ML Assisted Search for Lunar Anomalies

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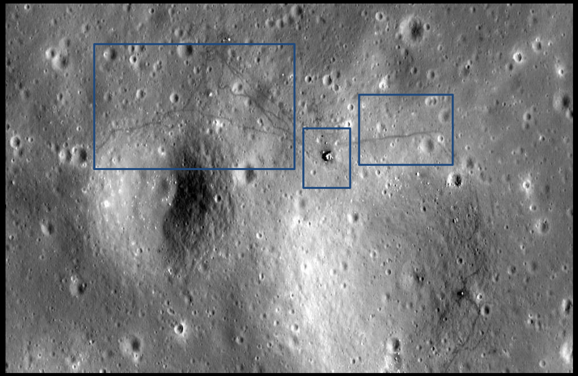
Idea:

train a **machine learning model on known technosignatures** on the Moon with the goal to search for other (non-) natural anomalies, using high-resolution imagery (LRO Narrow Angle Camera - NAC)



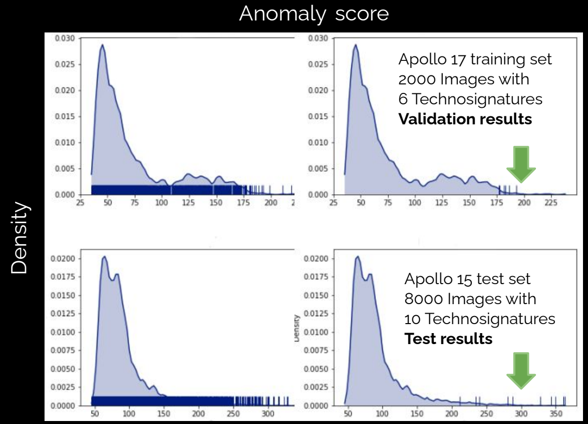
Apollo 12 Landing Site and Tracks **(NAC image)**

First results:

We trained a model on an Apollo 17 NAC data set, and then applied it to a Apollo 15 NAC test set.

All technosignatures were identified with high anomaly scores.

Lesnikowski, Bickel & Angerhausen, NeurIPS, 2019



Methods:

besides providing **bulk data download APIs** for lunar data and **data augmentation methods** for this highly imbalanced dataset, we used *deep neural network* (DNN) and *variational autoencoder* (VAE) architectures

sample walk through the learned latent variable space

Conclusions and Next steps:

The prototype presented here scores in efficiency over manual vetting (EoMV) between 50 and 110, an **increase by orders of magnitude.** With the support of a *Google Cloud Platform Education Program Grant* our next steps will be:

(1) to **improve upon** the promising results of our early **prototype** and
(2) to extend our analysis to **the whole lunar surface** that has available NAC data