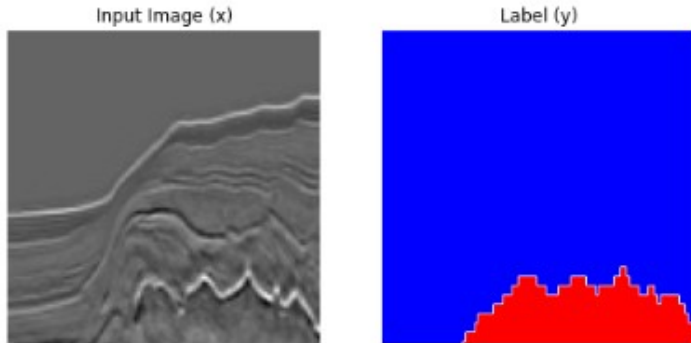
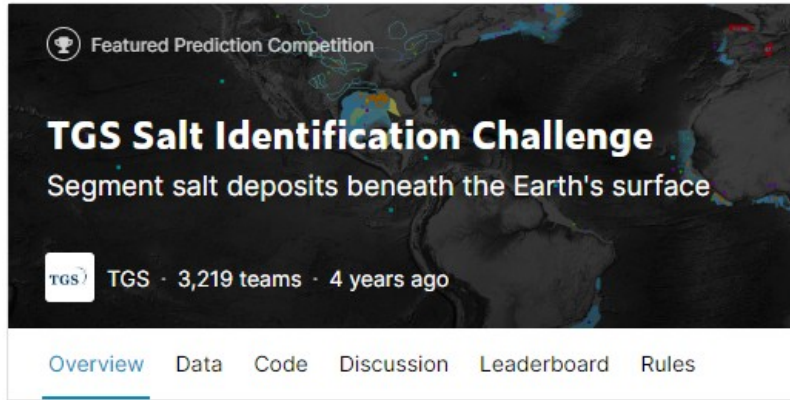


Explain- able- Christm as

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



Intro to Idea

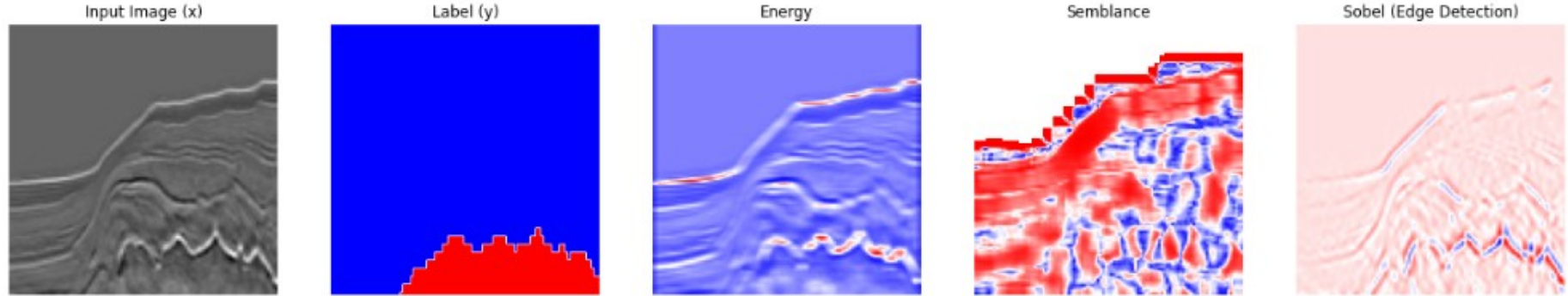


We used the **TGS Salt Identification Challenge data** along with a **U-Net model** trained from scratch using Tensorflow's library.

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**.

