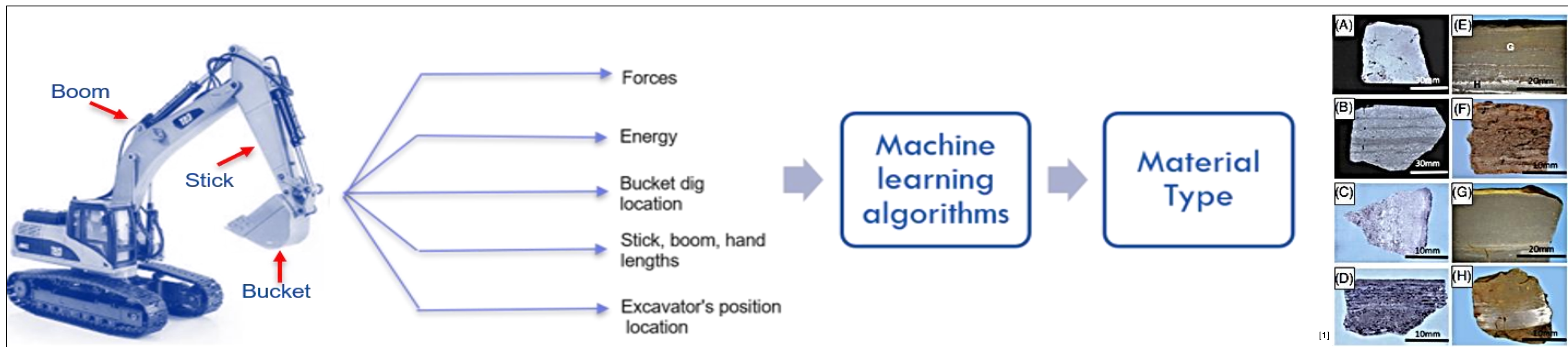


Inference of Geological Material Groups Using Structural Monitoring Sensors on Excavators

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Research Question

Material property directly relates to ore quality assessment and downstream processing. Operators commonly observe that the digging effort is related to mechanical properties of the material being dug.

- Can material type be inferred from digging effort measurements?
- Can digging effort be inferred based on prior knowledge of material type?

