Stratum: Corporate Case Study

June 2021

Copper Porphyry Overview

The Deposit:

- [redacted] is a large Copper-Gold porphyry in interior British Columbia
- Mine has a production history of over 60 years
- Has over ~190k drill hole samples, ~140k blasthole

The Challenge with [redacted] . . .

The Problem

The mine has razor thin margin — average recovered grade of 0.21% with a 0.18% cutoff grade

The Objective

To grow margin through better waste classification

The Outcome

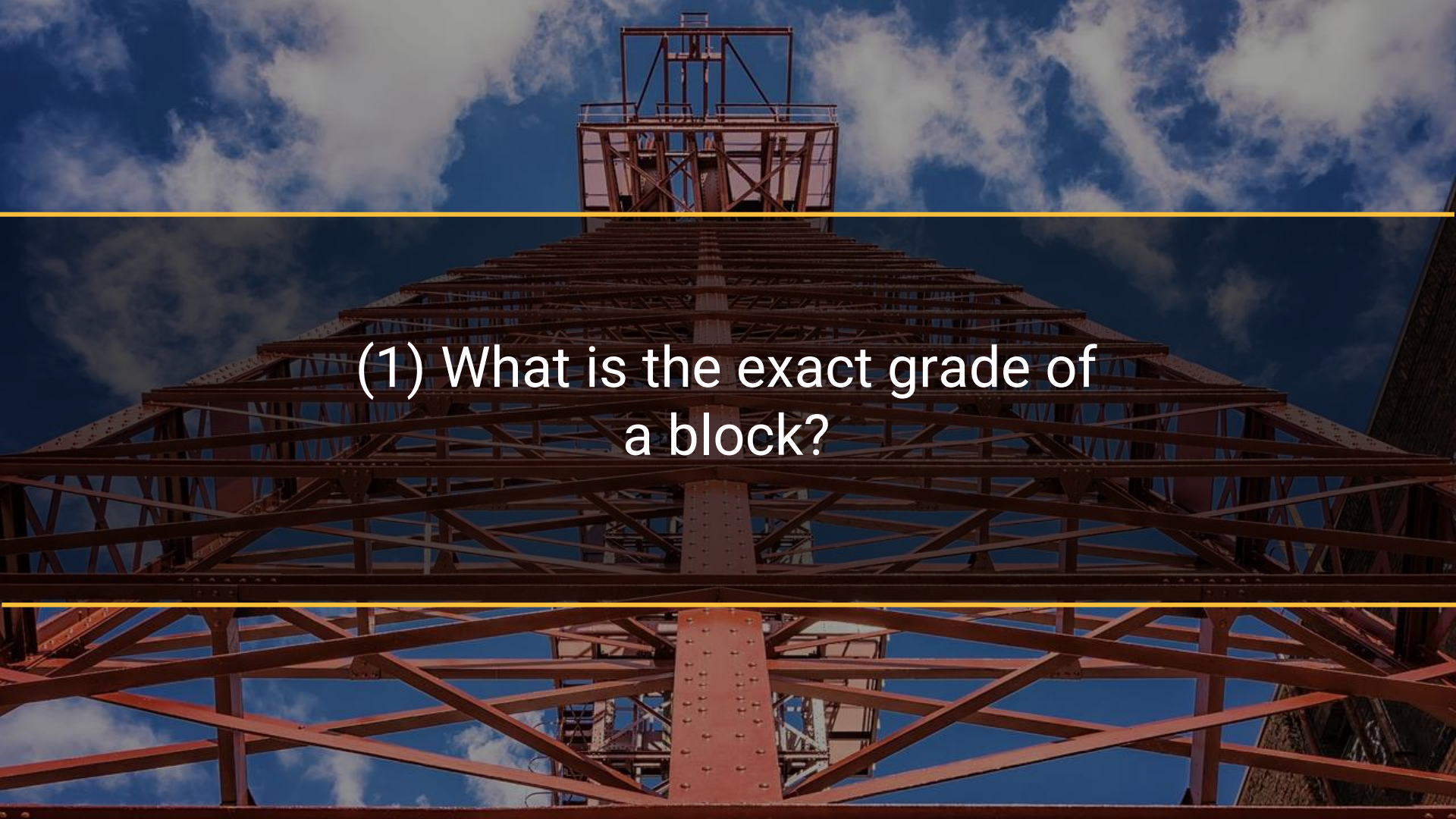
A better resource model that accurately predicts grade variation can create value by identifying exactly which blocks are economical

THE SOLUTION

AI outperforms Kriging by learning from 190k samples worth of multi-element assays to **determine which blocks are above cutoff**

