

Journey to Mars

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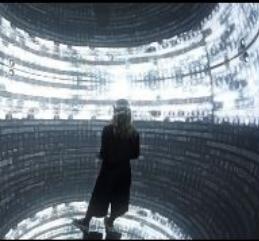
Content

- idea
- what we have done
- creating a database
- training
- generating new images
- results

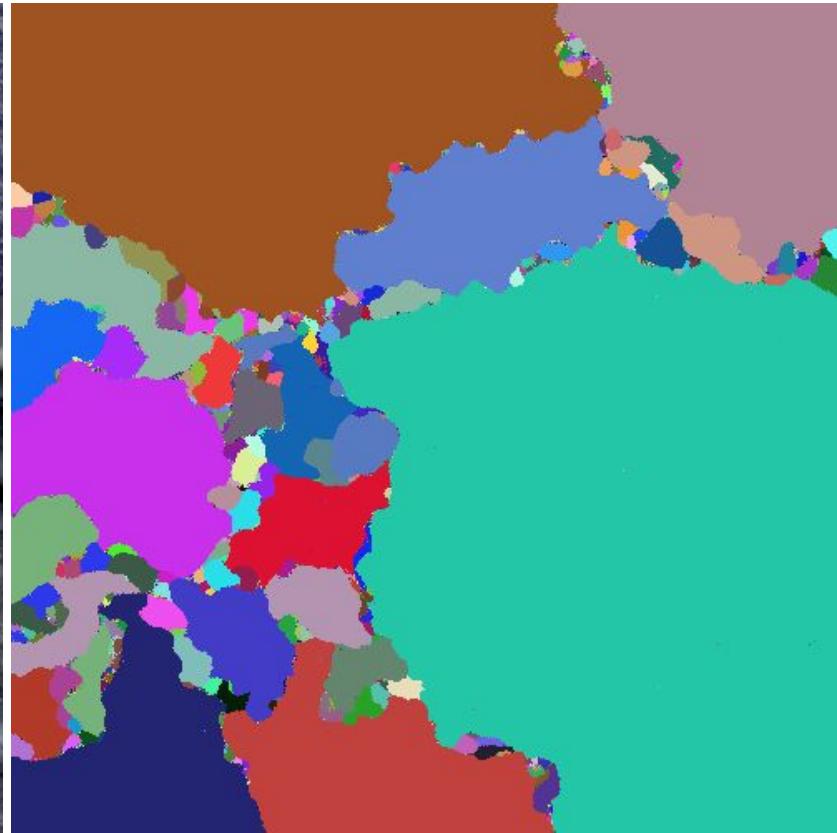


Idea

- inspiration from [Refik Anadol](#)
- train a stylegan model with images from mars
- create some short animations movies



What we have done

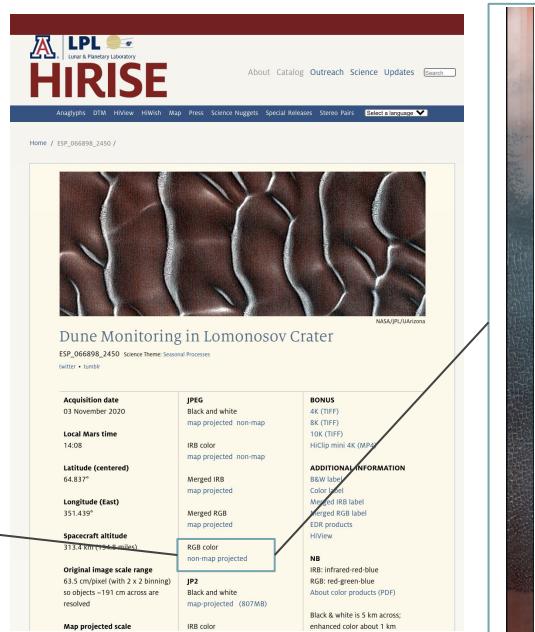
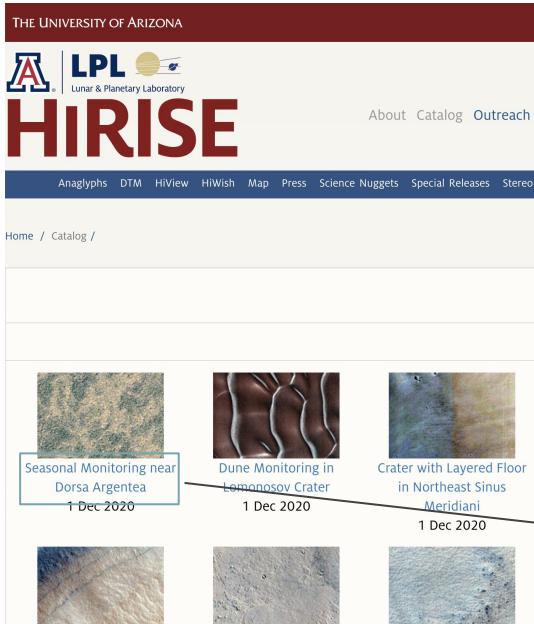