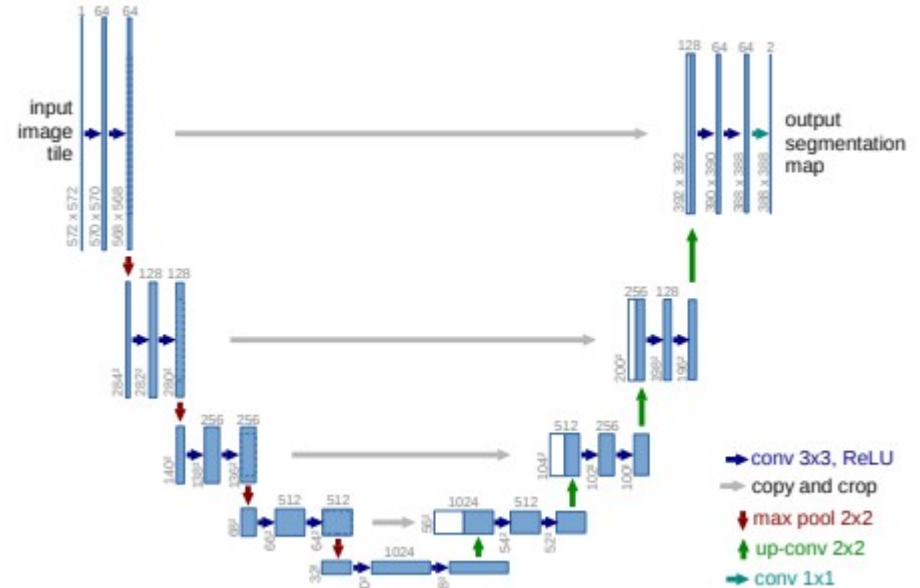
Salt often has a different seismic character compared with other type of geological structures. Therefore, seismic attributes could offer some useful input features.

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!



Ronneberger et al. (2015)

Model Training

mlflow 1.26.1

Experiments

Models

GitHub Docs

Default > Run 19cc549a15b343b2bf7d8eb2068782bb > val_auc

val_auc

Completed Runs ②

1/1

Points: ☐ Off

Line Smoothness ②

1

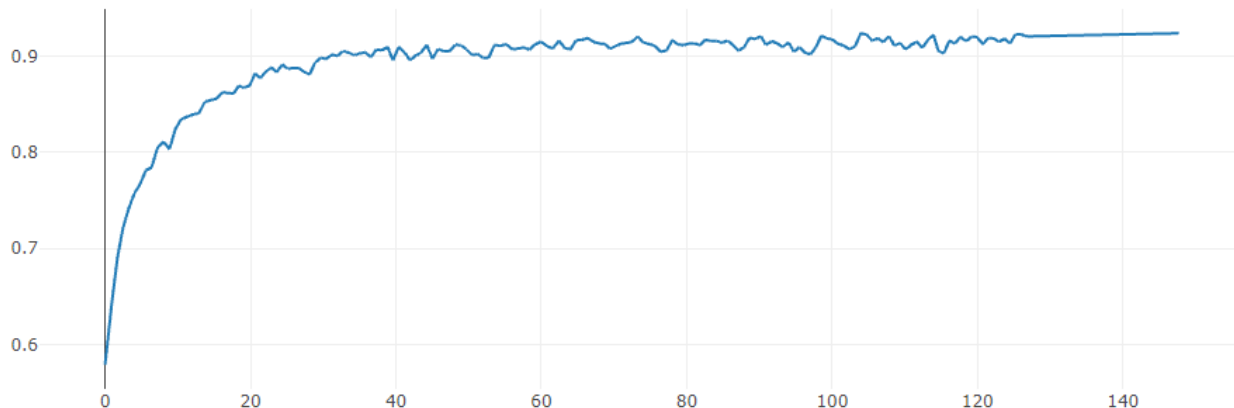
X-axis:

- ☐ Step
- ☐ Time (Wall)
- ☒ Time (Relative)

