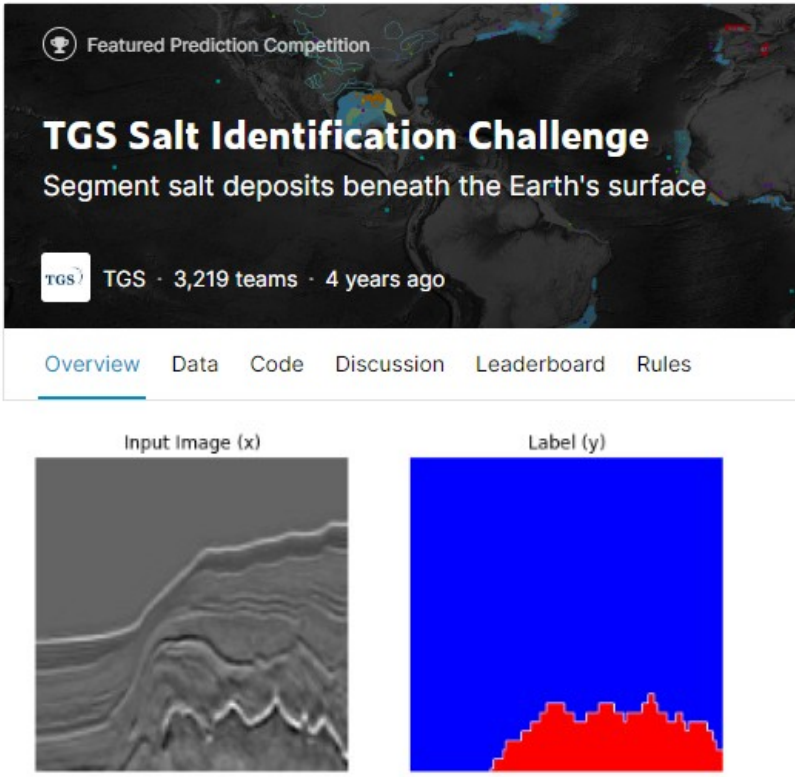
Explainable-Christmas

Marcos Jacinto - Madrid - Geowellex
Edwin Brown - UK - Optic Earth

Intro to Idea

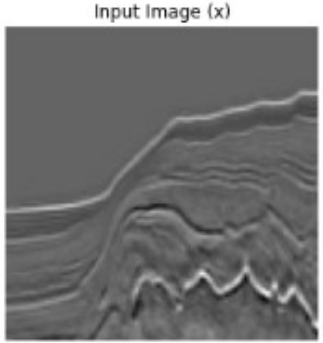


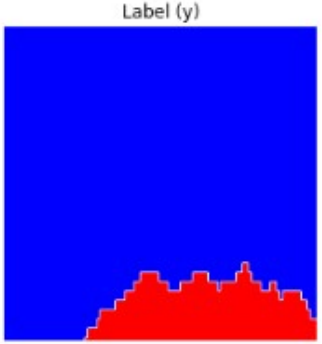
We used the **TGS Salt Identification Challenge data** along with a **U-Net model** trained from scratch using Tensorflow's library.

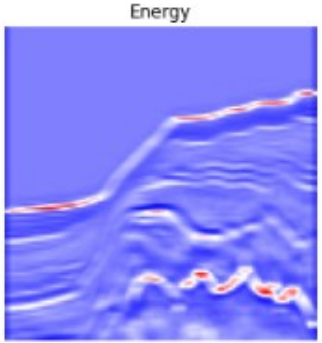
Seismic attributes were created from the seismic data.

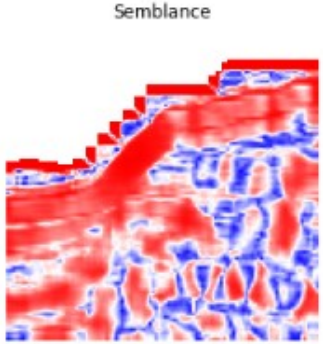
Finally, we used **Shap library** to **calculate SHAP values** and obtain a measure of how important each feature (seismic data and attributes) is.

