Week 1

Mining Asset Detection (MAD)

Getting to know the tooling

- QGIS
- Google Earth Engine
- Trying to get R to work
- Google Drive vs. git setup

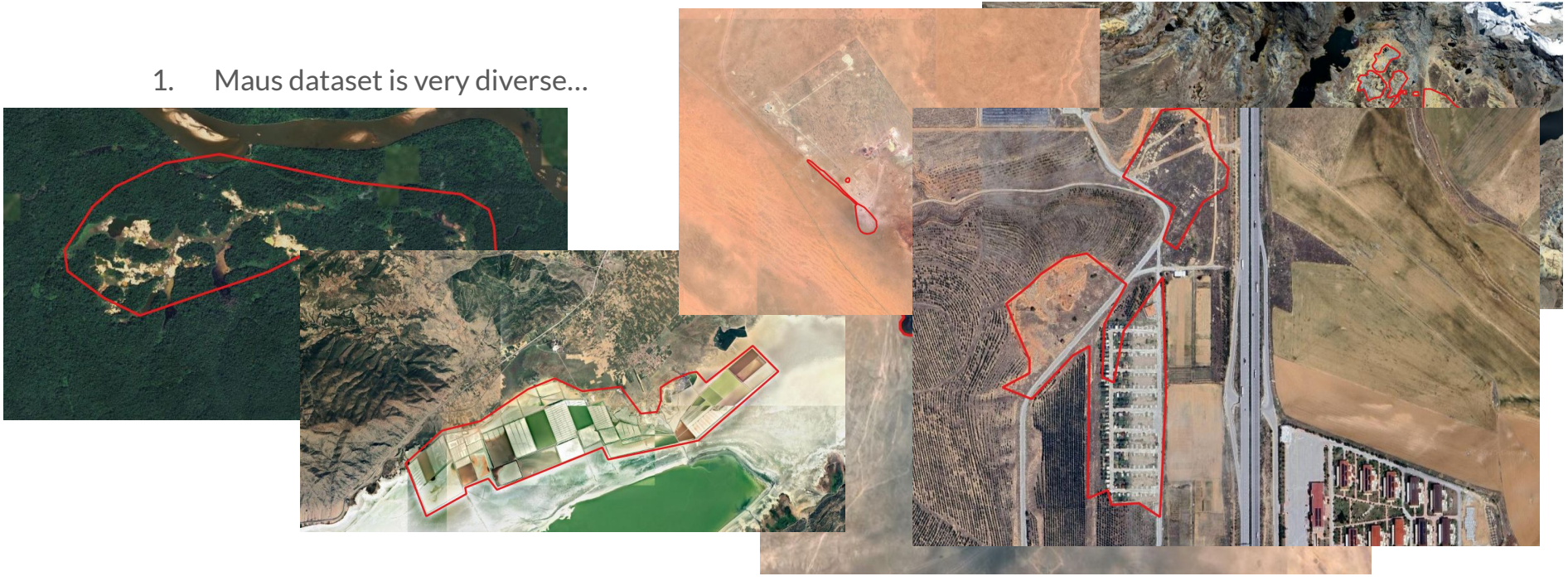
Playing around with features - Methodology

- Trial and error to try to detect common patterns.
  - Generate a Lasso regressor for subset of images
  - Look at coefficients
  - Check images for patterns
  - More in the demo

- **Not yet any real evaluation of how well the regressor performs, just exploration**

Playing around with features - Learnings

1. Maus dataset is very diverse…

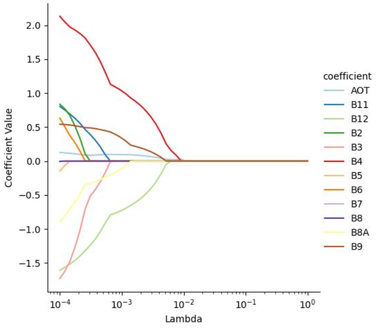


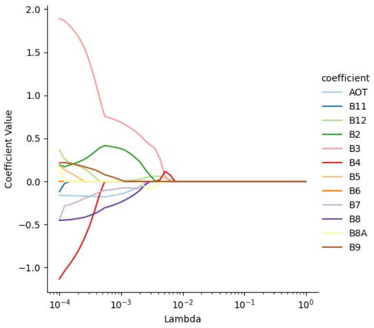
Playing around with features - Learnings

