

# Image Style Transfer

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Poređenje CycleGAN-a i Neural Style Transfer-a

# Image style transfer

- Tehnika u oblasti CV-a za kreativno generisanje slika



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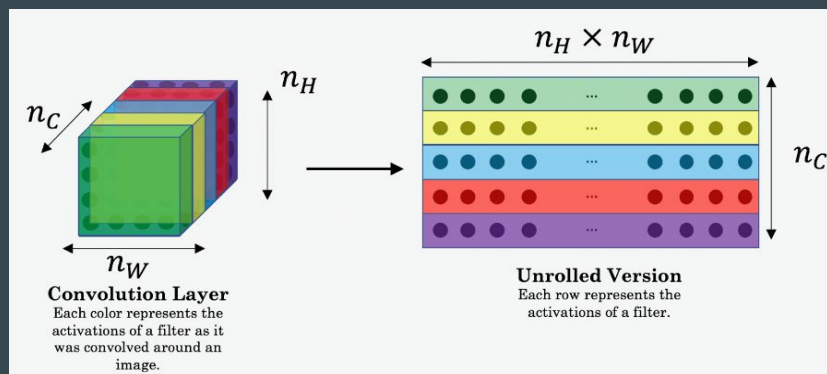


Slika 1: Primer Style transfera - Luvr + Impresionizam

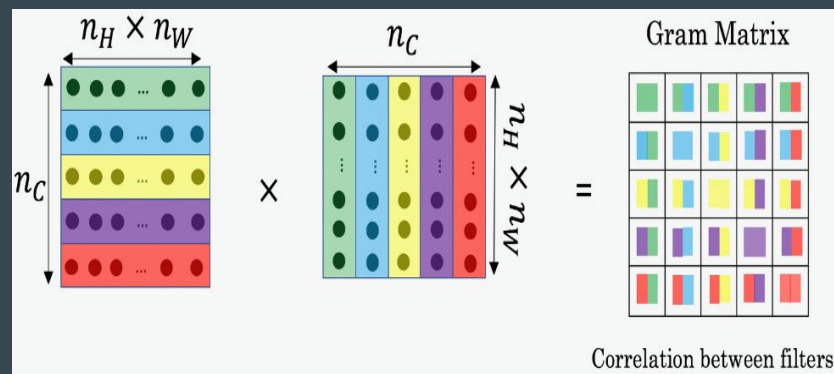
- Dva popularna pristupa:
  - CycleGAN
  - Neural Style Transfer (NST)