Attribute Generation









A set of **seismic attributes** were calculated from the original seismic section using the **Bruges library.**

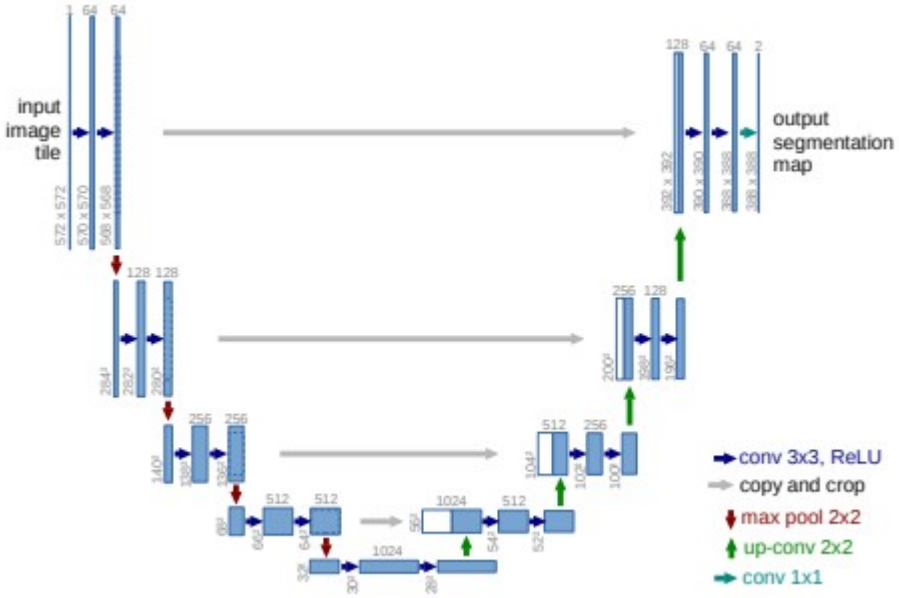
Salt often has a different seismic character compared with other type of geological structures. Therefore, seismic attributes could offer some useful input features.

Model Summary

We used a **U-Net model** trained from scratch using Tensorflow's library.

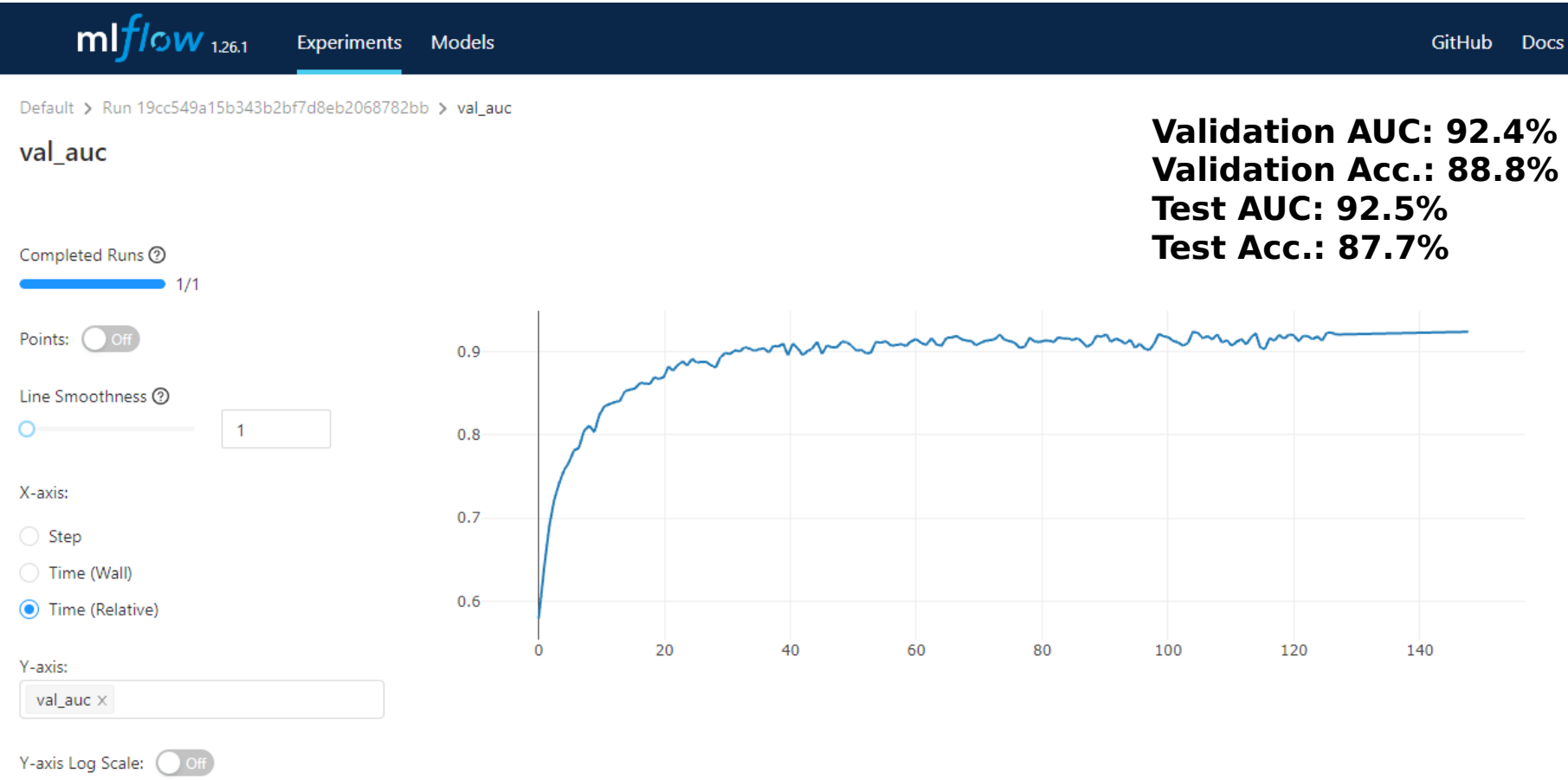
During training, we used two NVIDIA GPUs* from the provided cluster.