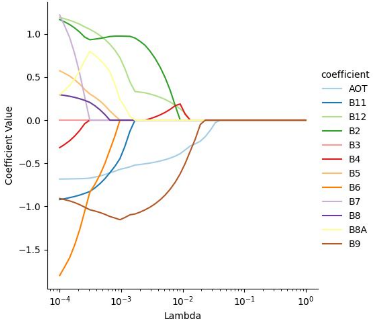
1. Maus dataset is very diverse…
2. To have a solid ground truth we might need to preprocess images further…

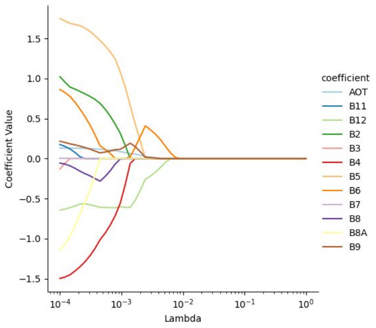
Playing around with features - Learnings

1. Maus dataset is very diverse…
2. To have a solid ground truth we might need to preprocess images further…
3. Current Lasso approaches struggle with predicting dominant channels…









Thoughts on how to use Lasso

- Instead of using a “binary” ground truth (either inside Maus polygon or outside)
  - Use a confidence value as y, derived from using a gaussian Kernel (or something else) on the images
- Diversify the used pixels.
  - Instead of polling all pixels from multiple images, poll the same amount of pixels from more images
- Use the proposed extension (combination of channels)
  - Wouldn’t Lasso pick up on these good patterns anyways?
- Instead of using vanilla Lasso use and stochastic gradient descent
  - Enables incremental learning (Lasso runtime comes at its limit with 100 images ≈ 25million pixels ≈ 26G)
- Use different Lassos based on different characteristics?
  - Based on regions (metadata), image characteristics, seasonalities?

How to continue

- Try to tweak Lasso further (as described on previous slide) and perform larger learning runs
  - Right now mostly in range 10-100 images (3min - 45min duration)
  - Start evaluating the results on a test set
- Think about alternative approaches:
  - SIFT like object detection
- Look more at what others have done/found out.

Recent progress in **object detection** in **satellite imagery**: A review
K Bhil, R Shindihatti, S Mirza, S Latkar, YS Ingle… - … : Select Proceedings of …, 2022 - Springer
… [6] put forth an **object detection** technique for **satellite imagery** comprised of Convolutional … categorizing target **objects** and non-target **objects** in an **imagery**. In this **object detection** system…
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[HTML] Swin-transformer-enabled YOLOv5 with attention mechanism for small **object detection** on **satellite images** [HTML] mdpi.com
H Gong, T Mu, Q Li, H Dai, C Li, Z He, W Wang, F Han… - Remote Sensing, 2022 - mdpi.com
… strengthening **object detection** performance in **satellite images** to respond to the above challenges. In addition, as the **satellite image object detection** tends to be real-time, the **detection** …
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[HTML] Automatic target **detection** from **satellite imagery** using machine learning [HTML] mdpi.com
A Tahir, HS Munawar, J Akram, M Adil, S Ali… - Sensors, 2022 - mdpi.com
… In this research paper, we are going to address the **object detection** problem in **satellite imagery**. **Object detection** in **satellite imagery** has its own challenges and its own plan of action to …
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A hierarchical **object detection** method in large-scale optical remote sensing **satellite imagery** using saliency **detection** and CNN [PDF] tandfonline.com
Z Song, H Sui, L Hua - International Journal of Remote Sensing, 2021 - Taylor & Francis
… , focusing on the **object detection** process around the large-scale optical RS **images**, this … via a hierarchical region extraction and **object detection** framework (as illustrated in Figure 2). …
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[HTML] Building footprint extraction and counting on very high-resolution **satellite imagery** using **object detection** deep learning framework [HTML] springer.com
W Nurkarim, AW Wijayanto - Earth Science Informatics, 2023 - Springer
… intend to **detect** and count buildings in **satellite imagery** using WorldView-3 by integrating the partitioning segmentation and convolutional neural networks (CNN) based **object detection** …
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Demo