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Conference

The 34th Australasian Joint Conference on Artificial Intelligence

More information

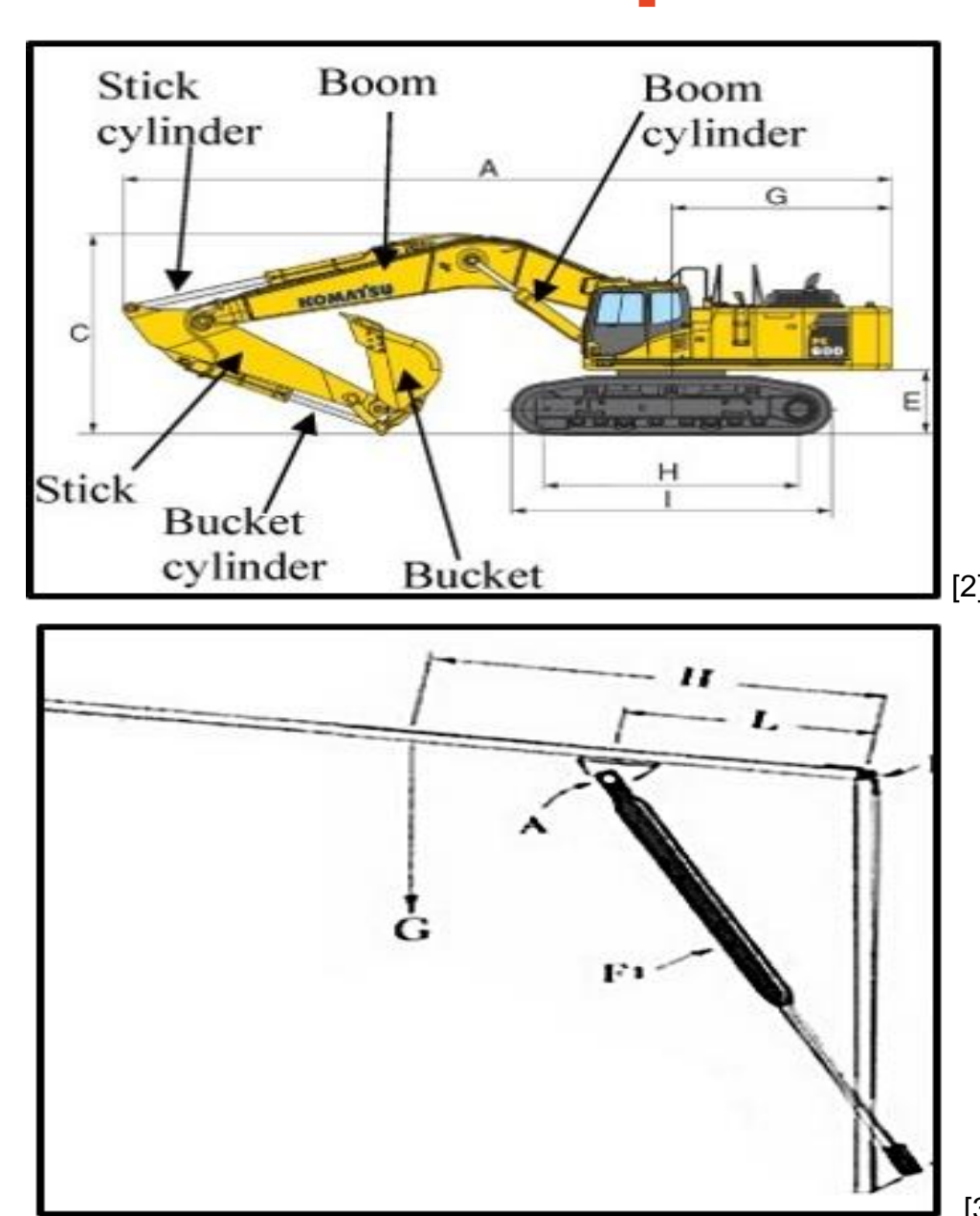
Contact Name

liyang.liu@sydney.edu.au

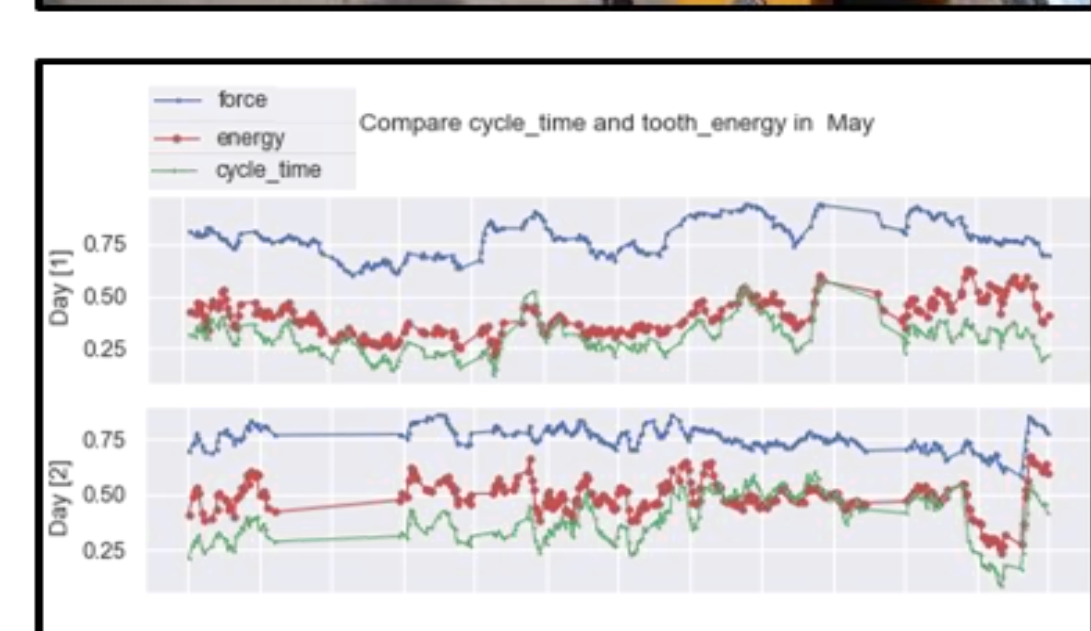
Website

<https://www.sydney.edu.au/engineering/our-research/robotics-and-intelligent-systems/australian-centre-for-field-robotics/mining.html>