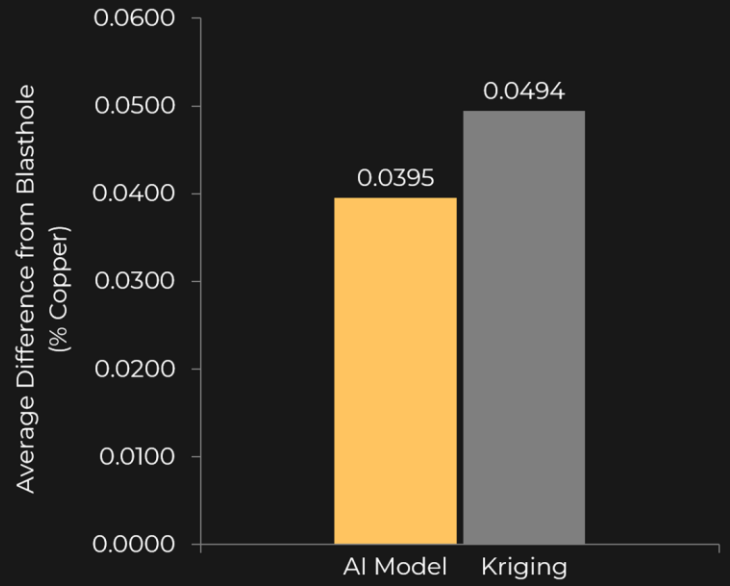
The Questions We Answer

1. What is the exact grade of a block?
2. Is a block above the cutoff grade (LG= 0.13%) or waste?
3. What is the expected tonnage of mineable areas?


(1) What is the exact grade of
a block?

Long-Range vs. Blasthole Grade Reconciliation

Stratum's model more accurately predicts the exact grade of any block.



Method (block-wise reconciliation):

- The graph shows the average difference between drillhole model prediction and blasthole at given point

Results:

- 05.1% accuracy increase over Kriging
- Increased accuracy translates into better knowledge of exactly how economical each block is

Average Deviation At Various Intervals

Grade Intervals	Avg Deviation		Improvement
	AI	Kriging	
0.00 – 0.10	0.0379	0.0602	37.1%
0.10 – 0.18	0.0817	0.0879	7.1%
0.18 – 0.21	0.0899	0.0979	8.2%
0.21 – 0.70	0.1488	0.1833	18.8%

Method:

- The graph shows the average difference between drillhole model prediction and blasthole at given point
- Table shows average difference at various grade intervals

Results:

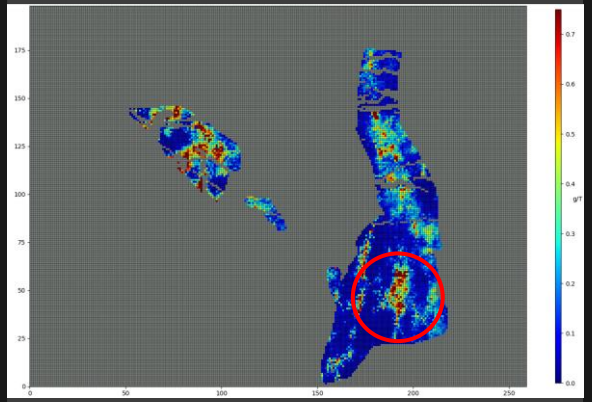
- Model has less average difference at every interval

Bench Analysis (z = 172.29)

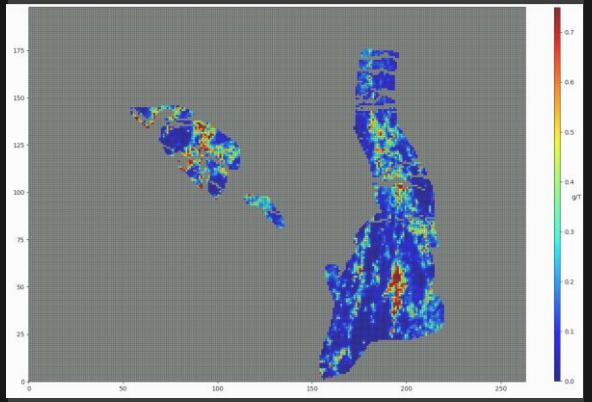
Block size: 7.5 x 7.5 x 15m

The AI models higher grade area while Kriging smooths those areas to lower estimation grade

