**Pseudo Code for Final Predictions**

For Final Predictions Random Forest with 20 number of trees was trained on complete Dataset.

# Preparing a dictionary to store Input Parameters and their ranges:

First an excel file containing the chemical composition of new grades was read and stored in "chem" variable.

A list consisting the names new grades was created using "chem" and stored in variable "lst".

All the names of files (containing ranges) were also read and stored in "comb" variable.

A dictionary is made which had the name of Grade (lst) and its ranges (comb) together as key-value pair.

# Predictions and Summarizing Results.

Iteration on dictionary:

file = read and store combination (e.g. In188\_Combinations.csv)

composition = name of the corresponding combination (e.g. Inconel 188)

input\_param = concatenating file and composition

saving input\_param to \_input\_params.csv (e.g. Inconel\_88\_input\_params.csv)

x1 = transforming input variables using Standard Scaler

predictions = passing x1 to the trained Random Forest Model to get predictions for SR and MRR

saving these predictions in Results csv. (e.g. Inconel\_188\_Results.csv)

# Summarizing unique values of SR and MRR

for i in unique values of SR and MRR in Result:

Separating the unique values of SR and MRR in a dataframe

mn = storing minimum value of each input parameter

mx = storing maximum value of each input parameter

saving min and max in a dictionary

creating a new dataframe to append dictionaries

saving all the results in summary.xlsx (e.g Inconel\_188\_Summary.xlsx)