finding website > Twitter Anadol
Refik > hirise.org > [other datasets](#)

[webscraper.io](#) > new sitemap >
Tabelle.csv

[image-downloader.py](#) > crop
images > [dataset-tools.py](#) > 2

Generating Database Mars



Page 1 of 2,801 (67,223 images)

- + Advantages
- + regularly updated
- + over 65'000 High Quality pictures (512 x 4000-10'000px)
- + free
- + easy to scrape

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Generating Database Mars

Start URL

[https://www.uahirise.org/catalog/index.php?page=\[201-245\]](https://www.uahirise.org/catalog/index.php?page=[201-245])



ID	Selector	type	Multiple	Parent selectors
id1	.catalog-cell-images a.cells	SelectorLink	yes	_root

Sitemap finally ▾ Create new sitemap

Selectors Selector graph Edit metadata Scrape Browse Export Sitemap Export data as CSV

```
{"_id": "finally", "startUrl": ["https://www.uahirise.org/catalog/index.php?page=[201-245]"], "selectors": [{"id": "id1", "type": "SelectorLink", "parentSelectors": ["_root"], "selector": ".catalog-cell-images a.cells", "multiple": true, "delay": 0}, {"id": "id2", "type": "SelectorLink", "parentSelectors": ["id1"], "selector": ".product-text-beta a:nth-of-type(4)", "multiple": true, "delay": 0}]}{ "_id": "finally", "startUrl": ["https://www.uahirise.org/catalog/index.php?page=[201-245]"], "selectors": [ { "id": "id1", "type": "SelectorLink", "parentSelectors": [ "_root" ], "selector": ".catalog-cell-images a.cells", "multiple": true, "delay": 0 }, { "id": "id2", "type": "SelectorLink", "parentSelectors": [ "id1" ], "selector": ".product-text-beta a:nth-of-type(4)", "multiple": true, "delay": 0 } ] }
```

1. Install plugin webscraper.io from google
 2. open Developer Tools > WebScraper
 3. create new sitemap
 4. define start url and name in metadata
 5. select different elements and levels (f.ex last slide)
 6. scrape
 7. if scraping is done export csv (open in excel)
- + you can export sitemap and sent to your mate