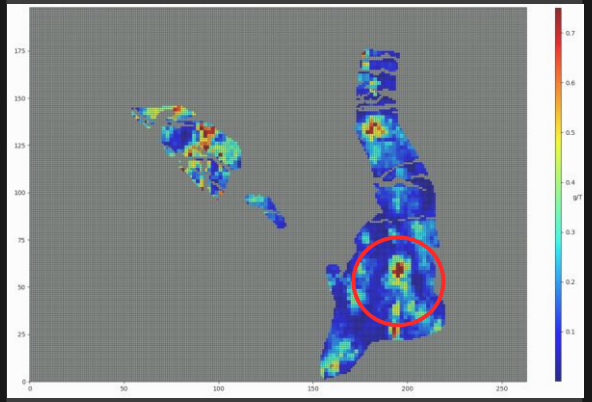
AI Model



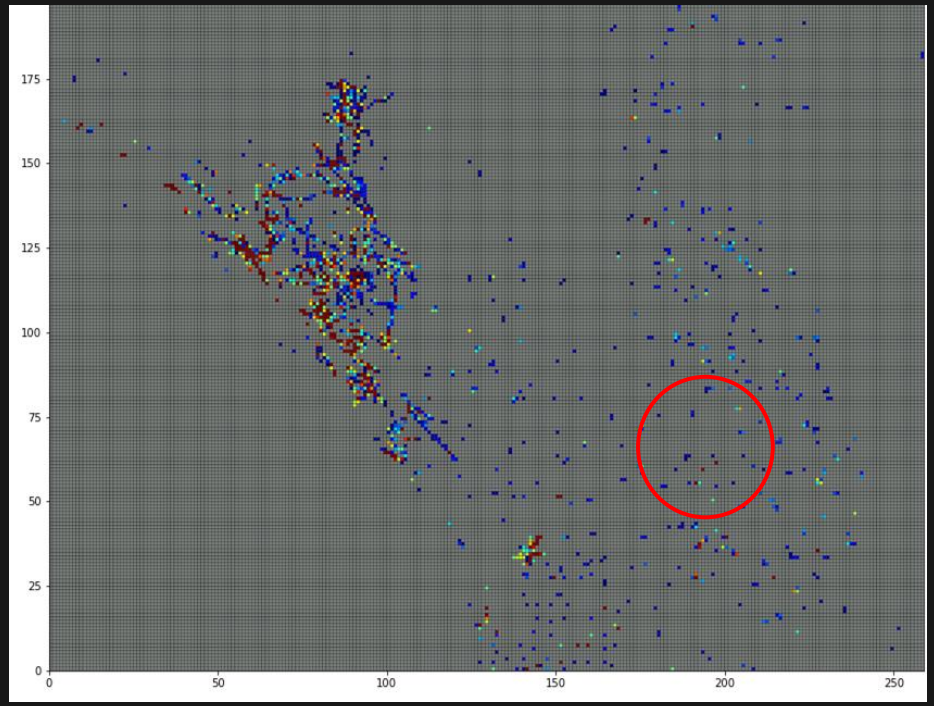
Blastholes (Truth)

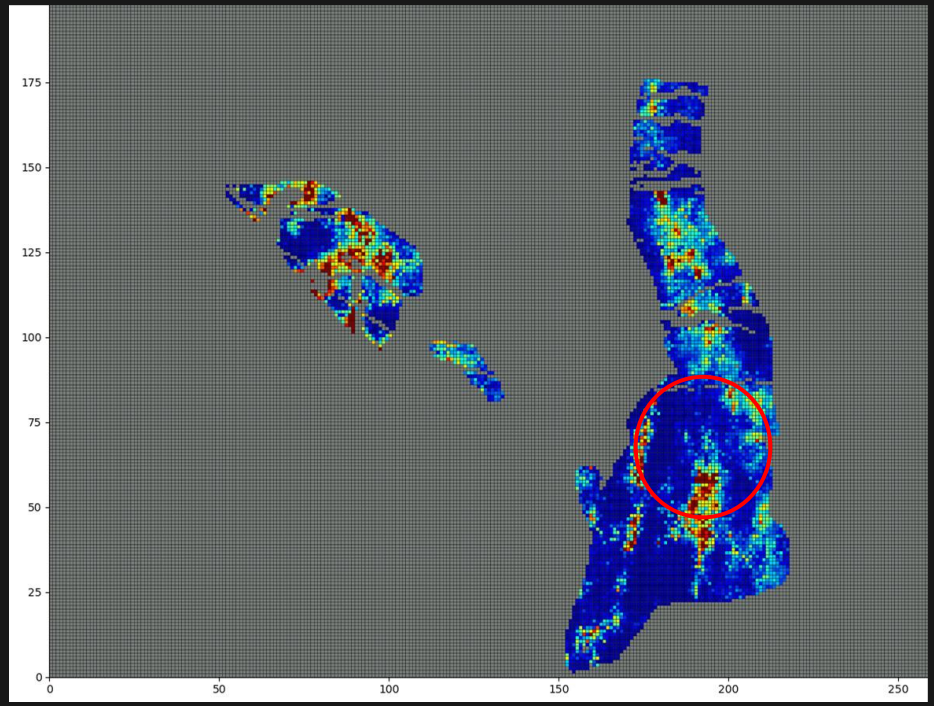


Kriging



What Led to These AI Predictions? (z = 172.29)