*Thanks NVIDIA!

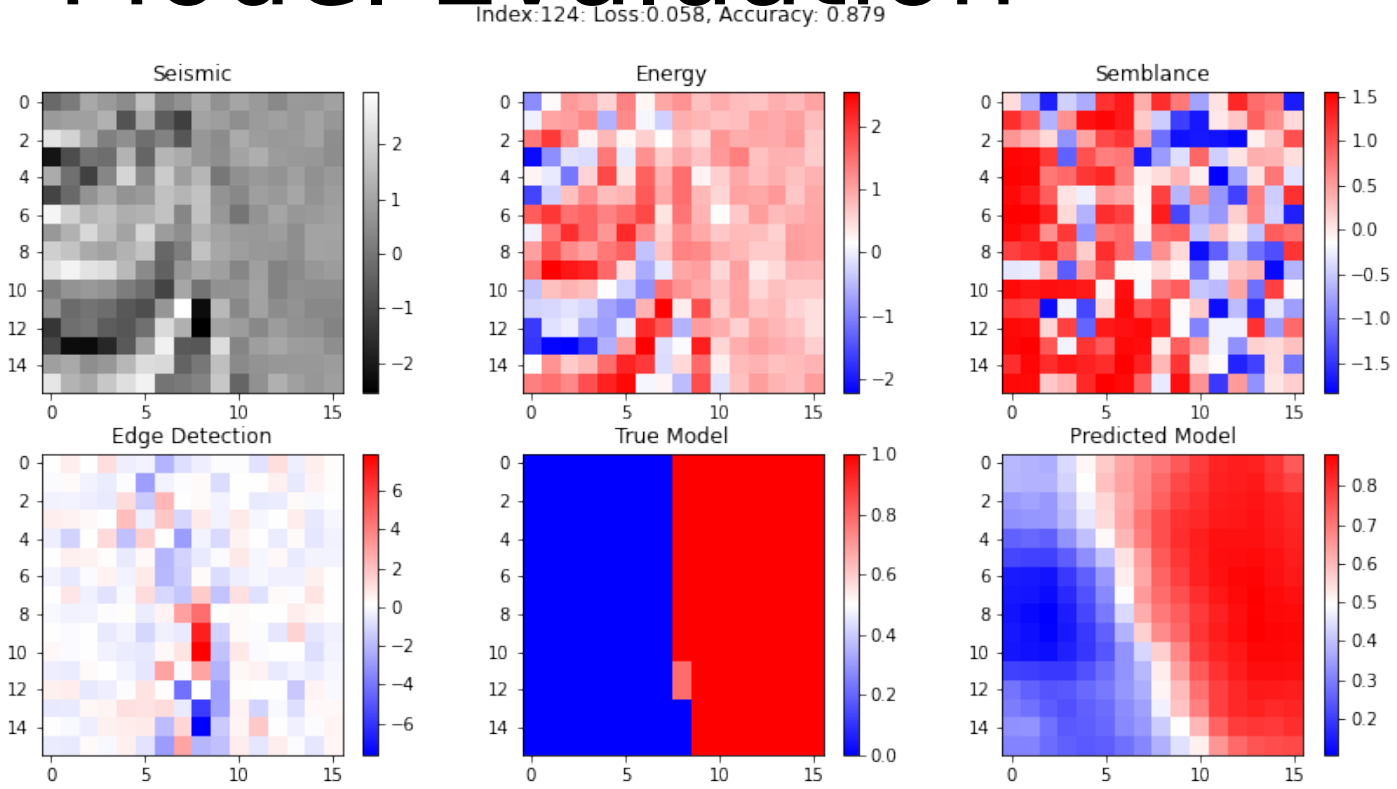


Ronnerberger et al. (2015)