# Neural style transfer (NST)

- Transfer learning
- VGG-19 pretrenirana mreža
- Content i style loss



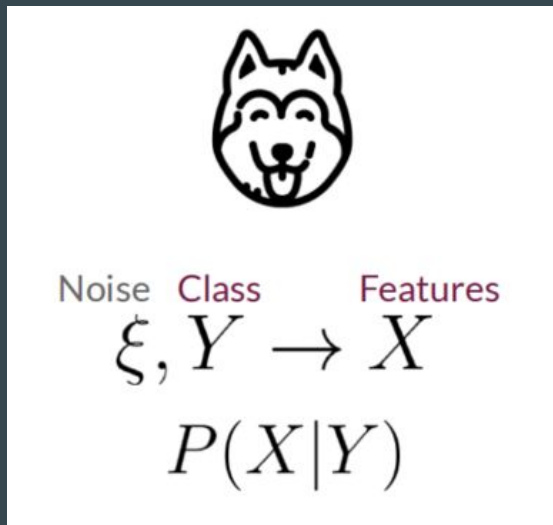
Slika 2: Content loss



Slika 3: Gram matrix i style loss

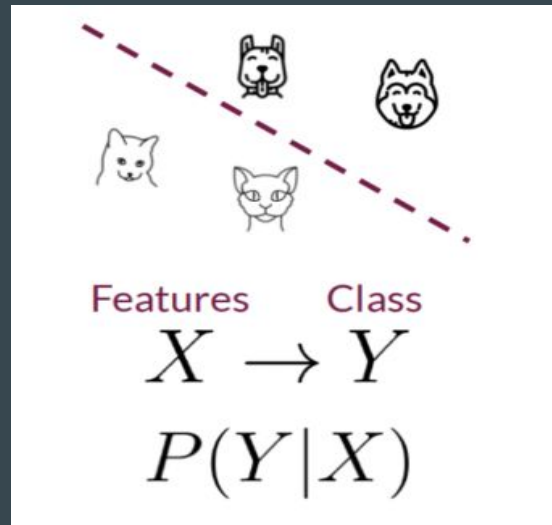
# Generative Adversarial Networks (GANs)

Generator



VS.

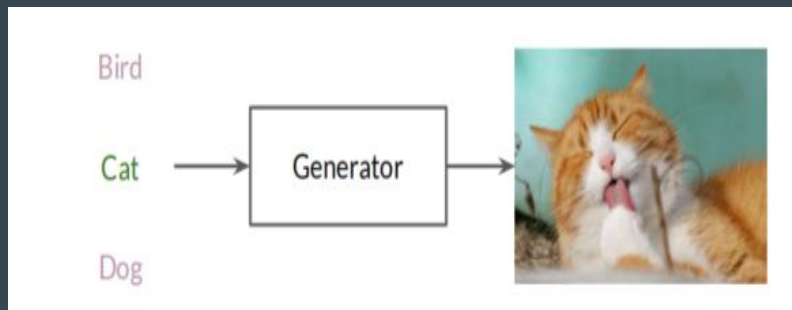
Discriminator



Slika 4: Osnovne komponente GAN-a

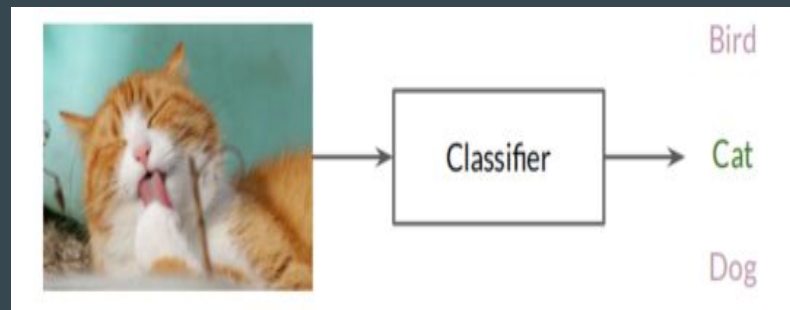
# Generative Adversarial Networks (GANs)

Generator



VS.