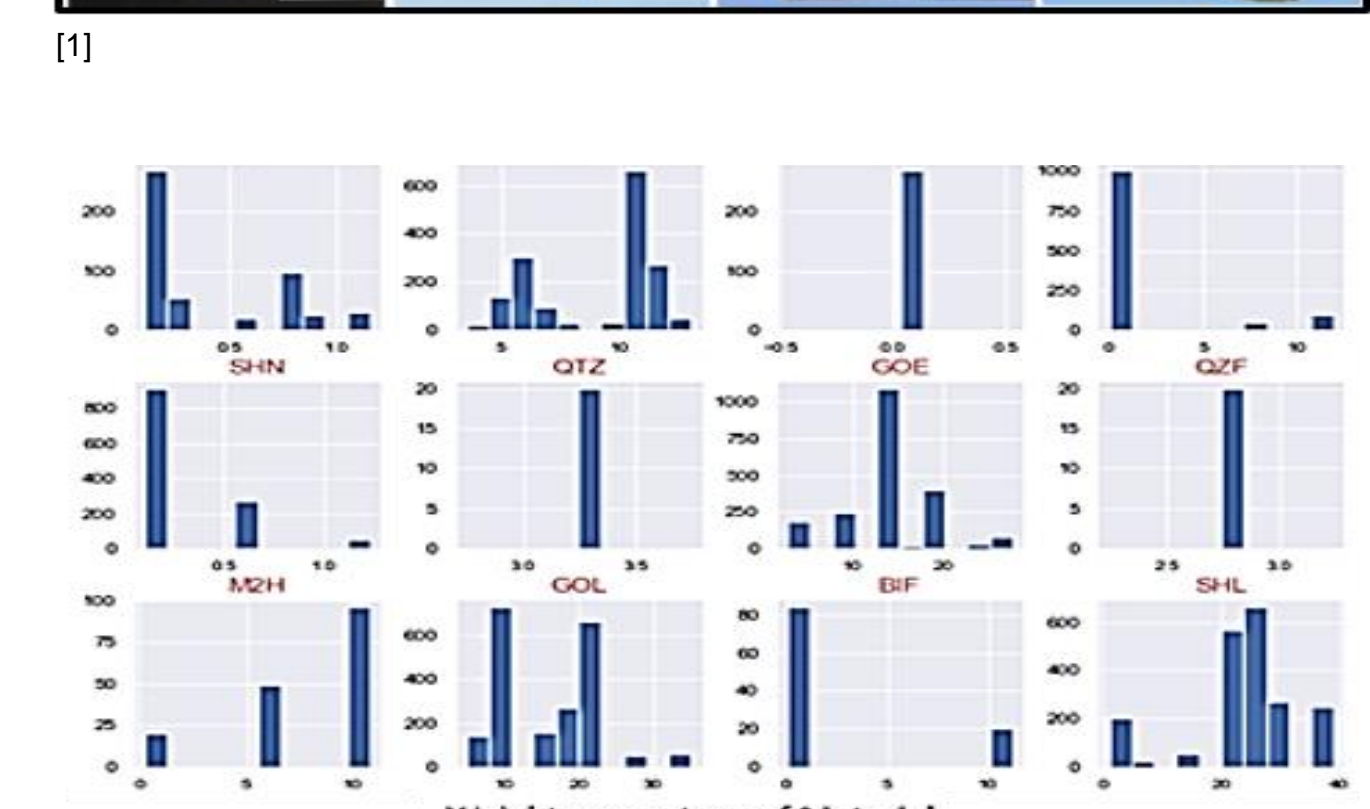
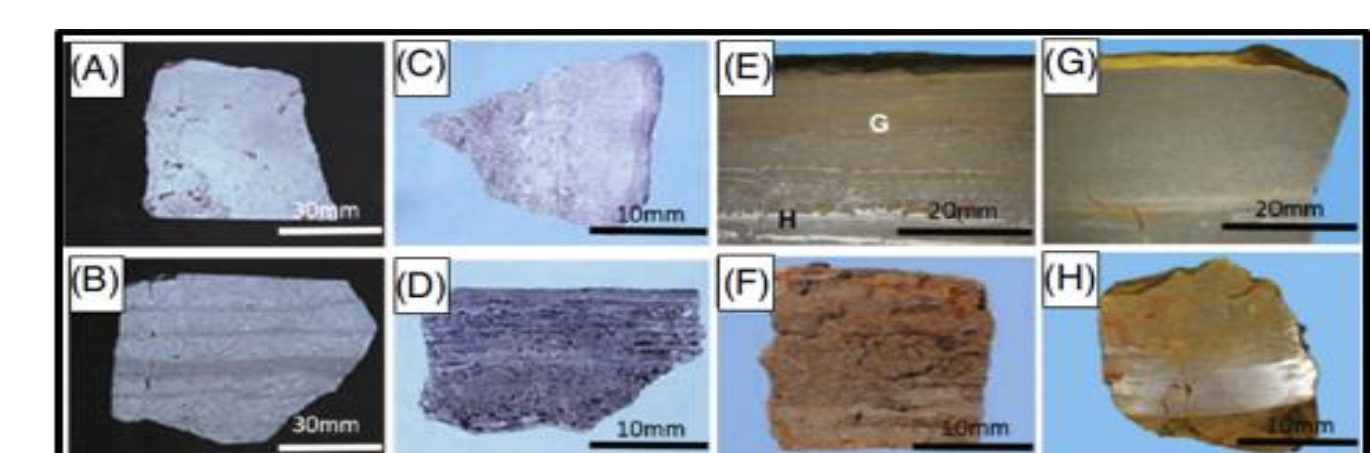
Data Description



