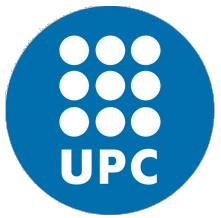
DEEP LEARNING FOR COMPUTER VISION

TEAM 2 - Colorization with Conditional GANs



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OVERVIEW

Objectives

Datasets

Architecture

Training

Results

Conclusions and Lessons Learned

OBJECTIVES

Understanding and testing Conditional GANs

Image colorization using Conditional GANs

Transfer learning on a new dataset

DATASETS

- Facades: http://cmp.felk.cvut.cz/~tylecr1/facade/

  # training samples: 200

  # testing samples: 178

- Cat_Dataset: https://www.kaggle.com/crawford/cat-dataset

  # training samples: 198

  # testing samples: 104

ARCHITECTURE

GANs (Generative Adversarial Networks).

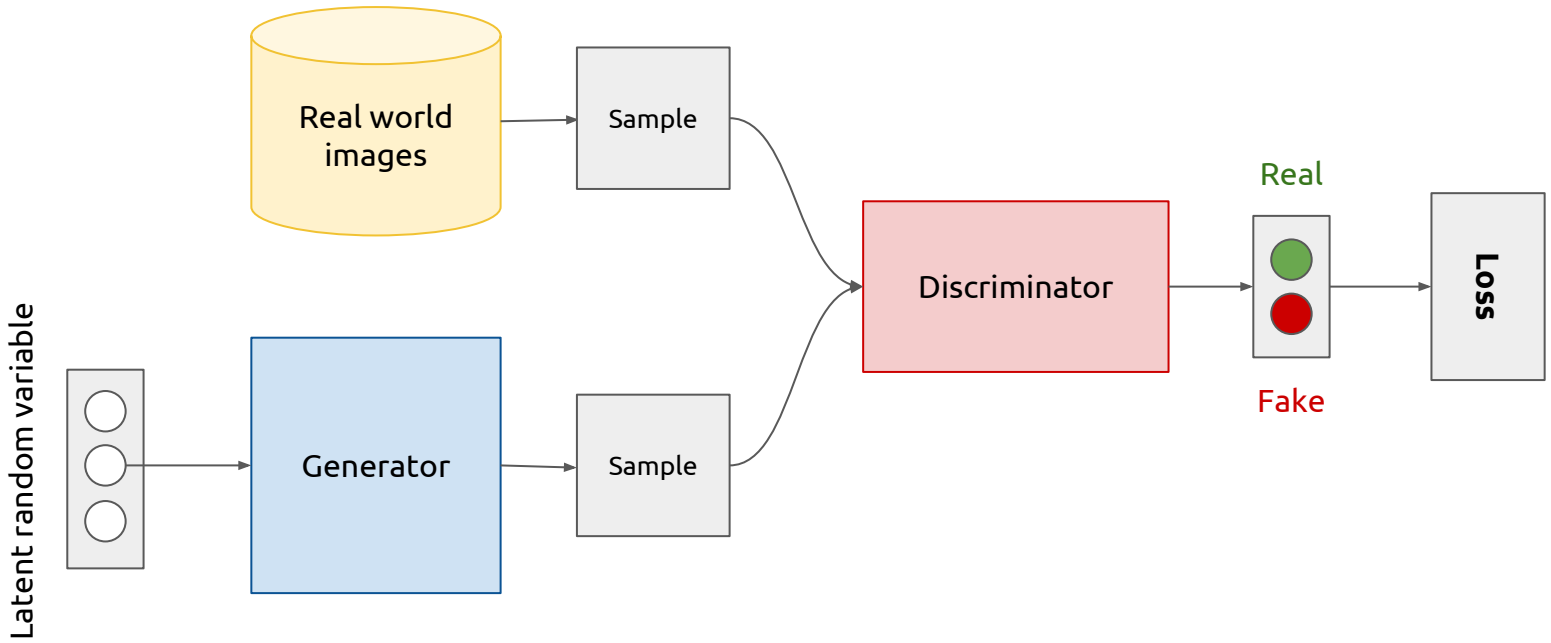
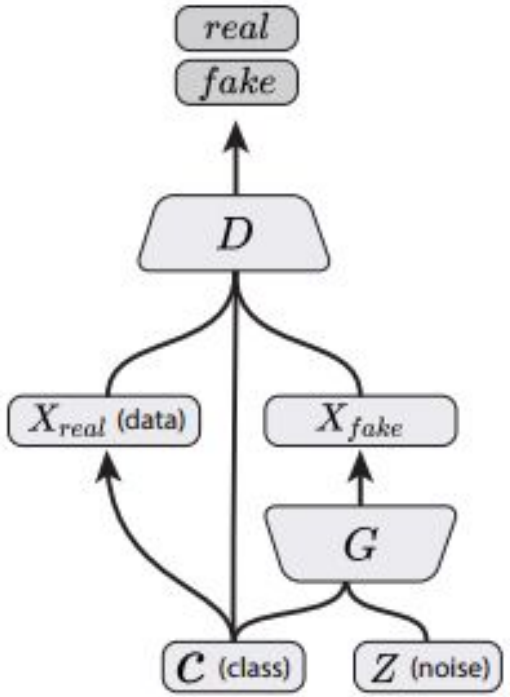