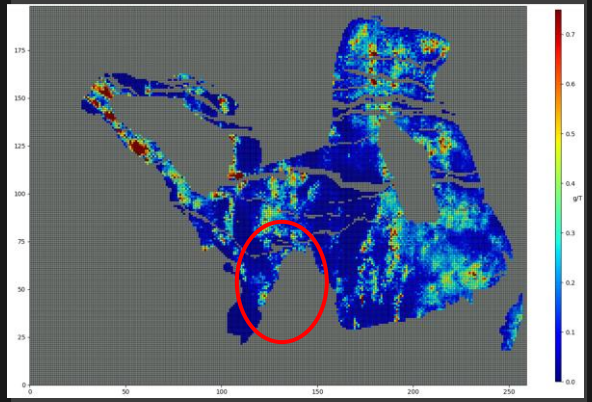


Bench Analysis (z = 67.29)

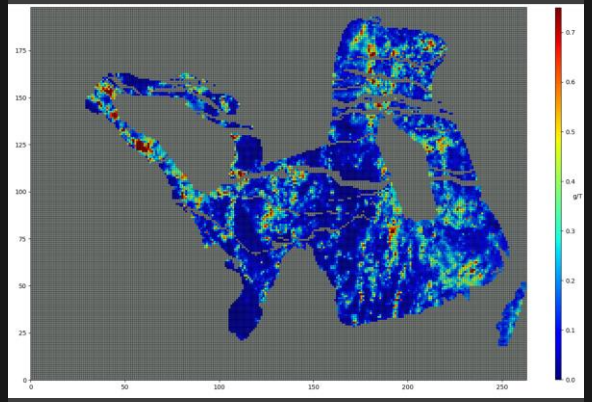
Block size: 7.5 x 7.5 x 15m

AI predicts low grade mineralization while Kriged model overestimates grade in same region

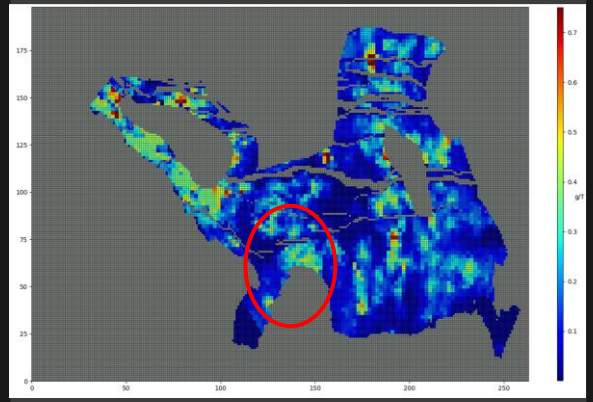
AI Model



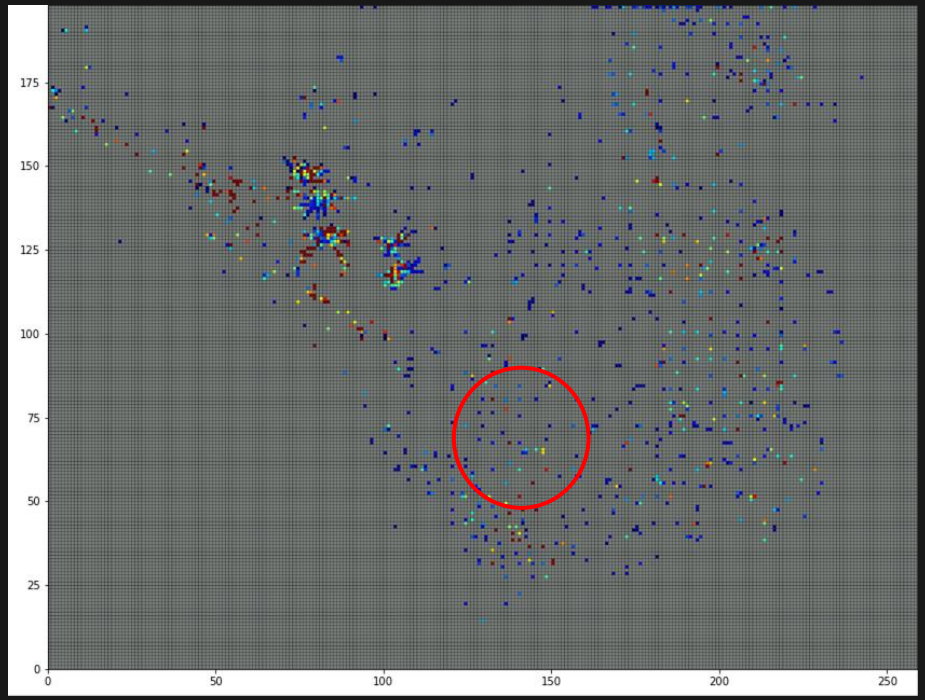
Blastholes (Truth)

