Tutorial of Sphalerite Classifier

Introductions to this tutorial

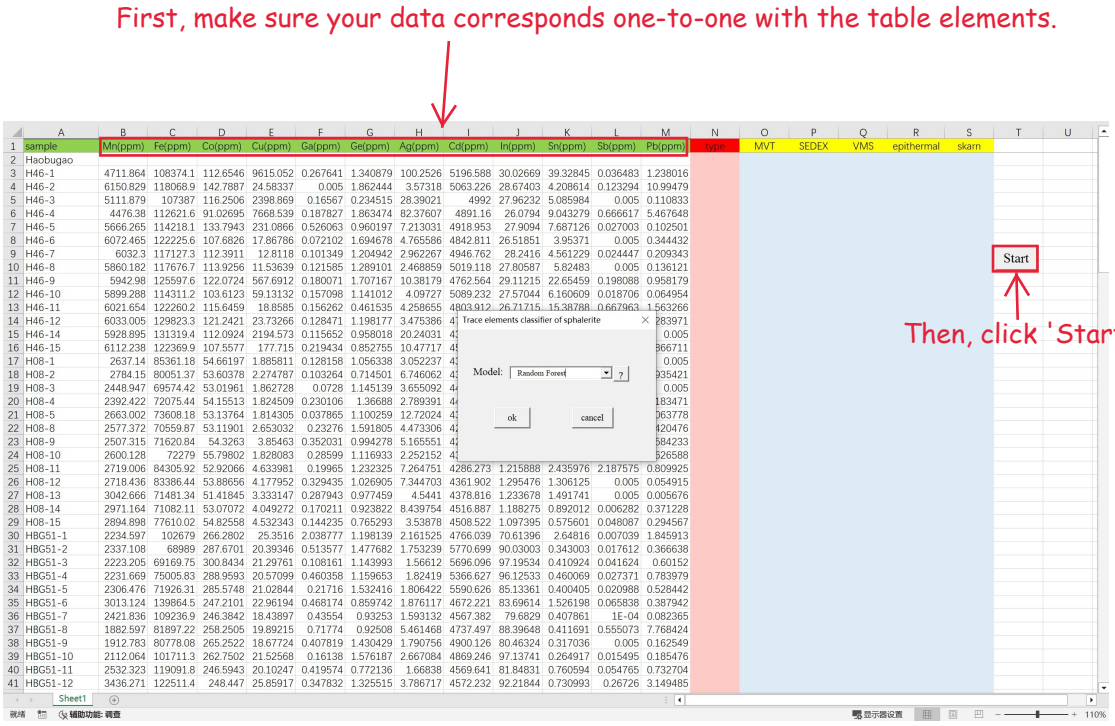
This document is a tutorial for the "Sphalerite classifier. xlsm" macro program. This program can be downloaded at https://sdeakii.github.io/machine-learning/.

The sphalerite classifier is a classifier trained on multiple machine learning algorithms to predict the type of mineral deposit based on the trace element composition of sphalerite. This program facilitates deposit genesis identification on computers lacking a machine learning environment.

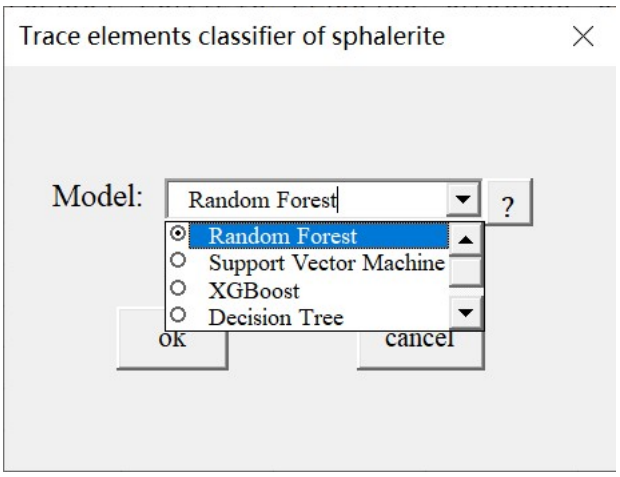
It is best to use Excel versions 2019 and above for this program, as there may be compatibility issues with older versions of Excel.

Steps:

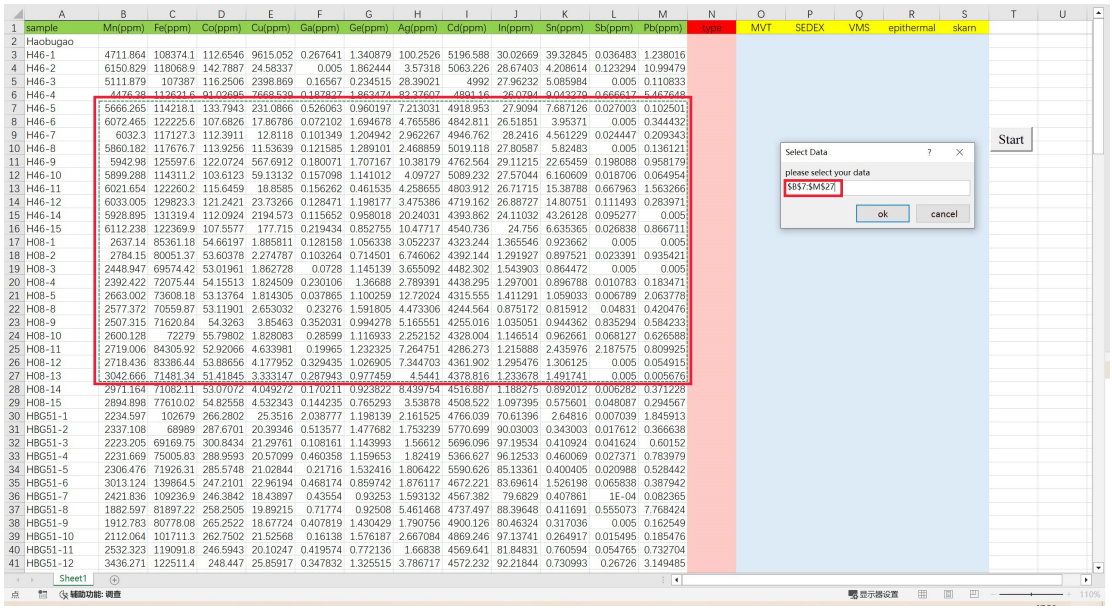
(1) Fill in your element data of sphalerites in the order of the table, ensuring that your data corresponds one-to-one with the table elements. Then click the 'Start' button.