Image taken from Kevin McGuinnes's Generative Models slides.

ARCHITECTURE

Conditional GAN.

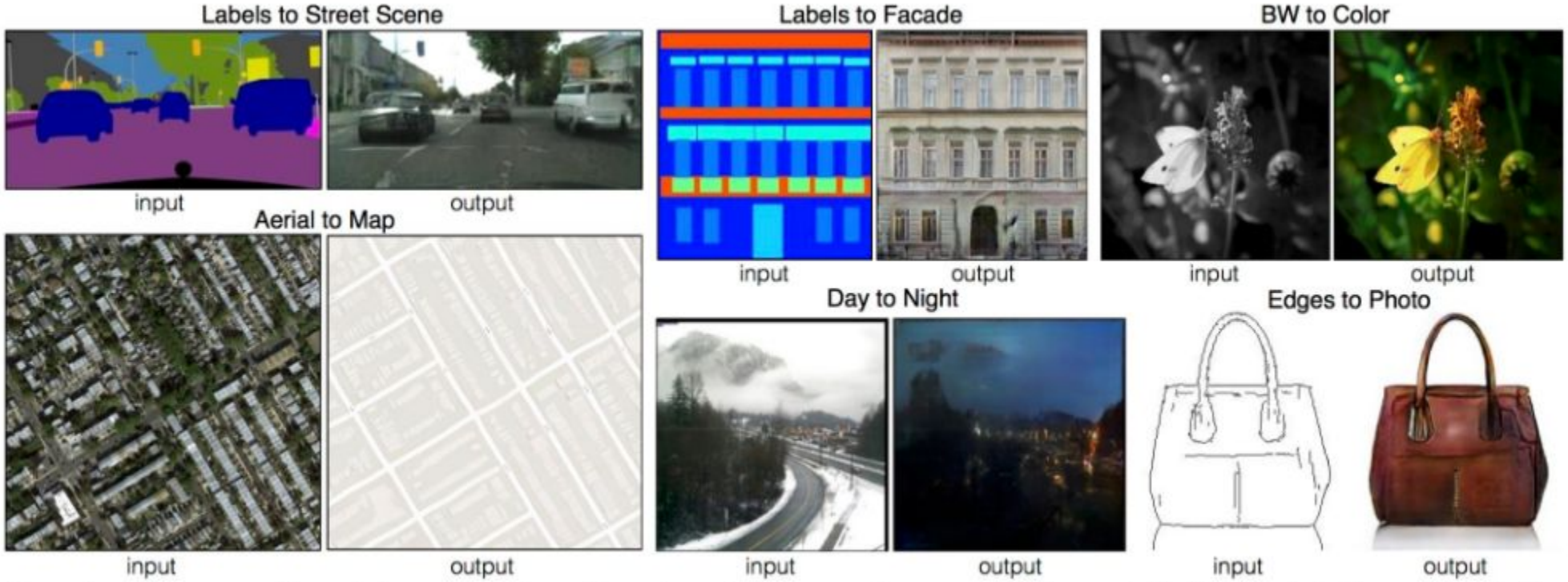
- Unlike an unconditional GAN, the generator has an input condition (image, label, …)



Conditional GAN
(Mirza & Osindero, 2014)

ARCHITECTURE

Pix2pix - Image to Image Translation



Example results on several image-to-image translation problems. In each case we use the same architecture and objective, simply training on different data.