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Generating Database Mars

				finally245-400
1	web-scrapr-order	web-scrapr-start-url	id1	id1-href
2	160625608-333	https://www.uahirise.org/catalog/index.php?/page/262	Possible Fan Deposits in Perier Crater	https://www.uahirise.org/ESP_058877_2000/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058877_2000/ESP_058877_2000.J2000.NOMAP/browse.jpg
3	1606251306-2277	https://www.uahirise.org/catalog/index.php?/page/306	Exposure of South Polar Layered Deposits	https://www.uahirise.org/ESP_058100_058195/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058100_058199/ESP_058100_058199.J2000.NOMAP/browse.jpg
4	1606256051-3271	https://www.uahirise.org/catalog/index.php?/page/265	Slope Survey	https://www.uahirise.org/ESP_058838_1800/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058838_1800/ESP_058838_1800.J2000.NOMAP/browse.jpg
5	1606253005-2929	https://www.uahirise.org/catalog/index.php?/page/279	Features of Upper Plains Unit in Deuteronilus Mensae	https://www.uahirise.org/ESP_058815_2258/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058815_2258/ESP_058815_2258.J2000.NOMAP/browse.jpg
6	1606254106-3038	https://www.uahirise.org/catalog/index.php?/page/274	Enigmatic Terrain Between Thyles Rupes	https://www.uahirise.org/ESP_058878_1088/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058878_1088/ESP_058878_1088.J2000.NOMAP/browse.jpg
7	1606251068-2175	https://www.uahirise.org/catalog/index.php?/page/310	Gusev Crater Mosaics	https://www.uahirise.org/ESP_058030_1645/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058000_058099/ESP_058030_1645/ESP_058030_1645.J2000.NOMAP/browse.jpg
8	1606256728-3302	https://www.uahirise.org/catalog/index.php?/page/283	Gully Monitoring	https://www.uahirise.org/ESP_058857_3130/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058857_3130/ESP_058857_3130.J2000.NOMAP/browse.jpg
9	1606257096-3790	https://www.uahirise.org/catalog/index.php?/page/245	Monitor Changes at Exomars EDM Crash Site	https://www.uahirise.org/ESP_059342_1780/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_059300_059399/ESP_059342_1780/ESP_059342_1780.J2000.NOMAP/browse.jpg
10	1606257429-3342	https://www.uahirise.org/catalog/index.php?/page/253	Eroded Highlands	https://www.uahirise.org/ESP_059048_1470/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_059000_059099/ESP_059048_1470/ESP_059048_1470.J2000.NOMAP/browse.jpg
11	1606256713-2997	https://www.uahirise.org/catalog/index.php?/page/283	Endeavour Crater	https://www.uahirise.org/ESP_058884_1775/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_058800_058899/ESP_058884_1775/ESP_058884_1775.J2000.NOMAP/browse.jpg
12	1606250302-1950	https://www.uahirise.org/catalog/index.php?/page/320	South Polar Layered Deposits	https://www.uahirise.org/ESP_057891_0925/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_057800_057899/ESP_057891_0925/ESP_057891_0925.J2000.NOMAP/browse.jpg
13	1606250431-1973	https://www.uahirise.org/catalog/index.php?/page/319	Mult-elevation Gullies	https://www.uahirise.org/ESP_057450_1410/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_057400_057499/ESP_057450_1410/ESP_057450_1410.J2000.NOMAP/browse.jpg
14	1606257573-3391	https://www.uahirise.org/catalog/index.php?/page/251	Jarosite Stratigraphy Near Mawrth Vallis	https://www.uahirise.org/ESP_059250_2000/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_059200_059299/ESP_059250_2000/ESP_059250_2000.J2000.NOMAP/browse.jpg
15	1606249906-1489	https://www.uahirise.org/catalog/index.php?/page/330	Mesas	https://www.uahirise.org/ESP_057654_2215/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_057600_057699/ESP_057654_2215/ESP_057654_2215.J2000.NOMAP/browse.jpg
16	1606250905-2198	https://www.uahirise.org/catalog/index.php?/page/312	Monitoring of South Polar Residual Cap Albedo Features	https://www.uahirise.org/ESP_057975_0945/non-map/https://hirise-pds.lpl.arizona.edu/PODS/EXTRAS/RDR/ESP/ORB_057900_057999/ESP_057975_0945/ESP_057975_0945.J2000.NOMAP/browse.jpg

dataset-tools2.py

```
def helenaStyle(img, filename, scale):
    make_path = args.output_folder + "helena_style-" +
str(scale) + "/"
    if not os.path.exists(make_path):
        os.makedirs(make_path)

    img_copy = img.copy()
    (h, w) = img_copy.shape[:2]
    img_ratio = h / w
    counter_image = 1

    # crop images from bottom up
    while img_ratio > 1:
        file_counter_image = str(counter_image)
        print("fileCounter: " + file_counter_image)
        temp = img_copy[h - w*counter_image:h, 0:w]
        temp_copy = temp.copy()
        crop = temp_copy[0:w, 0:w]
        crop = image_resize(crop, max_scale)
        saveImage(crop, make_path, filename + "-" +
file_counter_image)
        if (args.mirror): flipImage(crop, filename + "-" +
file_counter_image, make_path)
        if (args.rotate): rotateImage(crop, filename + "-" +
file_counter_image, make_path)
        img_ratio -= 1
        counter_image += 1
```