Kinematic data
Stick/boom/bucket lengths



Strain Gauge data
Force, energy, payload

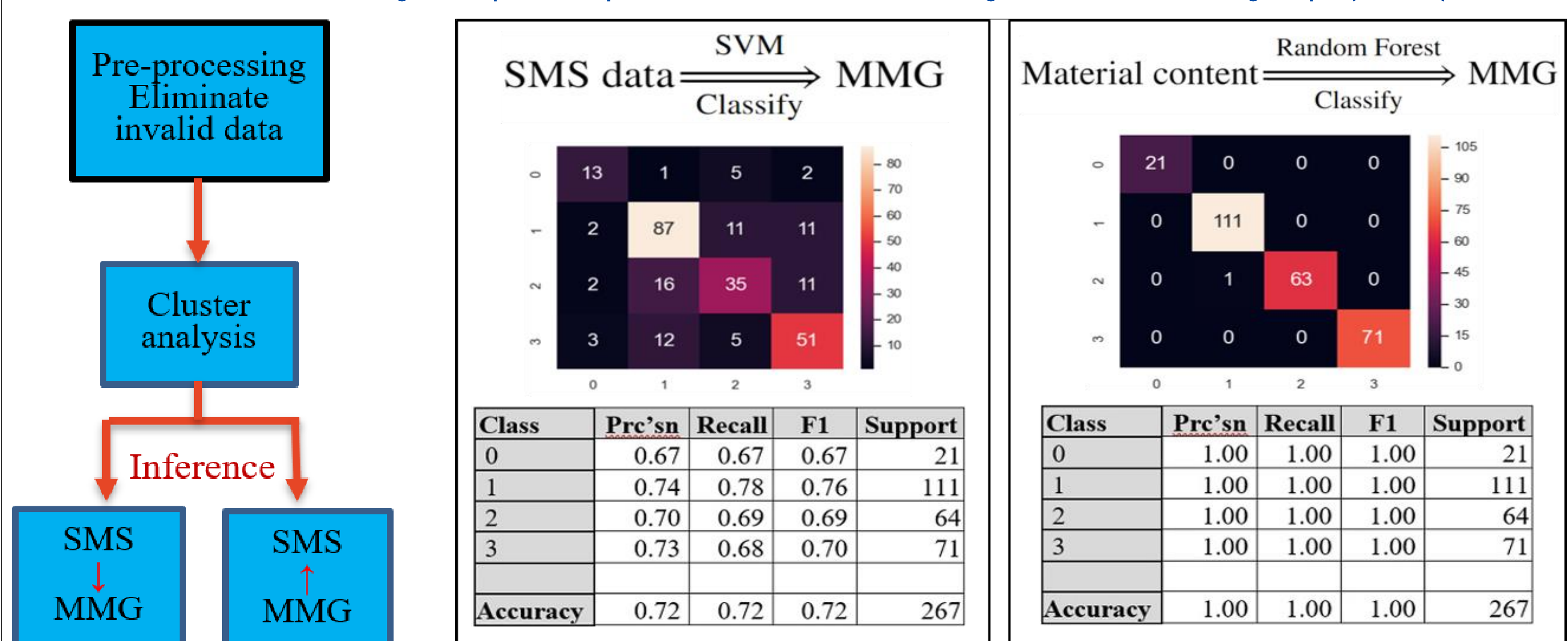


Material Log data
Material type and content percentage

Two-way Inference

Instead of naively classifying features down to MG level, we propose a novel super-sample based SMS clustering method:

- Form super SMS sample based each MG, feature values are group mean
- Perform K-means clustering on super sample and arrive at four categories of material groups (MMG).



Conclusion

Demonstrated a proof-of-concept study for a novel approach to infer the material group using the SMS sensor data of diggers during mining.

Conducted two-way classification with accuracy of 72% and 100% respectively.

The promising results suggest our approach is worth further investigation on bulk material identification.

Reference
[1] J. Clout et al, "Mineralogical, chemical, and physical metallurgical characteristics of iron ore", Iron Ore, 2022
[2,3,4] miscellaneous images from the internet