STRATUM: Corporate Case Study

Multi-element Correlation for Fe Quality Modelling

July, 2021

STRATUM AI

STUDY CASE
DATA QUALITY ANALYSIS

THE PROCESS:

- Before the modeling process begins, the project data set has to be examined for any abnormalities that might interfere with the data training process.
- In this case, the deposit studied is an Iron multielement open pit that has over ~ 150k drillhole samples and ~110k blasthole samples
- Given the nature of the data collected within the pit a multielement-analysis is performed in order to find non-linear patterns in the multi-element data

STUDY CASE
MULTIELEMENT DEPOSIT

QUESTIONS WE ANSWER

1 **GRADE BIAS**
How large is the data set grade bias?

2 **GRADE NOISE**
How large is the data set grade noise?

3 **IRON MODELLING**
What assays contribute to improved iron modelling?

STUDY CASE
ML EVALUATION CRITERIA

Legend

None (0%-5%) | Low (5%-15%) | Medium (15%-25%) | High (<25%)

1. Grade Bias: This metric measures the average grade difference between two data types in blocks where they overlap. High differences indicate potential skews due to assaying or sampling techniques.

	26 Fe Iron	14 Si* Silicon	13 Al* Aluminium	15 P Phosphorous	25 Mn Manganese	20 Ca* Calcium	12 Mg* Magnesium	22 Ti* Titanium	PPC
Drillhole[1] (10x10x10) * Oxides	0.58%	3.51%	12.62%	8.07%	41.47%	38.93%	88.56%	86.43%	11.90%
Blastholes[1] (10x10x10) * Oxides	0.86%	9.22%	15.44%	11.50%	6.79%	9.06%	0.81%	22.15%	13.12%

[1]The Drillholes & Blasthole data is compared with other secondary data that is within the same block analyzed

STUDY CASE
ML EVALUATION CRITERIA

Legend

- None (0%-5%)
- Low (5%-15%)
- Medium (15%-25%)
- High (<25%)

2. Grade Noise:

This criteria measures how much nearby samples deviate from each other within the same data type. High differences indicate either noise and/or high local variation.

Drillholes (10x10x10)	26 Fe Iron	14 Si* Silicon	13 Al* Aluminium	15 P Phosphorous	25 Mn Manganese	20 Ca* Calcium	12 Mg* Magnesium	22 Ti* Titanium	PPC
* Oxides	5.95%	16.80%	29.15%	23.53%	48.90%	19.28%	38.48%	40.63%	19.77%

3. Number of Samples:

A large amount of data is necessary to do high quality machine learning. This metric evaluates how well suited dataset is to ML based on its size.

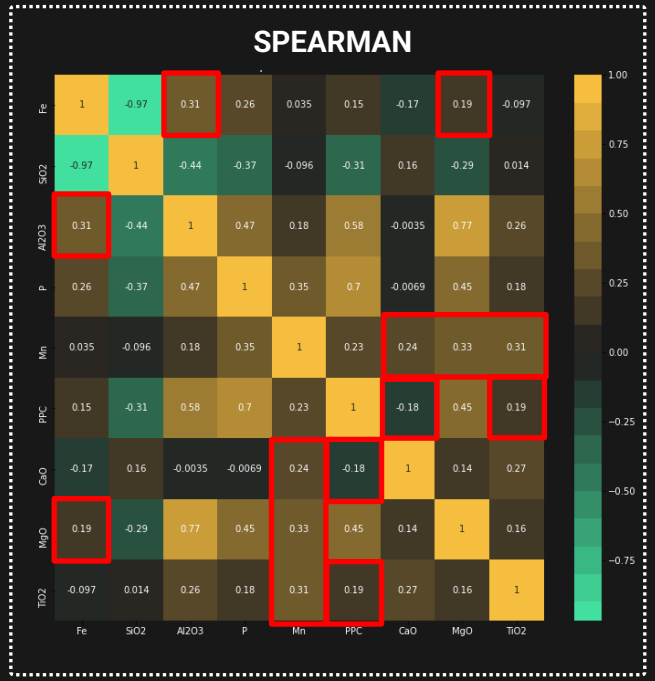
	Drillholes	Blastholes	Other
Data recieved	~ 150k samples	~ 110k samples	~ 24k samples

STUDY CASE
MULTIELEMENT DEPOSIT

MULTIELEMENT ANALYSIS

DDH (Drillholes)

Pearson and Spearman are two different metrics that identify mostly linear correlations. When they do not agree, it generally indicates there are non-linear patterns in multi-element data that the AI can take advantage of.



STUDY CASE
MULTIELEMENT DEPOSIT

SUMMARY

How large is the data set grade bias?

Iron is not biased to any significant degree. However, there is a high degree of bias for the Mn, Ca, Mg and Ti drillhole samples

How large is the data set grade noise?

Overall there is no significant noise for Iron samples and the other elements analyzed

What assays contribute to improved iron modelling?

There appears to be a non-linear pattern relationship between Fe & Mg (oxide) and Fe & Al (oxide) that Al can exploit.

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LOW RISK – HIGH YIELD – AI DRIVEN