Run

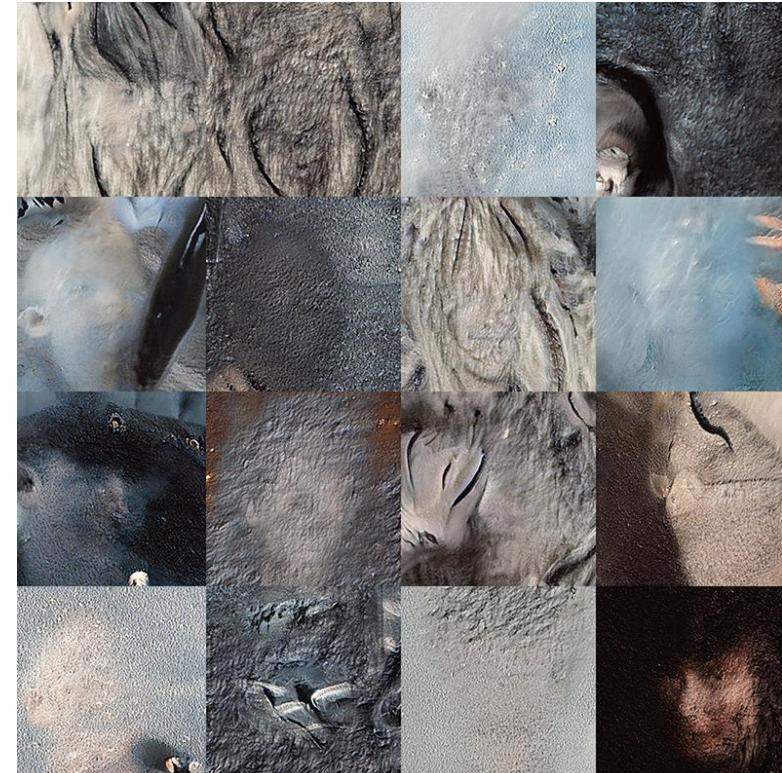
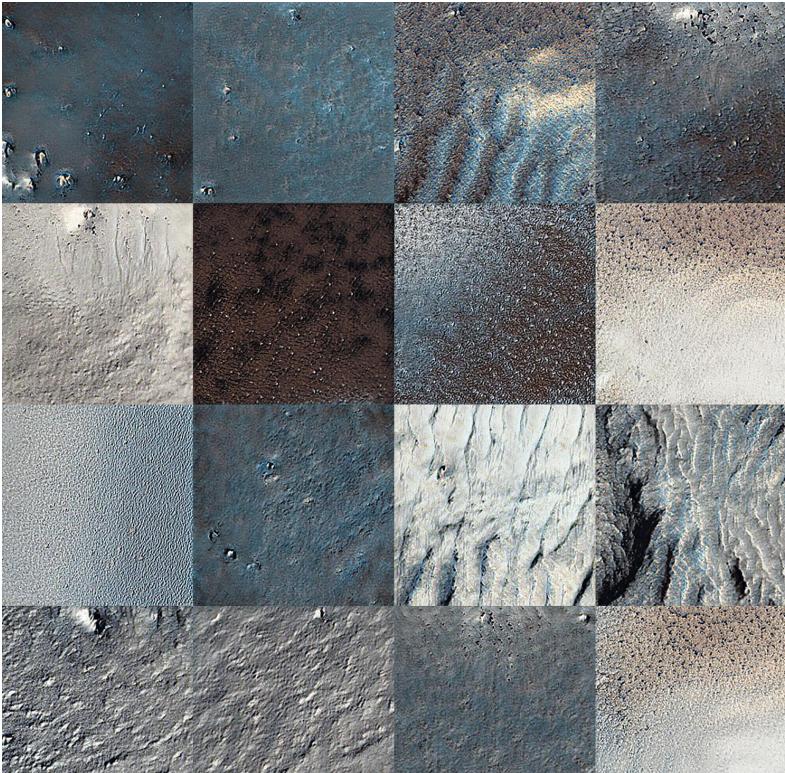
```
python dataset-tools2.py --input_folder /Volumes/SansTitre1/_COMPPerX_/Database_mars/finally245-400 --output_folder /Volumes/SansTitre1/_COMPPerX_/Database_mars/finally245-400 --process_type helena_style
```