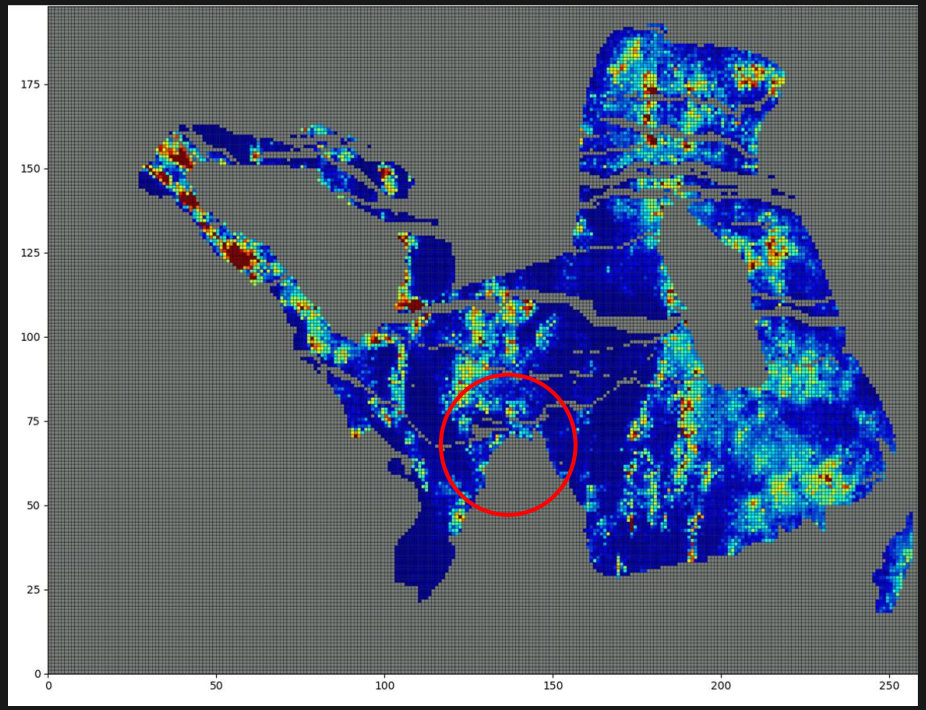


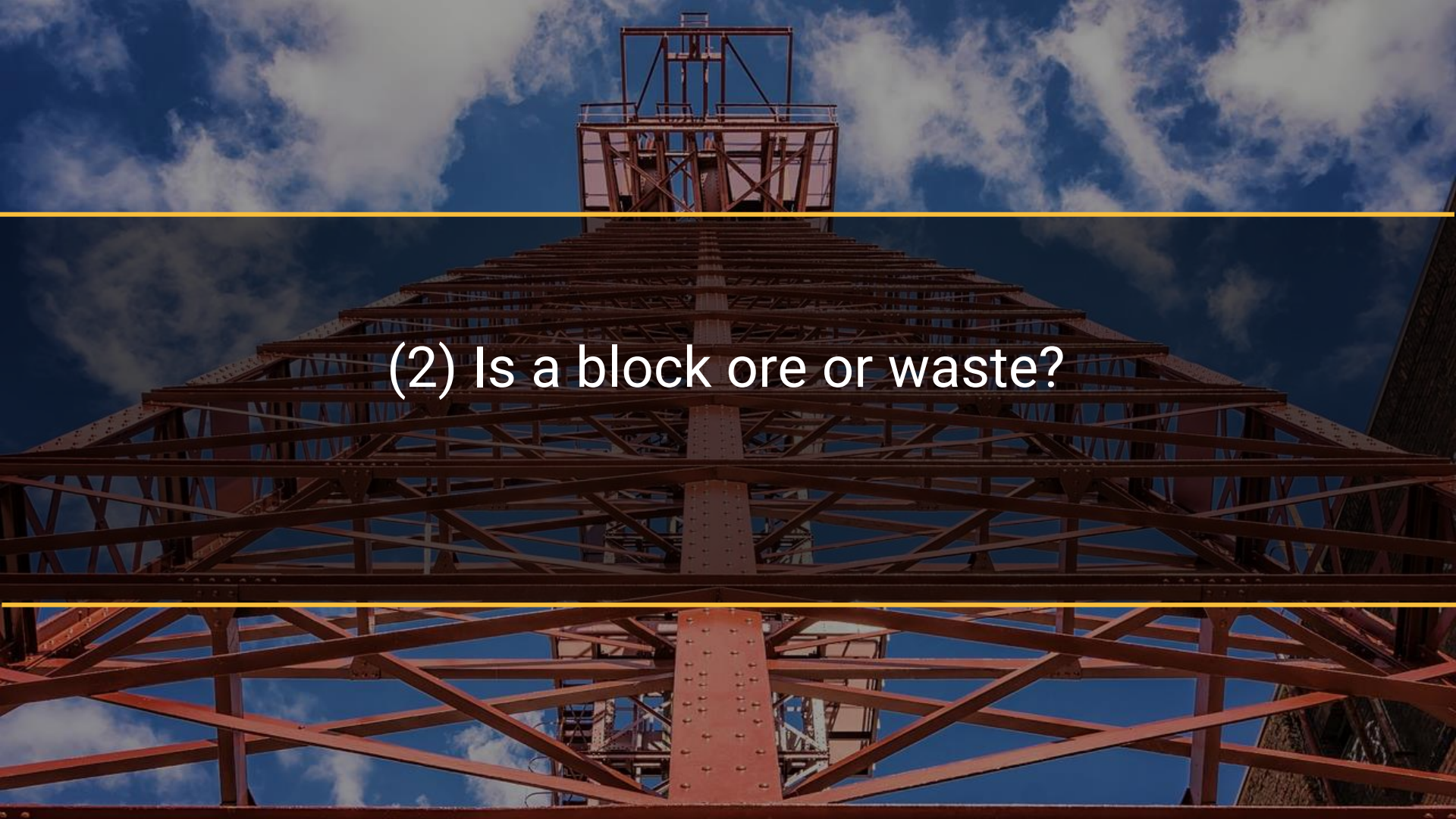
Kriging



What Led to These AI Predictions? (z = 67.29)

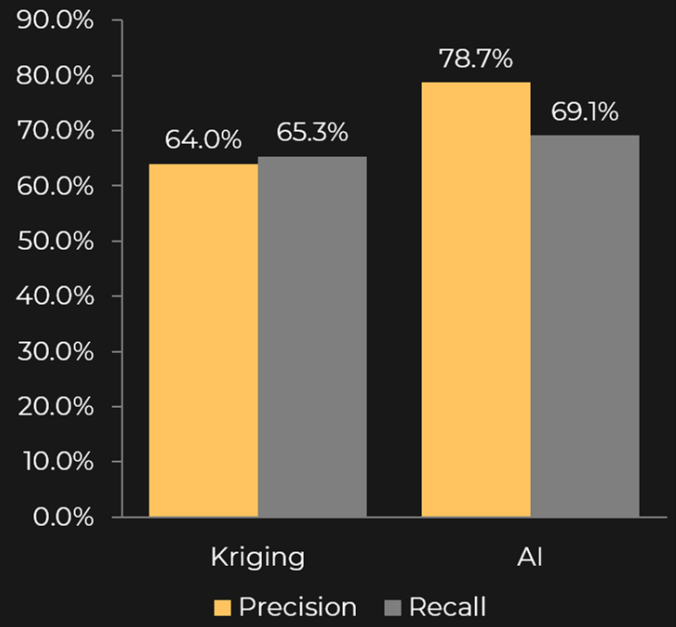





(2) Is a block ore or waste?

Economic Region Classification (Cu % > LG)

Stratum's AI resource model more accurately classifies whether a block is economical to extract.



Metrics

- Recall is what percent of economic blastholes are classified as such (Find all copper that exists)
- Precision is what percent of blastholes classified as "economic" are in fact so (Minimal false positives)