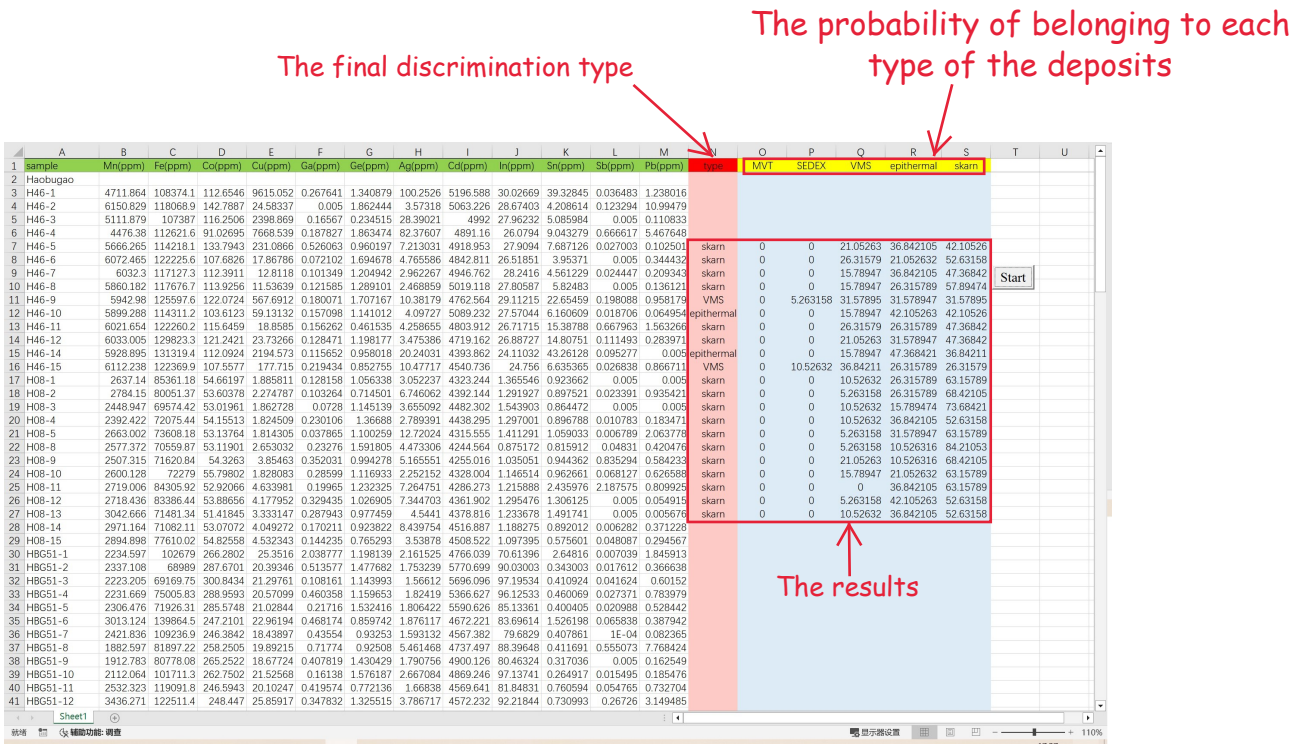
(2) This program will pop up a model selection interface, where you can choose the machine learning model you want to apply. Then click 'OK'.



(3) Then this program will pop up a data selection interface, long press the left mouse button to select the data you want to classify. Then click 'OK'.



(4) Finally, this program will automatically generate the genetic types of Zn-Pb deposits for the selected data, as well as the probability of belonging to each type of the deposits or some other detailed information.



Note: Only the random forest model and XGBoost model have the probability of belonging to each type of the deposits, while the decision tree model does not. The SVM model uses the 'one vs one' decision function, which combines 5 different types pairwise to obtain 10 different types of combinations. The function value is proportional to the distance from sample X to the separation hyperplane. Positive value indicate that the sample belongs to the deposit type before "vs", while negative value indicate that the sample belongs to the deposit type after "vs". Based on the comprehensive statistics of the 10 combinations of Zn-Pb deposit types, the type with the highest number of votes is determined as the genetic type to which the sample belongs. For details, please refer to https://scikit-learn.org/stable/modules/generated/sklearn.svm.SVC.html#svc.