

Project experience 3

30 April 2021

EU H2020 project “A Human-centred Internet of Things Platform for the Sustainable Digital Mine of the Future”

Research directions (mature methods in the market)

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Route 1:

Use long-term datasets and RNN to learn information for early warning, while using the post-warning short-term data sets to analyse survival probability in real-time.

Current situation:

Proof of the concept of the baseline model.

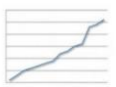
Route 2:



Use CNN in processing radar image datasets to obtain multi-dimensional (time&space) hazard prediction in the mining scenarios.

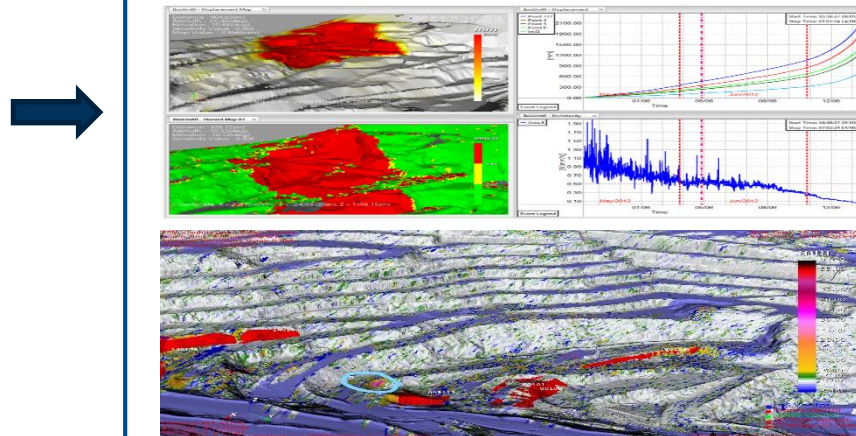
Current situation:

The baseline model is developed.

Titania radar system and its capabilities

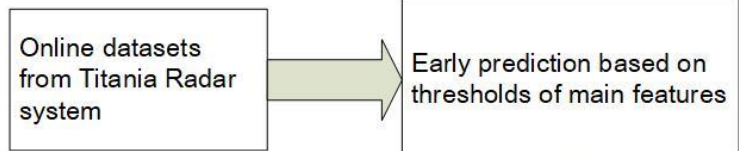
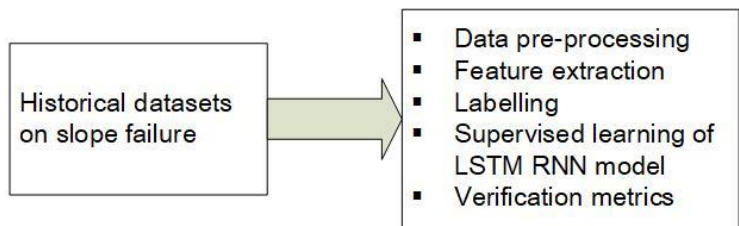
	Long datasets	IBIS Guardian can manage long datasets (year worth of data) useful to keep track of the rock mass behaviour and perform geotechnical back-analysis.
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	High spatial Resolution	Our radar resolution (i.e. 0.5m x 4.4m resolution cell at 1 km) refers to the smallest physical detectable area on the slope, ensuring the user has full confidence that they will not miss any movements at any scale. The high spatial resolution makes it possible to cover the full extent of slope hazards, from sub-bench to overall slope displacements.
	Long operating range: 10m to 4.000m	Long operating range and extremely broad coverage, enabling full coverage of the pit slopes from a single installation site. Remote monitoring distance obviates the need to move the system for blasting or pit operations.



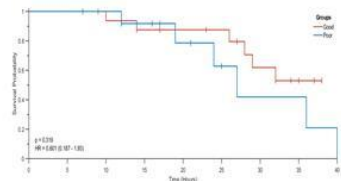
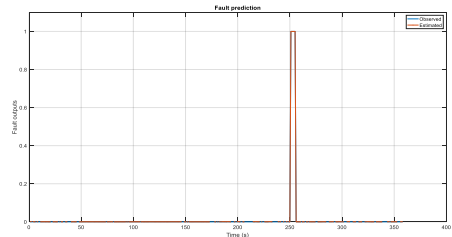
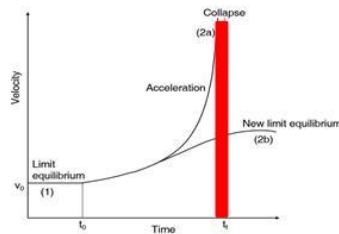
Methods & baseline models: slope failure analysis (Route 1)

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Survival analysis is triggered after early warning

- Update feature store
- Retrain the model



The datasets requirements

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- **The targets / continuous integrations& deployment** from Titania.
- **Data-Driven:** The back-end algorithms are based on time series prediction/estimation, therefore **sensor and radar sampling datasets** are essential, and **continuity and data volume** need to be guaranteed for the utmost benefits of the adopted methods.
- **Human-Centred :** Event record surrounding **employees** in the mining scenarios (**key statistics, expert ratings on key operations, performance indicators, safety indicators...**) etc.

The advantages/benefits

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- A set of software/applications/evaluations applicable in mining industry;
- Top publications – Nature/Nature Geoscience/Nature ML/PNAS;
- The worldwide advertising/promotion of Dig_IT, Titania, and Brunel with high impact.

Thank you!