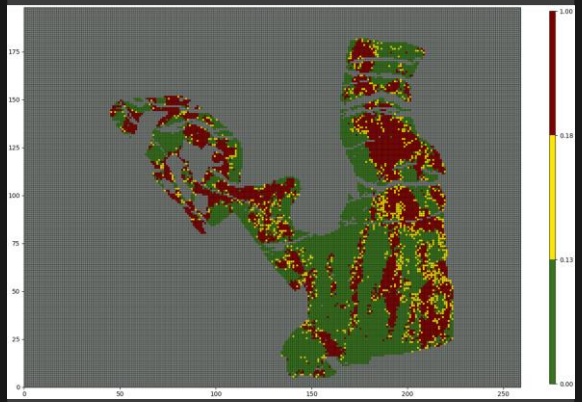
Results

- 14.7% higher precision over NI-43 101
- 3.8% higher recall over NI-43 101

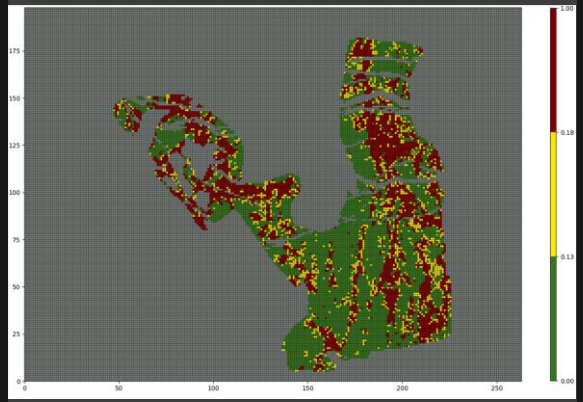
Cross Section Analysis (z = 127.29)

Stratum’s higher accuracy is due to AI’s ability to better reconstruct geology from drillholes

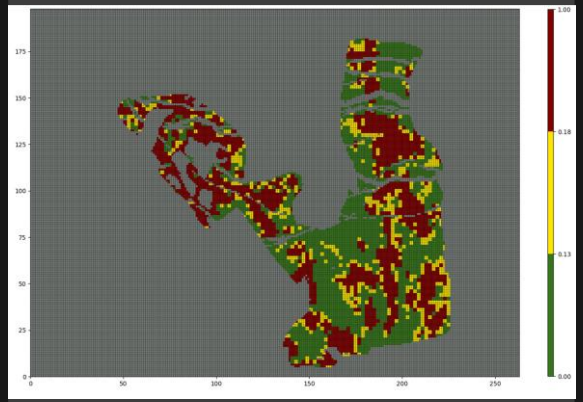
AI Model



Blastholes (Truth)



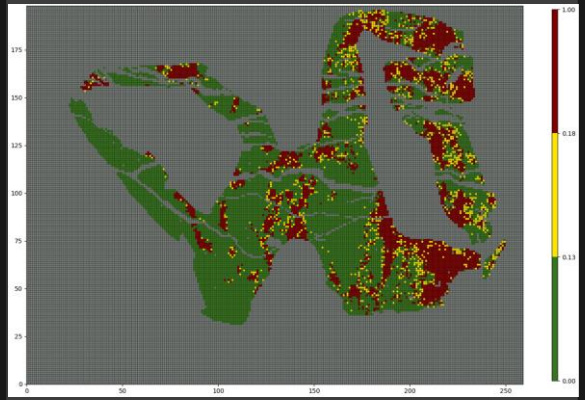
Kriging



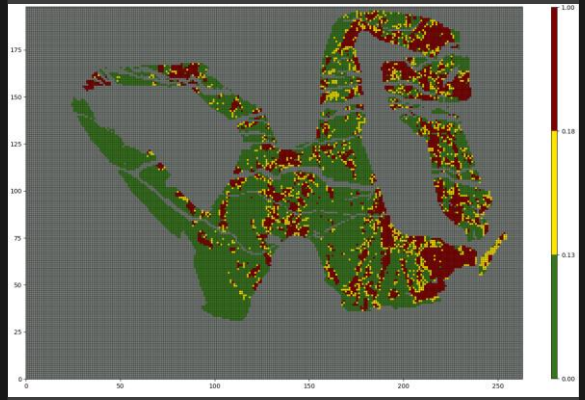
Cross Section Analysis (z = 37.29)

Stratum’s higher accuracy is due to AI’s ability to better reconstruct geology from drillholes

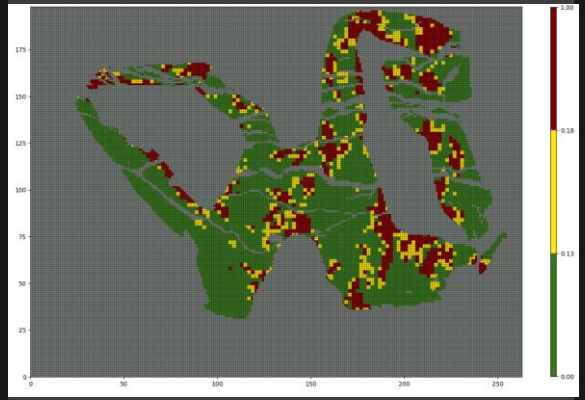
AI Model



Blastholes (Truth)