ARCHITECTURE

- Our Generator has 6 blocks, each one composed by:
  - Convolutional Layer
  - Normalization Layer
  - ReLu Layer

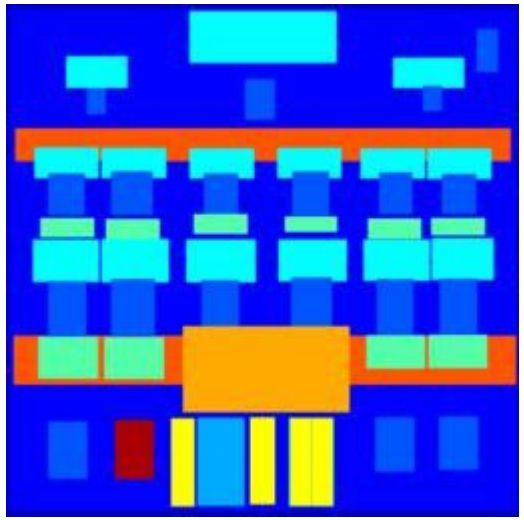
- The Discriminator is composed by 3 layers:
  - Convolutional Layer
  - Normalization Layer
  - LeakyReLu Layer

http://cs231n.github.io/neural-networks-1/

TRAINING

Source code: https://github.com/mrzhu-cool/pix2pix-pytorch.git

Source code example: labels to facades



Label

Facade

TRAINING

1. Colorization (from BW to color) train and test with facades dataset

epochs = 200, # learning rate = 0.0002 (default)

Original

Black and white

Generated

https://github.com/telecombcn-dl/2018-dlcv-team2

TRAINING

2. Colorization (from BW to color) test with cat dataset

Original

Generated

Original

Generated

https://github.com/telecombcn-dl/2018-dlcv-team2

TRAINING

3. Transfer Learning

epochs = 50, # learning rate = 0.0002 (default)