Y-axis:

val_auc x

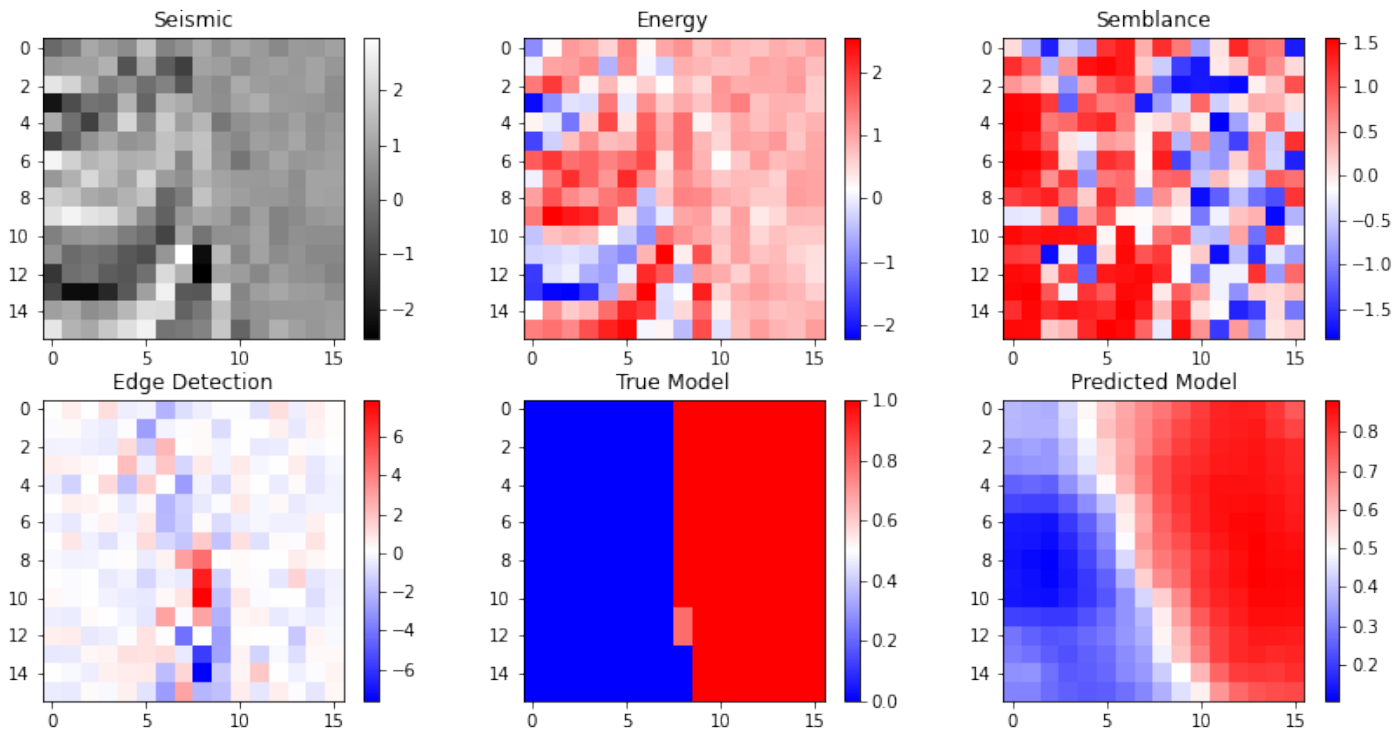
Y-axis Log Scale: ☐ Off



Validation AUC: 92.4%
Validation Acc.: 88.8%
Test AUC: 92.5%
Test Acc.: 87.7%

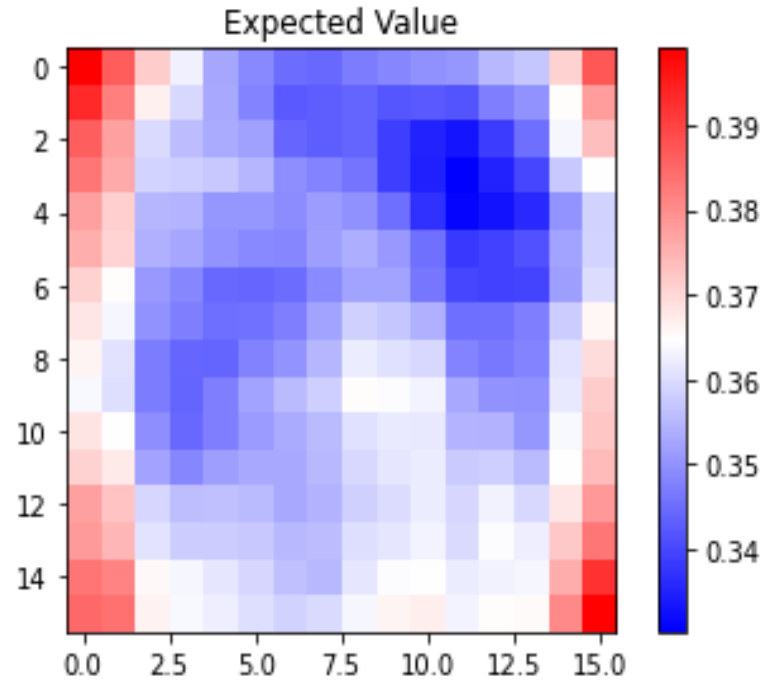
Model Evaluation

Index:124: Loss:0.058, Accuracy: 0.879



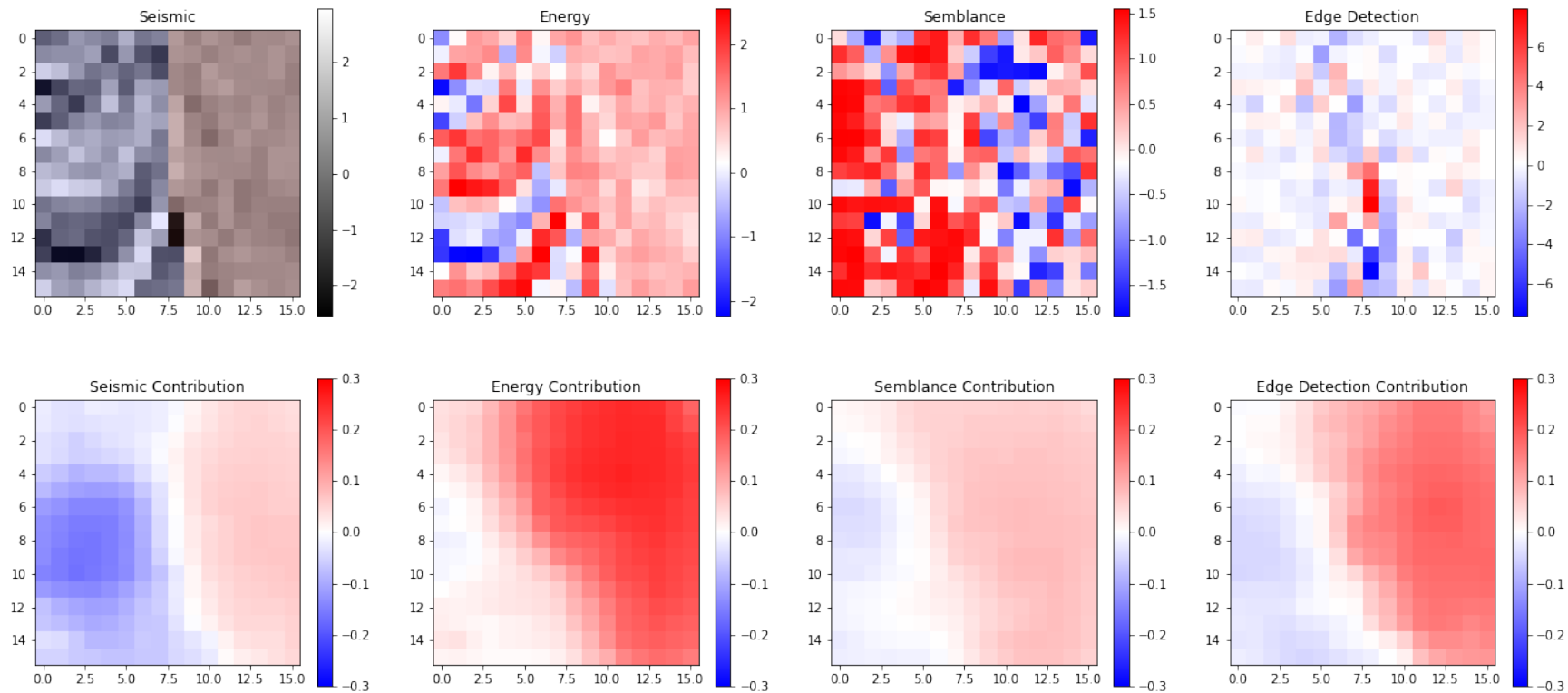
We had to reduce
samples to 16x16

Shap Evaluation



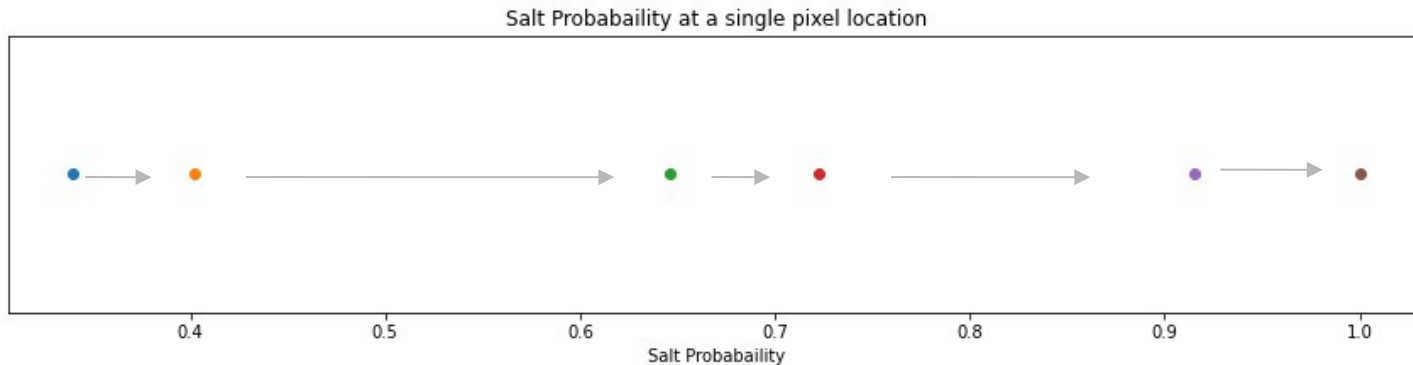
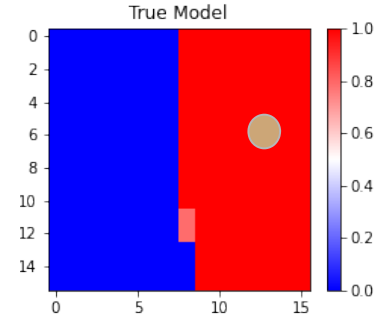
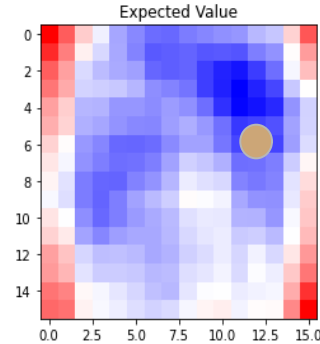
Shap Evaluation

Test Image Index: 124



Shap Evaluation

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



Challenges

```

age2022_team2@nvpoc-logi X _ble-Christmas X _ble-Christmas X _pipeline/data X + v
ssh eage2022_team2@nvpoc.ddnsfree.com 127 x at 10:05:55
eage2022_team2@nvpoc.ddnsfree.com's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-113-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Sun Jun  5 17:06:07 +04 2022

System load:  0.18           Processes:            327
Usage of /:   12.9% of 915.40GB   Users logged in:     1
Memory usage: 3%             IPv4 address for docker0: 172.17.0.1
Swap usage:   0%             IPv4 address for enp9s0: 192.168.1.2
Temperature: 16.8 C

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.

   https://ubuntu.com/blog/microk8s-memory-optimisation

68 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

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```

- 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