

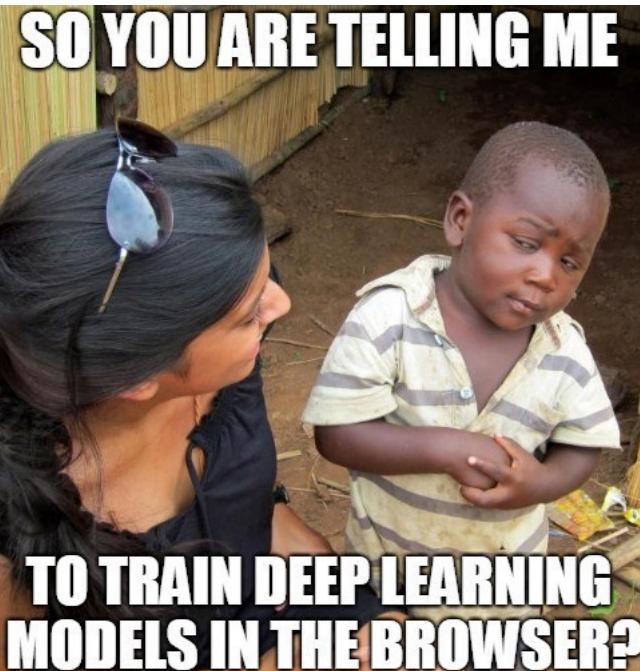
**When your GAN suffers  
from mode collapse**



# Team DVINCI

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# Task/Problem. Why this?

Train a NN so that it is capable of reliably coloring black-and-white pictures. The domain of all photos turned out to be too hard so we constrained ourselves to coloring only landscape pictures.

It is a creative task and therefore rather difficult for the machine but the effects are astonishing (at least once in a while).

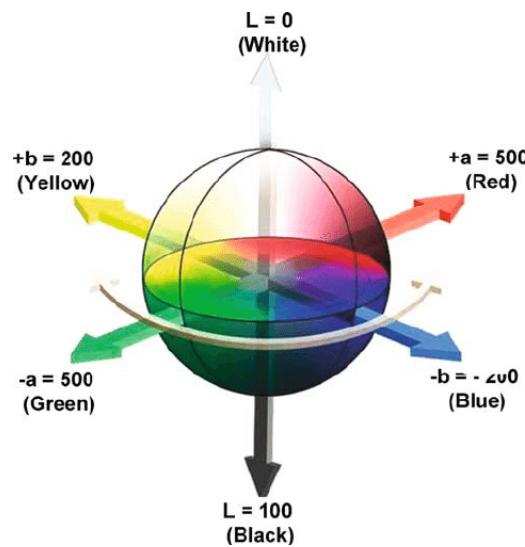
The solution could be used for the reconstruction of archival photos but will be for pure fun!

# Models

- Generator - U-Net architecture
- Critic - CNN topped with sigmoid (classifies parts of the image independently)

## LAB >> RGB

$L^*a^*b$  format is closer to how we perceive colors  
Just need to compute a and b channel



## Regularization

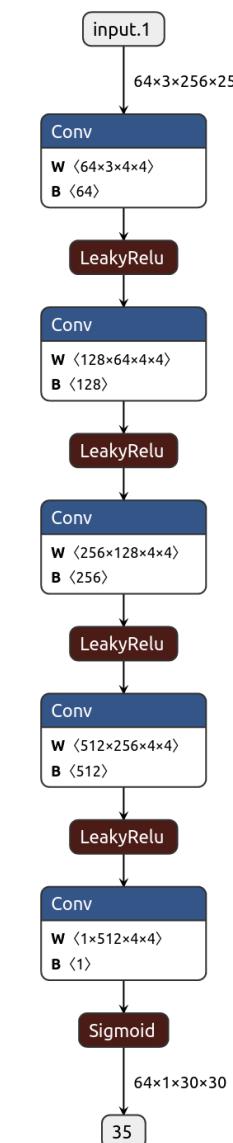
We used L1 distance metric (pixel wise) for regularization. Without it Generator stood no chances even against the slowest version of Discriminator :(

## Style Capture

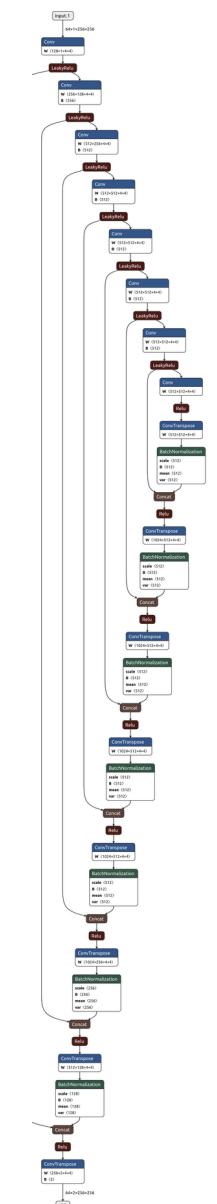
Just as in Ass3 we used vgg to catch picture style. Here instead of computing MSE loss we tried out a more sophisticated metric. As fabulous as it looks on paper the idea scattered after confronting CUDA memory limitations.

