

Work in Progress

# Image Colorization for Thermal Mobile Camera Images

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## Motivation

- High quality thermal image colorization is a rising subject in AI field
- Several uses are possible, e.g. security



- Problem is ill-defined
- No single solution which is best

## Goals

- Develop a Deep Learning based technique for coloring monochromatic thermal images
- Aiming to achieve as accurate as possible domain transfer from thermal to RGB
- Acquiring raw data using mostly Flir1 Pro camera

## Challenges

- Images are not aligned
- Outdoor and indoor thermal images are different in behavior
- Modifying the network according to our needs
- Producing realistic high quality results

## Flir1 Pro Camera

- Pocket thermal camera attached to smartphone
- Stills/Video available
- Produce matched thermal-RGB image/video
- Several differences between domain outputs

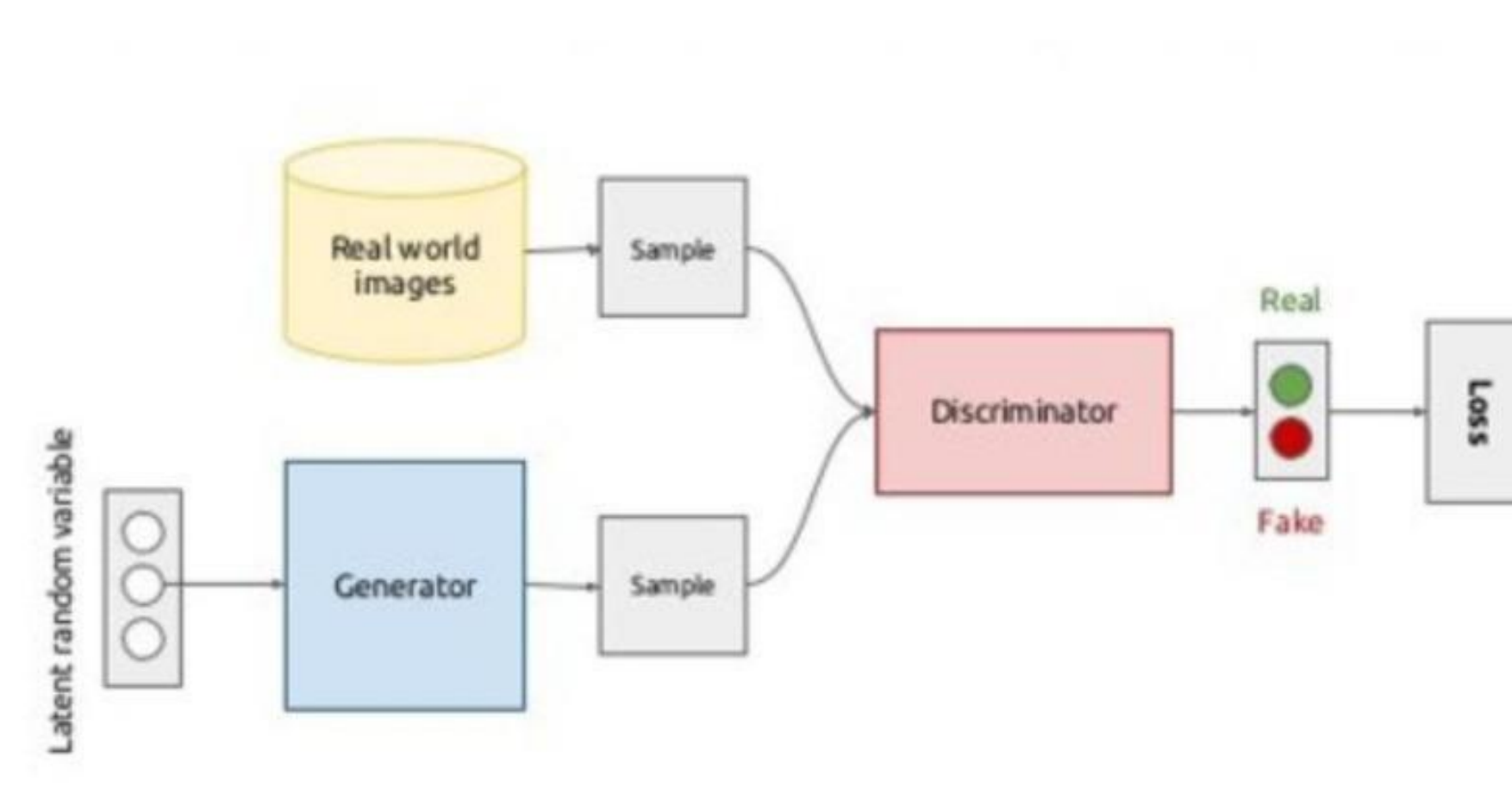


## GAN - Generative Adversarial Network

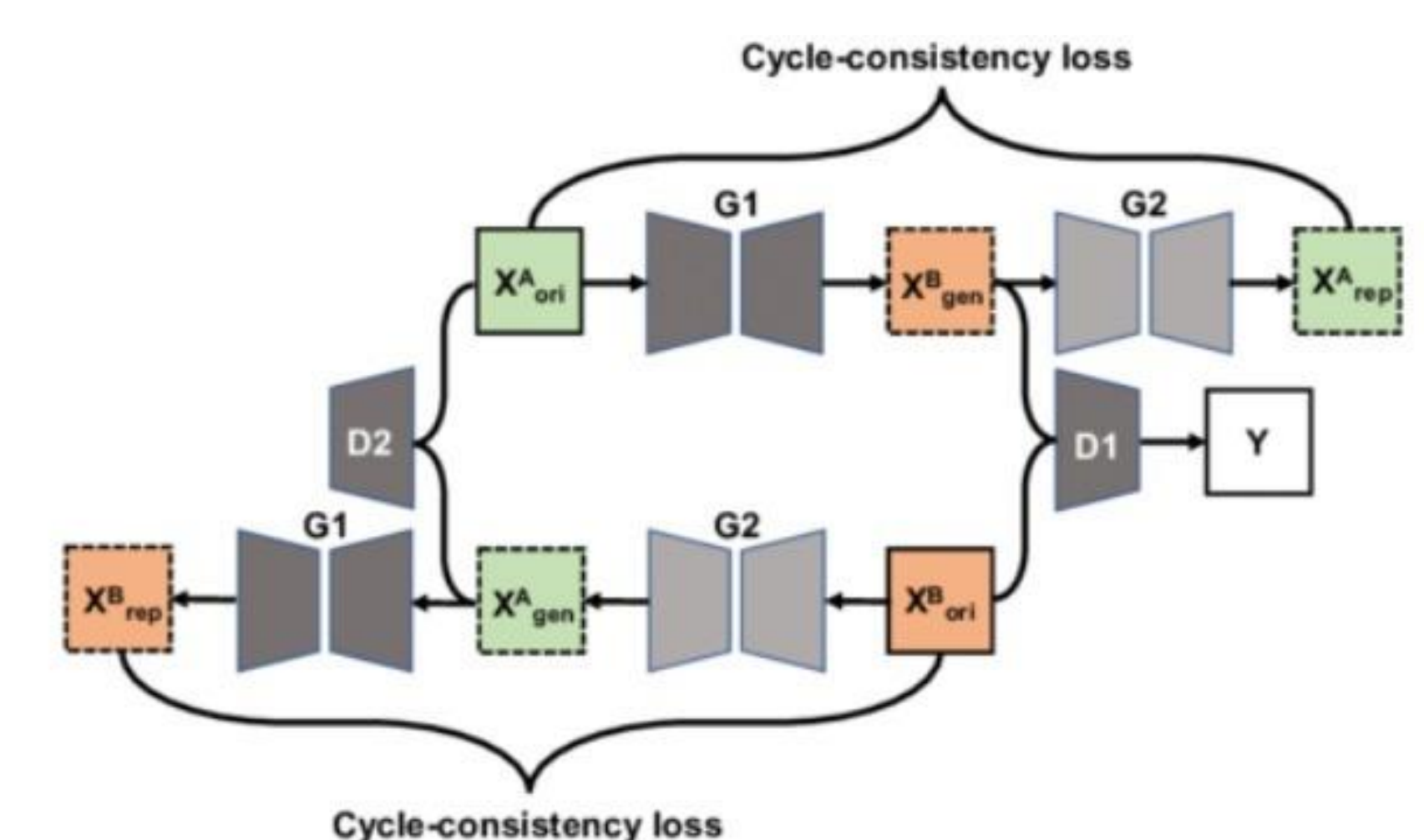
- Contemporary structure of CNN for generating new data instances that resemble input training data
- Difficult to train but can achieve good results
- Relies on a generator-discriminator structure relationship

## CycleGAN

- Involves automatic training of image-to-image translation models
- No need for paired examples (aligned data), but may require long convergence time



GAN



CYCLE GAN

## Current results



Input 1



Input 2

Result 1



Result 2



## Database

- Acquired videos using Flir1 camera
- Outdoor videos separated to ~10,000 thermal-RGB couples of images
- Image resolutions:  
Thermal – 640x480, RGB – 1440x1080
- Both urban and nature images acquired

examples

## Previous Project

- Same project goal
- Aligned images only
- GAN that produces RGB image out of the aligned thermal image (Pix2Pix)

## Conclusions

- VGG loss has an important contribution
- Discriminator/Generator pre-train may help for faster convergence and better results
- Partial results can be helpful for tuning the network