1. open your excel and check last row (link to img) -href
2. clone image-downloader.py
make sure the title of your last row is the same as in your script! here--> -href not -src
adapt script on line ?123?
3. run script image-downloader.py with your csv
4. open dataset-tools.py and crop your images
we adapted the script to cut the 512 x512 images from bottom to top
dataset-tools2.py.
Run script with your input output folder and



Pre Training | Colab Style Gan 2 ADA

Dataset: 65 Images (512px x 512px), Training: ~8 hours





Training I Paperspace and Jupyter

StyleGAN2 with adaptive discriminator augmentation (ADA)

ADA: Significantly better results for datasets with less than ~30k training images.

Our Dataset: 28'895 Images (512px x 512px), 22.78 GB

Training: ~72 hours on Paperspace



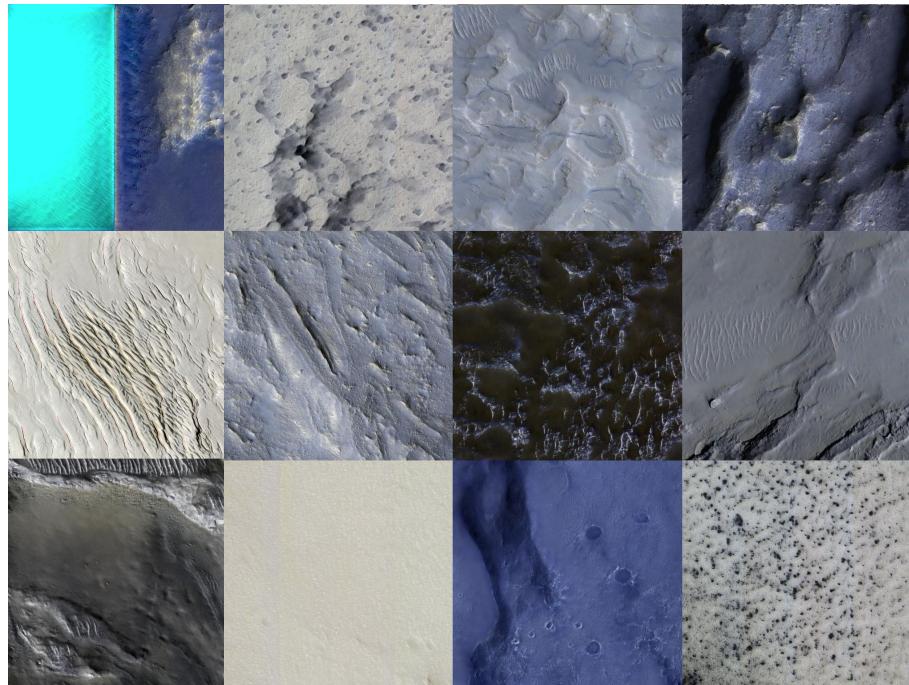
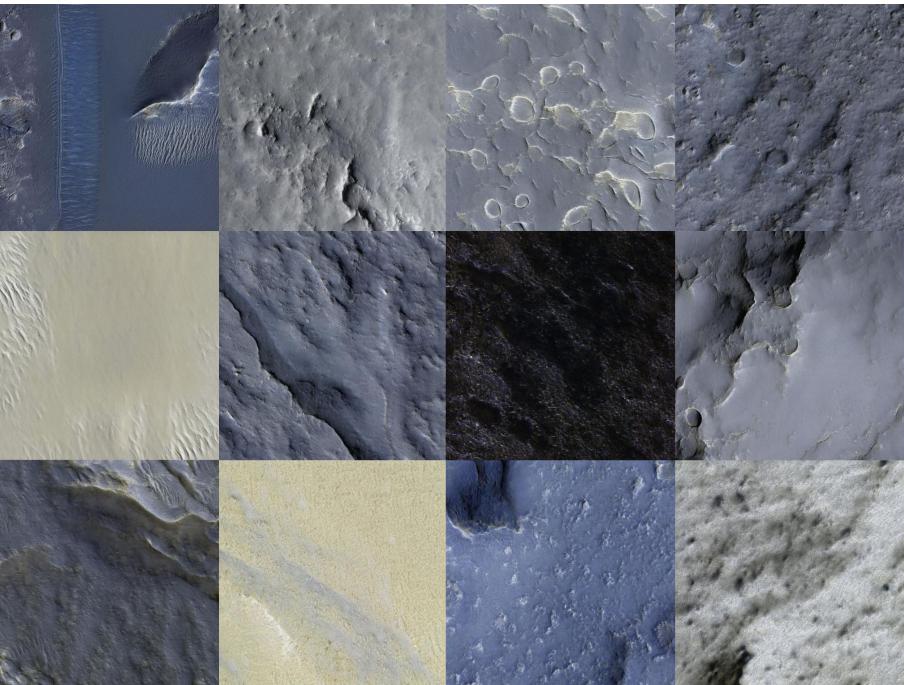
Training I Paperspace and Jupyter