## No tangent!

Mapping values to a specific range (e.g. by tanh) is not only redundant but slows learning process! Generator can easily learn the expected range of colors



Critic



Generator

# "Turing test" - instagram version

Które są oryginalne?

LEWE PRAWE

37 votes for lewe | 46 votes for prawe

Share Results

+ Code + Markdown

Match Dice

A teraz?

FEJK FEJK

23 votes for fejk | 43 votes for fejk

Share Results

+ Code + Markdown

Match Dice

Ziomeq się już 9h uczy xd

FEJK FEJK

22 votes for fejk | 27 votes for fejk

Share Results

**GAN 2:1 my followers!**



# Results (on fresh data!)

50 epochs



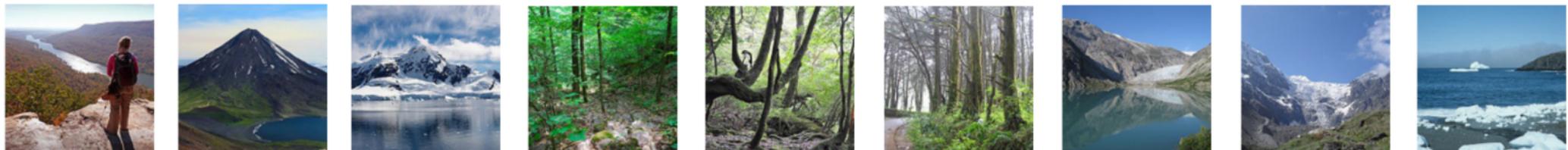
200 epochs



290 epochs



Original picture



# Conclusions

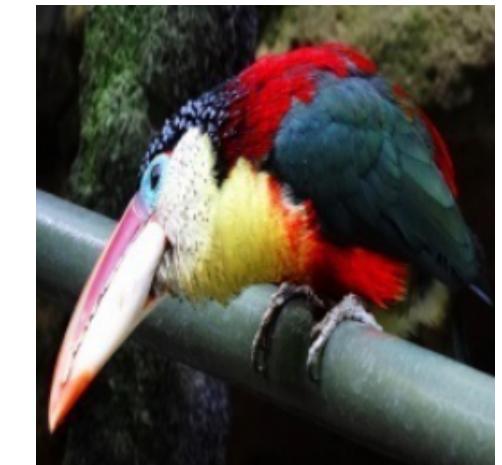
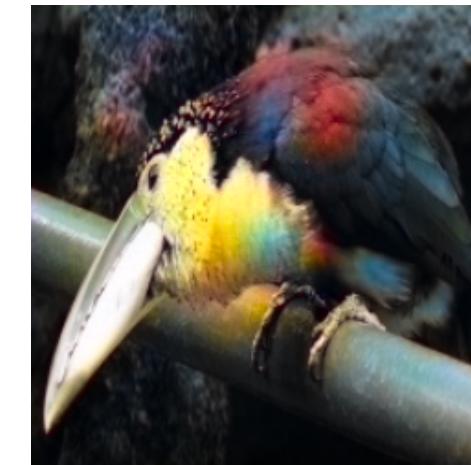
Runs (18)

Name (7 visualized)	State
PLACES_dlugo	crashed
BIRDS	crashed
BIRDS_dlugo	crashed
PLACES	finished
landscapes L1	finished
landscapes 2 L1	crashed
landscapes 2 vgg styl	failed
landscapes L1 aug	failed
landscapes aug hard	failed
crisp-plasma-105	failed
landscapes L1 cont.	failed
skilled-plant-32	crashed
soft-haze-107	finished
hard DS	failed
birds L1	crashed
BIRDS_24	crashed
PLACES_24	crashed
jumping-mountain-11	crashed

- ...the grass is green and the ~~girls are pretty~~ sky is blue
- Dataset matters a lot
- Dataset domain matters even more
- With such big architecture computation management and automated model saving (in case of basically anything) is crucial
- Weights&Biases is a cool tool for DL
- Data augmentation is always a good idea
- Using sophisticated methods may be less valuable when the tradeoff is significant loss in speed
- Deep U-net-> high resolution pictures -> small batches -> slow compute -> :(
- Shallow U-net -> :( by definition xd
- It is a good idea to keep different versions of your model for various purposes



Despite a very difficult dataset (ImageNet), it colors the basic objects well after 9 hours of training.



Good track, but a bit missing ... a very specific birds dataset, it should be easy!

Just in case you needed some (low-res) wallpapers...



# And more...



- <https://colab.research.google.com/drive/1RNam1LFcTnV2n4X38Qdwpg0SQcbE01LK?usp=sharing>