Model Training

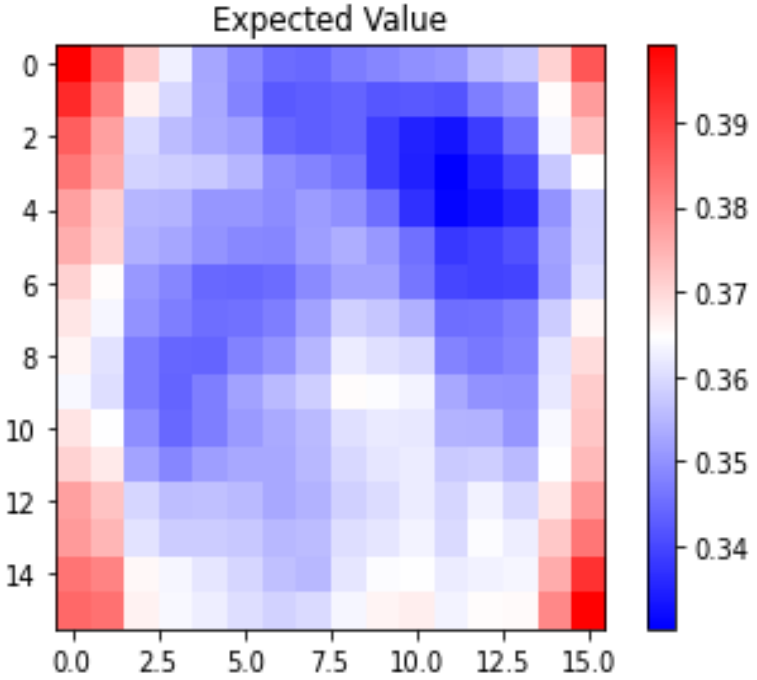


Model Evaluation

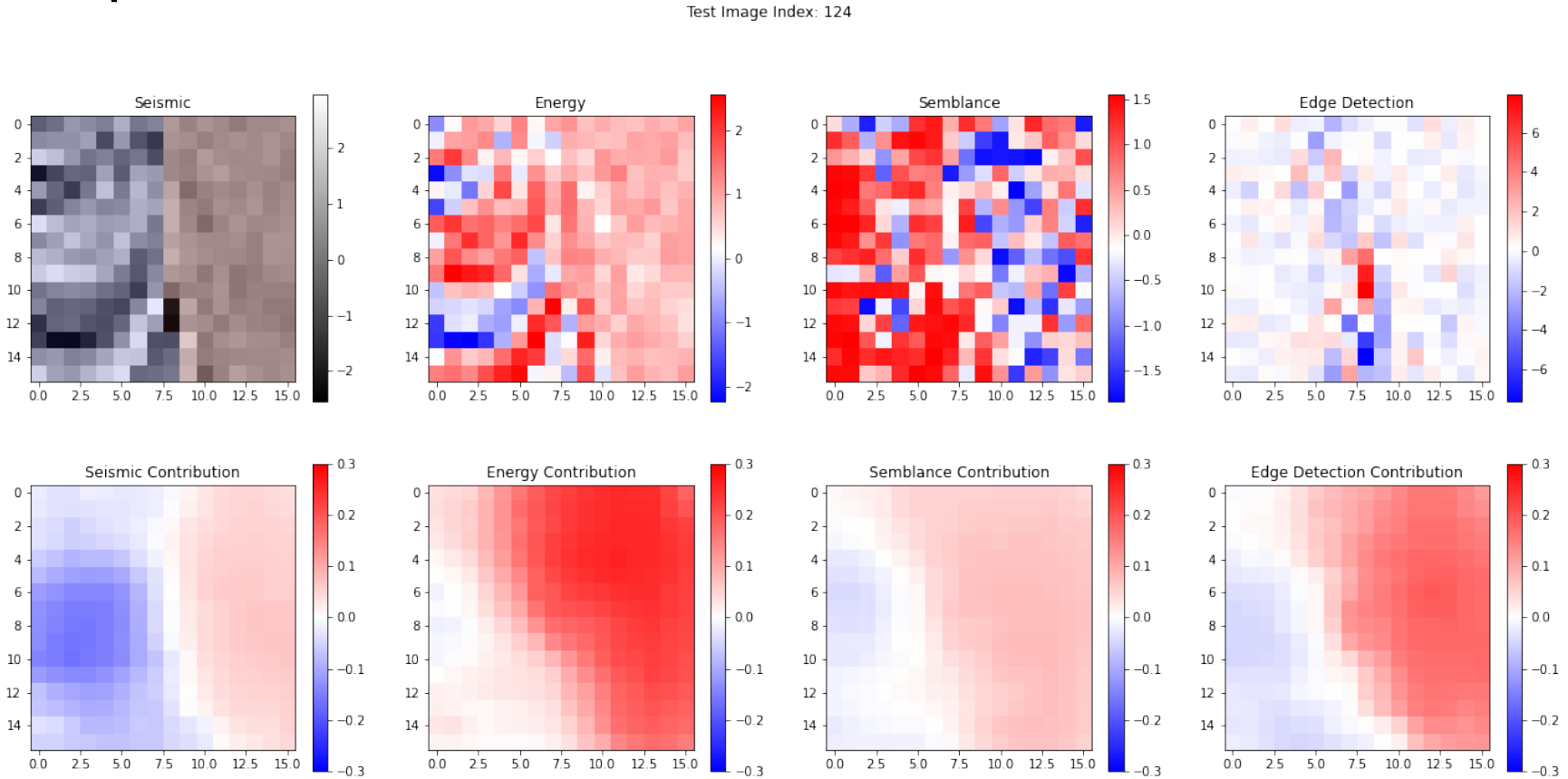


We had to reduce samples to 16x16

Shap Evaluation

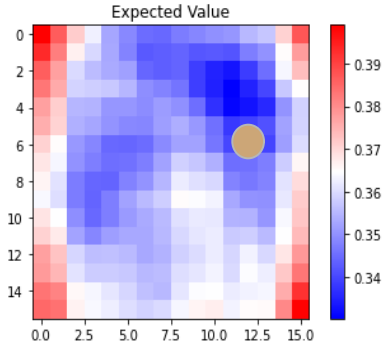


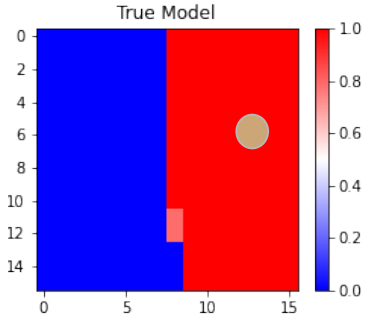
Shap Evaluation

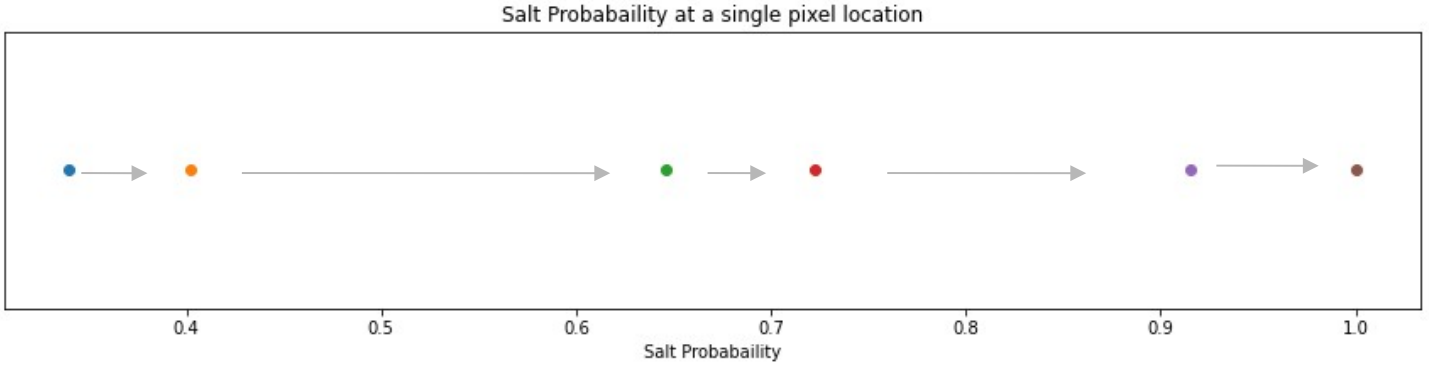


Shap Evaluation

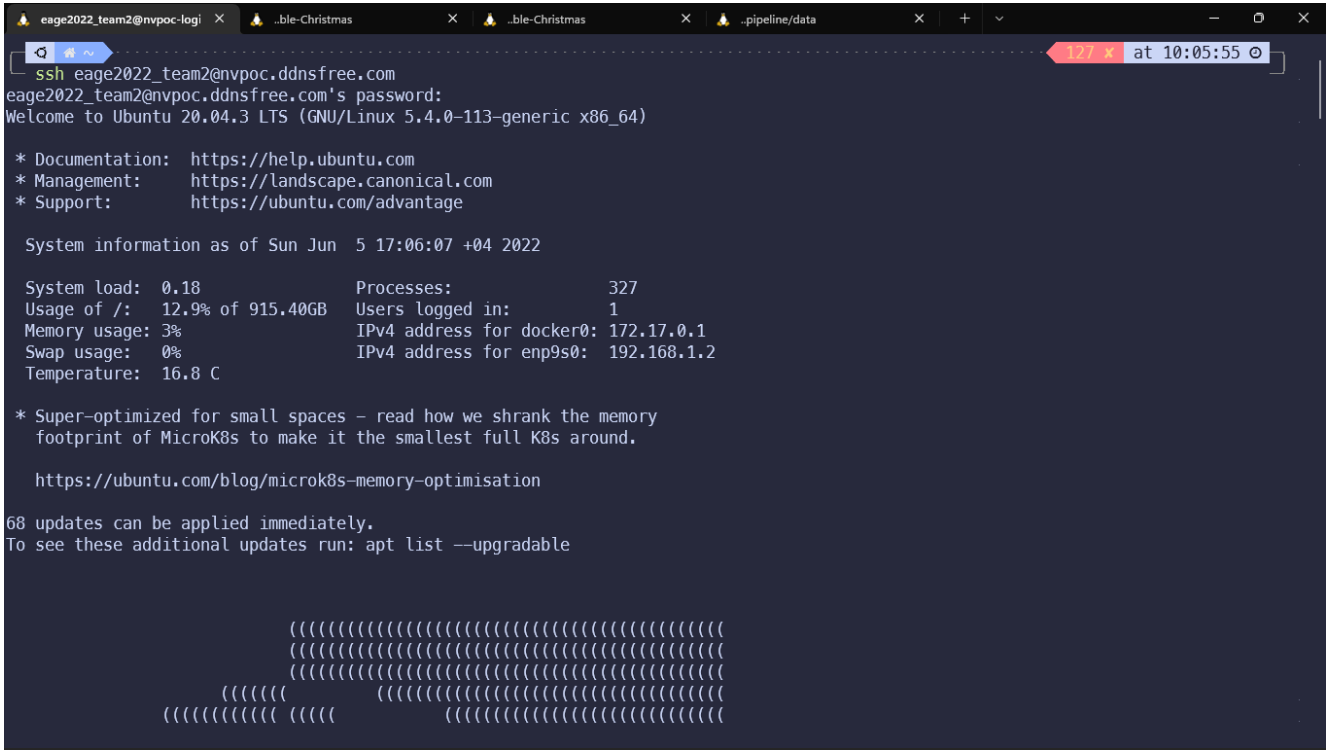
- Expected Value
- EV + Seismic
- EV + Seismic + Energy
- EV + Seismic + Energy + Semblance
- EV + Seismic + Energy + Semblance + Sobel
- Prediction
- Truth







Challenges



- Computing the SHAP values **isn’t optimized yet to GPUs**: had to reduce samples to 16x16

- Using NVIDIA’s cluster

Conclusions & Further Work

Using SHAP to explain allowed us to:

- Evaluate possible biases: all the attributes and the seismic data contribute to the predictions;
- Complete data-driven approach;

Next steps:

- Optimize a few parts of the code so it runs faster;
- Reproducible pipeline and experiment tracking.

Food for thought. .

“Deep learning also makes problem-solving much easier, because it completely automates what used to be the most crucial step in a machine learning workflow: feature engineering. “

Francois Chollet, Deep Learning with Python, 2021