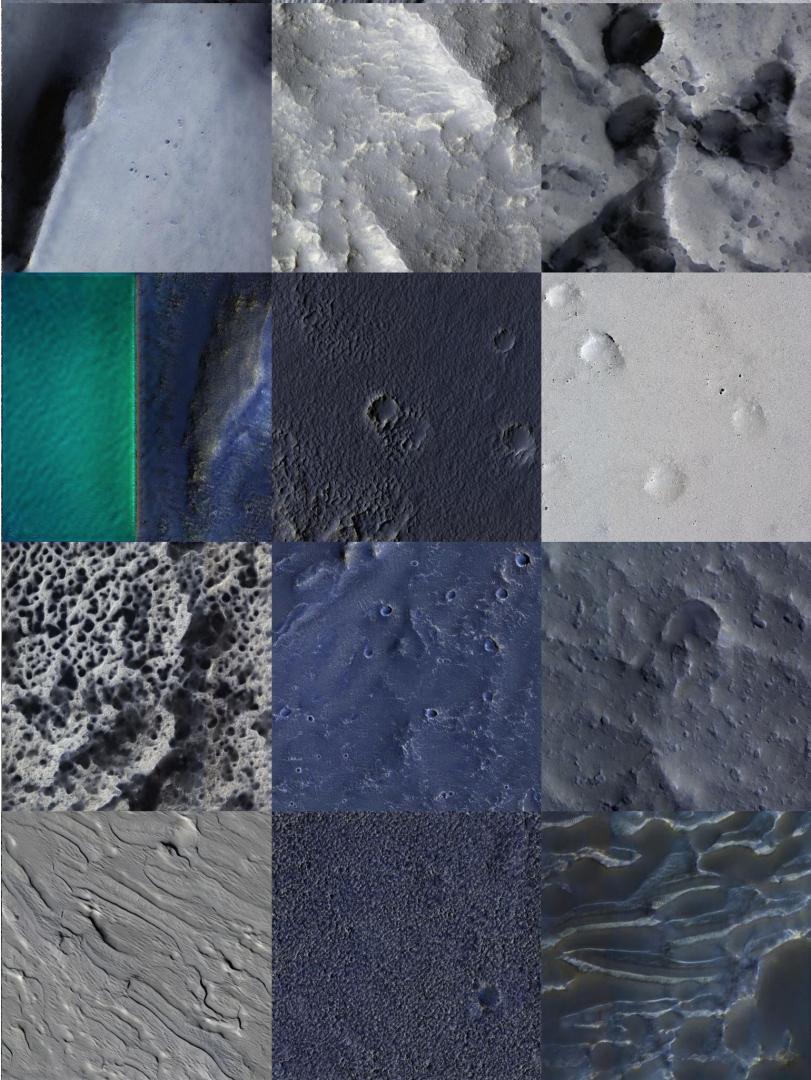
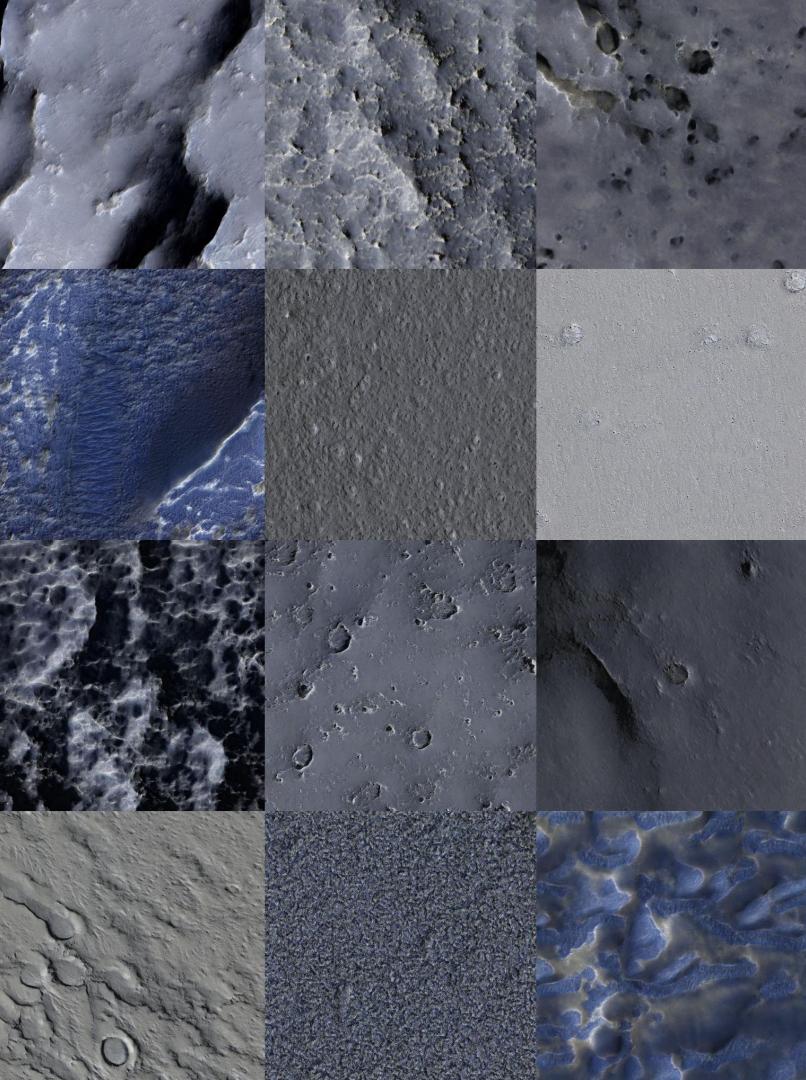
Challenges:

- not enough storage on paperspace -> 500 GB
- ssh connection drop -> always on jupyter notebook
- paperspace auto shutdown -> increase to 1 week
- python/bash/conda knowledge -> not fixed yet



Training | Results







generating Planets | Colab

Flesh_digression

Producing Videos from circular loops of the constant and latent layers in StyleGAN2 Ada Model..
it says... if you want to know how it works:

https://www.youtube.com/watch?v=zRN1kP_lBY8&ab_channel=ArtificialImages

- mainly videos with the trained model
- a few videos with the low quality pre-trained colab model

https://github.com/dvschultz/ml-art-colabs/blob/master/flesh_digressions.ipynb



Results | Faces | Mars textures







Fazit

Challenges:

- Machine Learning is a big topic
- to make a concept without to know if it could work
- Python

Get results from Errors!