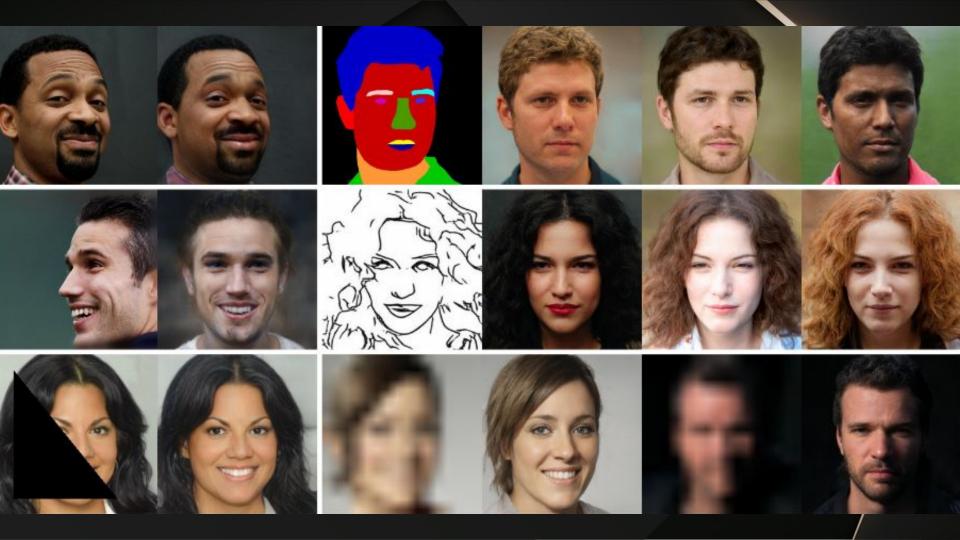
# Encoding in Style: a StyleGAN Encoder for Image-to-Image Translation

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# Introduction

- Generative Adversarial Networks (GANs), uma classe de rede neural de geração de imagens.
- Propõe uma nova arquitetura de StyleGAN introduzindo um encoder na arquitetura.



# Metodologia

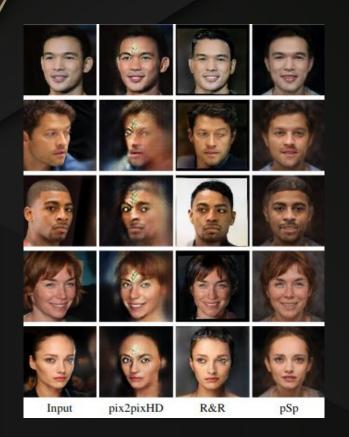
#### **Face Frontalization**

- Utiliza as bases de dados CelebA-HQ e FFHQ.
- Espelha a imagem e força o algoritmo a encontrar a imagem frontalizada tanto a partir da original quanto a partir da imagem espelhada, para a rede neural aprender apenas um padrão de imagem frontal.

#### Conditional Image Synthesis

- Utiliza uma base de dados de CelebA-HQ, AFHQ Cat e AFHQ Dog.
- Para cada imagem aplica um filtro de "esboço a lápis".
- Em seguida, aplica o método de simplificação de esboço, e assim, resulta em imagens que lembram esboços feitos à mão.

# **Resultados: Face Frontalization**

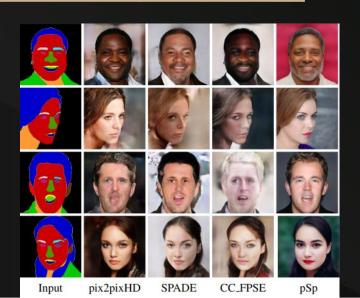


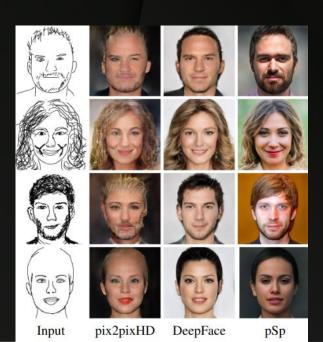
Method	<b>Similarity</b> 90° - 70° - 50° - 30°	Runtine
R&R	0.34 - 0.56 - 0.66 - 0.7	1.5s
pSp	0.32 - 0.52 - 0.60 - 0.63	0.1s