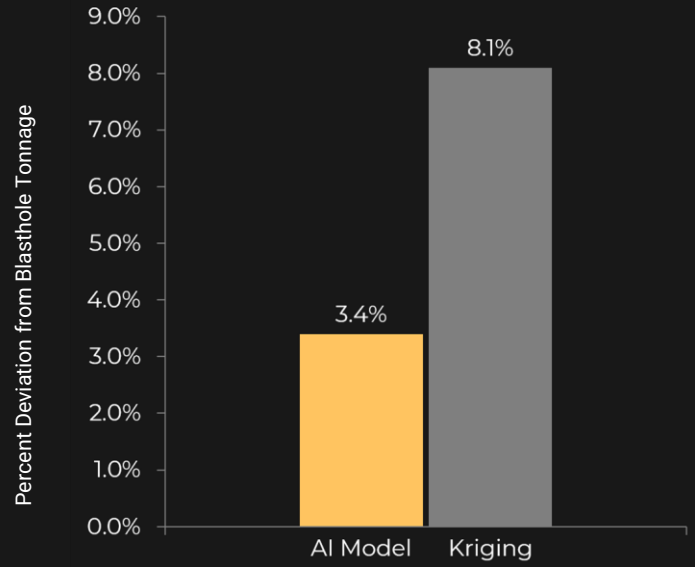
Kriging



(3) What is the expected tonnage of mineable areas?

Quarterly Tonnage Deviation

Stratum's model has less tonnage deviation from ground truth leading to better revenue projection.



Method (quarterly F1 reconciliation):

- Tonnage = sum(block | block > cutoff)
- The graph shows the average quarterly percent tonnage deviation between prediction and blastholes
- Cutoff = 0.18% is used

Results:

- AI has 58% less tonnage deviation

Tonnage At Various Cutoff Grades

Cutoff Grade (%)	Economic Tonnage Deviation	
	AI	Kriging
0.00	-4.0%	-6.0%
0.10	-4.5%	-4.9%
0.13	-2.2%	-5.9%
0.18	+3.0%	-8.6%
0.21	+6.7%	-11.4%

Method

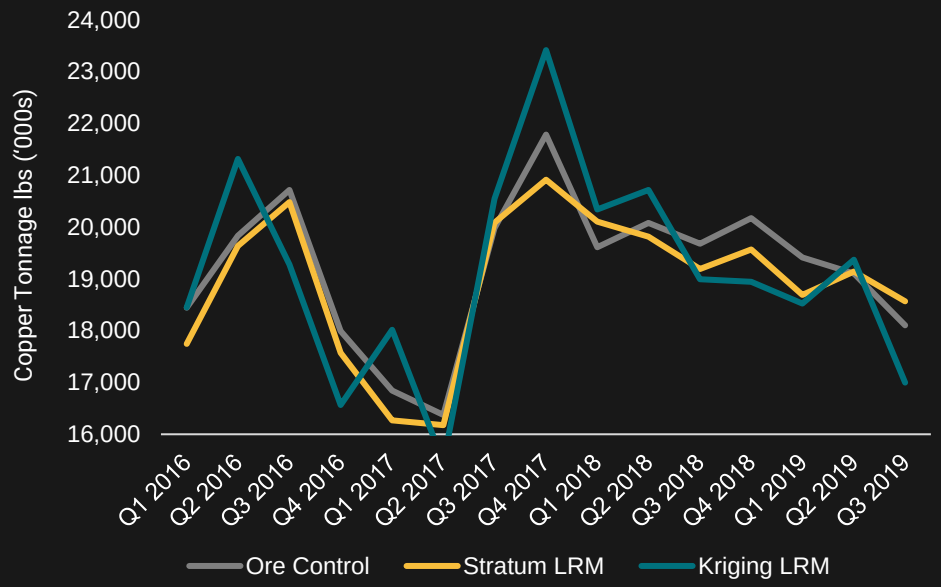
- Stratum's AI resource model was optimized for cutoff grades:
  LG = 0.13% HG = 0.18%
- The following table compares economic tonnage at various cutoffs with the same model

Results:

- Model has less tonnage deviation at every cutoff grade

Quarterly Tonnage Reconciliation

Higher accuracy on block-level translates into more accurate quarterly tonnage forecasting



Method (quarterly F1 reconciliation):

- Tonnage = sum(block | block > cutoff)
- The graph shows the percent tonnage deviation between prediction and blastholes per quarter for 16 quarters

Results:

- 58% less average quarterly tonnage deviation

Summary

1	What is the exact grade of a block?	AI model determines exact grade of any block with 20% higher accuracy
2	Is a block ore or waste?	AI model has 15% higher precision, leading to 19% higher grade in short-term stockpile (+$4.3M/yr profit).
3	What is the expected tonnage of mineable areas?	AI model predicts quarterly tonnage with 58% less deviation, leading to more reliable revenue forecasting.