iterative wine selection process using data sets constructed for classification of wine quality. The learning model developed here outperformed the existing linear and logistic prediction methods in terms of content prediction error. As a test on proof of concept, the methodology is applied to an oil sands processing data set created using an artificial model. The model established using the PCA and SVM methods matched well with the original model used to generate the artificial data set.