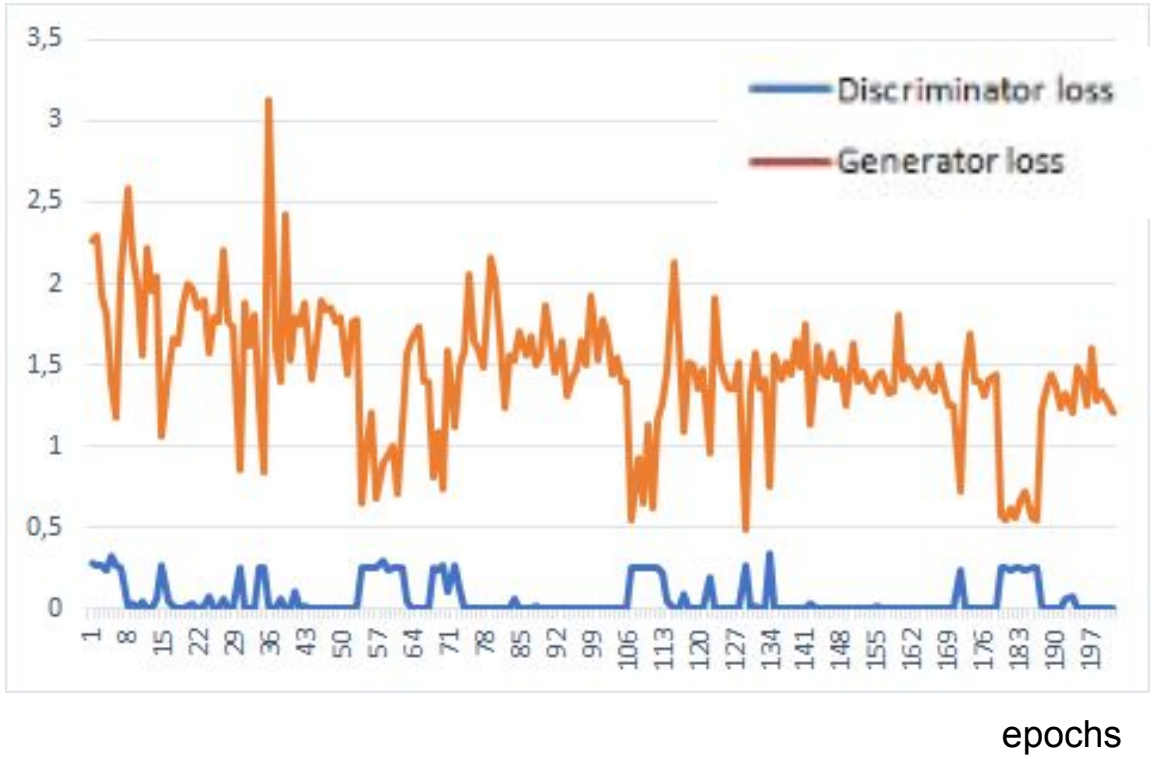
Original

Transfer

https://github.com/telecombcn-dl/2018-dlcv-team2

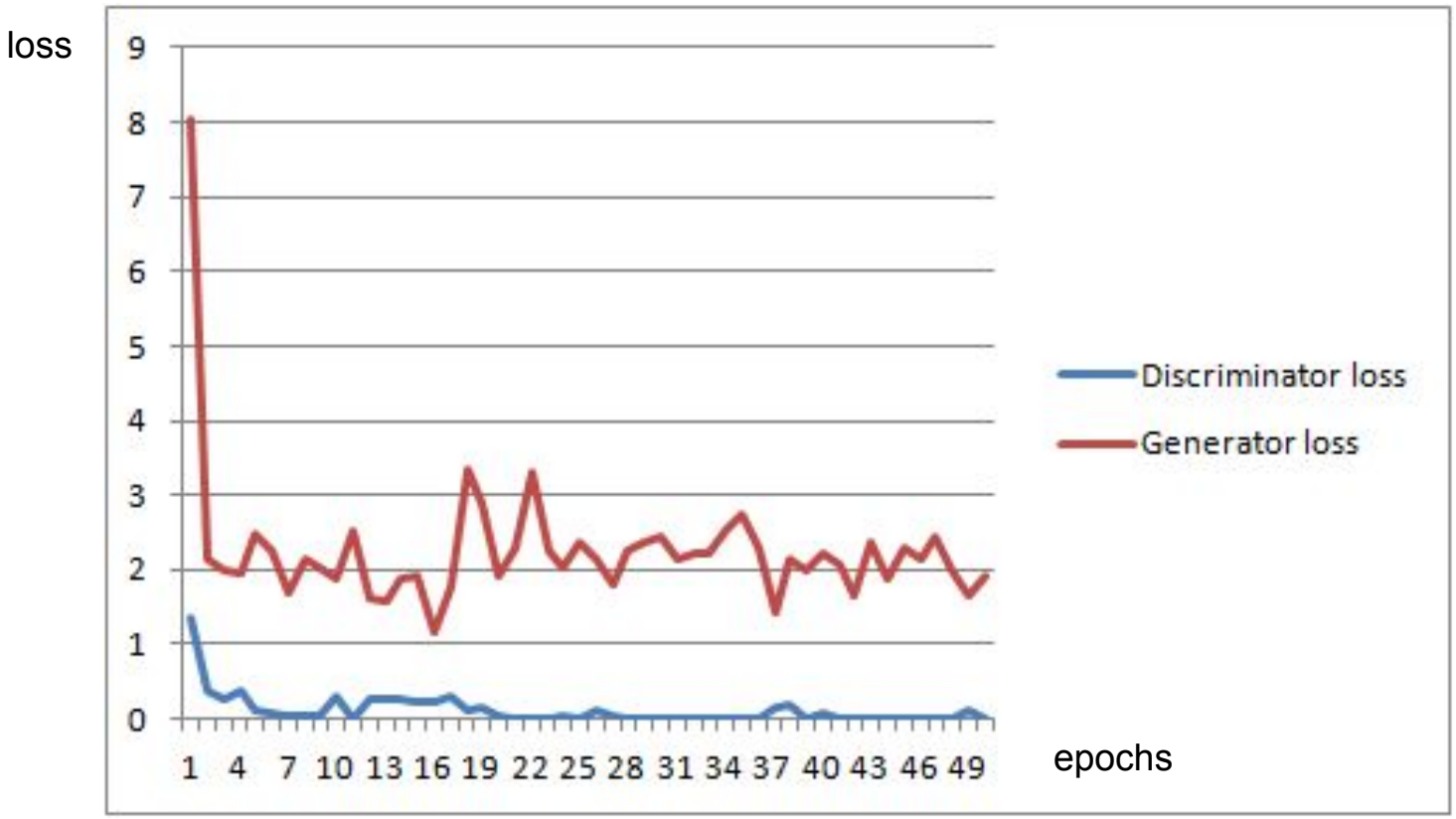
RESULTS

- Colorization trained for 200 epochs, with 200 facades training images:
  - Loss log:



RESULTS

- Transfer learning for cat dataset trained for 50 epochs, with 198 training images:
  - Loss log:



CONCLUSIONS AND LESSONS LEARNED

- Pix2pix gives overall good results in different image-to-image translation tasks
- Loss is a bit counter intuitive in GANs
- Transfer learning works better with similar datasets
- To improve the results of transfer learning → play with hyperparameters
- Imagenet, tiny imagenet: too long to train even with GPU

THANK YOU FOR YOUR ATTENTION !

Any questions ?

https://github.com/telecombcn-dl/2018-dlcv-team2/blob/master/train.py