# Resultados: Conditional Image Synthesis

Task	p2p	
Segmentation	94,72%	
Sketch	93,34%	

Percepção humana (8400 pessoas)







# Descrição do projeto









#### Problema

Imagens e documentos borrados.

# Pré processamento de imagem

Diminuir ruídos e simplificar a imagem.

# Data augmentation

Aumentar a base de dados.

# Aplicar o algoritmo

Criação de uma rede neural encoder.

#### 1. Problema

- Documentos com marca de café.
- Documentos e imagens antigas.
- Documentos amassados.
- ▲ Extração de OCR.

# 2. Pré processamento de imagem

- Transformar imagem para escala de cinza
- ▲ Filtro gaussiano (3\*3)
- ▲ Filtro laplaciano
- ▲ Inverter as cores
- ▲ Limiarização
- ▲ Mudar o tamanho da imagem para 172 x 360

There are several classic spatial filters for reducing or elimin from images. The mean filter, the median filter and the closing of used. The mean filter is a lowpass or smoothing filter that repute the neighborhood mean. It reduces the image noise but blurs the filter calculates the median of the pixel neighborhood for each publishing effect. Finally, the opening closing filter is a mathematic that combines the same number of erosion and dilation morphoto eliminate small objects from images.

The main goal was to train a neural network in a supervised image from a noisy one. In this particular case, it was much ed noisy image from a clean one than to clean a subset of noisy

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## **Exemplo:**

There are several classic spatial filters for reducing of quency noise from images. The mean filter, the mediat opening filter are frequently used. The mean filter is a filter that replaces the pixel values with the neighborhood image noise but blurs the image edges. The median filter of the pixel neighborhood for each pixel, thereby reducing the opening closing filter is a mathematical meanthment of the same number of erosion and dilation morp order to eliminate small objects from images.

The main goal was to train a neural network in a super a clean image from a noisy one. In this particular case, obtain a simulated noisy image from a clean one that noisy images. The process for obtaining simulated noischome: This process requires images of the backgrount the acquisition forms, which were obtained by printing a

#### 3. Data augmentation

- Criar imagens com ruidos (gauss, salt and pepper, poisson, speckle).
- Espelhamento das imagens.
- Rotacionar as imagens.
- Adicionar novas imagens fora do padrão da base.
- ▲ Base de dados vai de 288 imagens para 2592

There are several classic spatial filters for reducir frequency noise from images. The mean filter, the closing opening filter are frequently used. The mean smoothing filter that replaces the pixel values with the It reduces the image noise but blurs the image edges, culates the median of the pixel neighborhood for each ing the blurring effect. Finally, the opening closing fil morphological filter that combines the same number of morphological operations in order to eliminate small of the main goal was to train a neural network in a

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## 4. Aplicar o algoritmo

- ▲ Saida 540 \* 258 = 139,320.
- ◆ 5 camadas
- **168,047,480**
- ▲ Loss: BinaryCrossentropy
- Optimizer: ADAM
- Early Stop
- Rodou por 119 epocas
- ▲ Loss: 0.0868 treino
- ▲ Loss: 0.0951 teste

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# 03 Criação de uma API

- JadsonKris/Encoder (github.com)
- Cada chamada demora aproximadamente 10 segundos para ser executada (i5-7200u).
- Melhorou a performance da api Tesseract para OCR.
- Modelo ocupa mais de 300mb no formato h5.
- ▲ Mais de 20 segundos para carregar o modelo.

## Referências

1. Richardson, Elad, et al. "Encoding in style: a stylegan encoder for image-to-image translation." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2021.