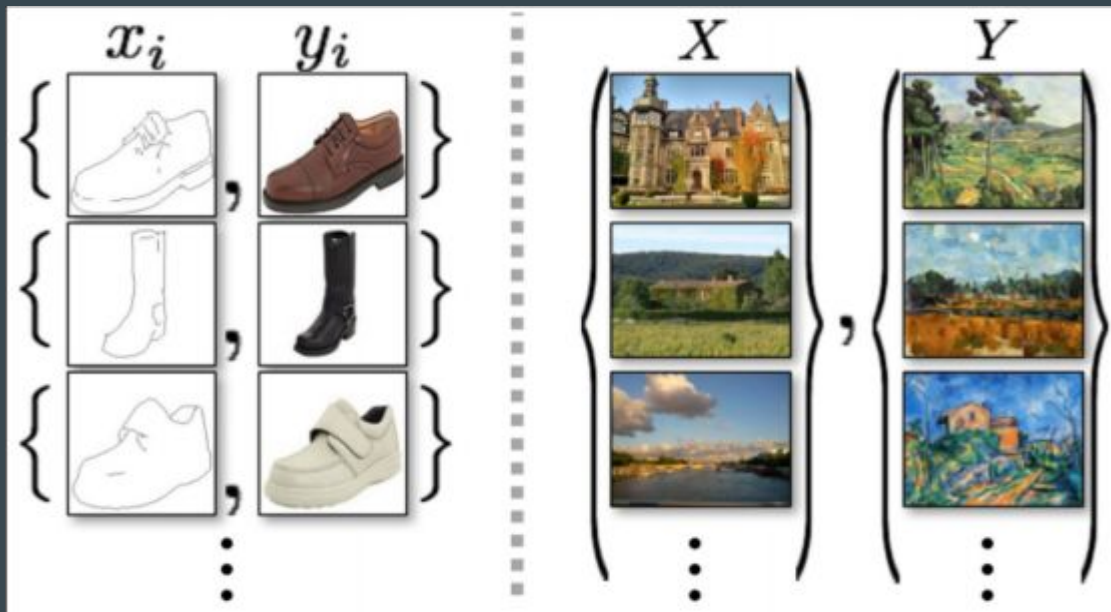
Discriminator



Slika 5: Osnovne komponente GAN-a 2

# CycleGAN

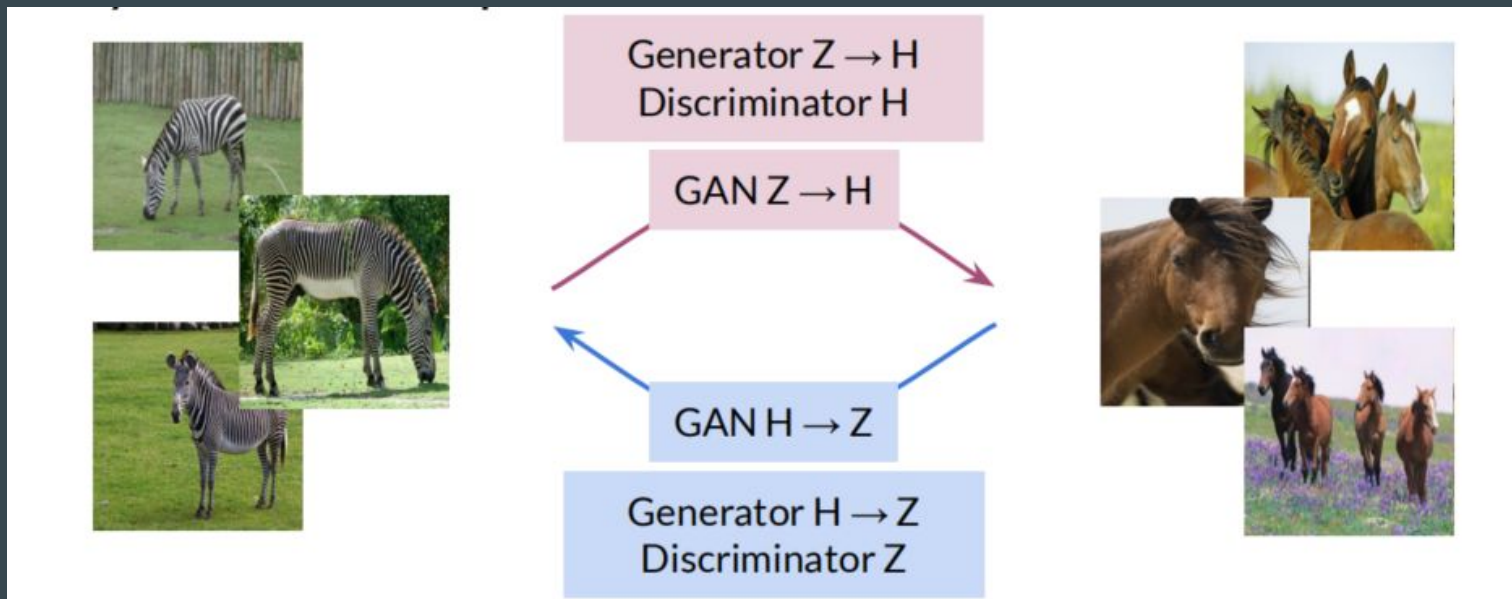
- Omogućava unpaired image-to-image translation



Slika 9: Paired i Unpaired image-to-image translation

# CycleGAN

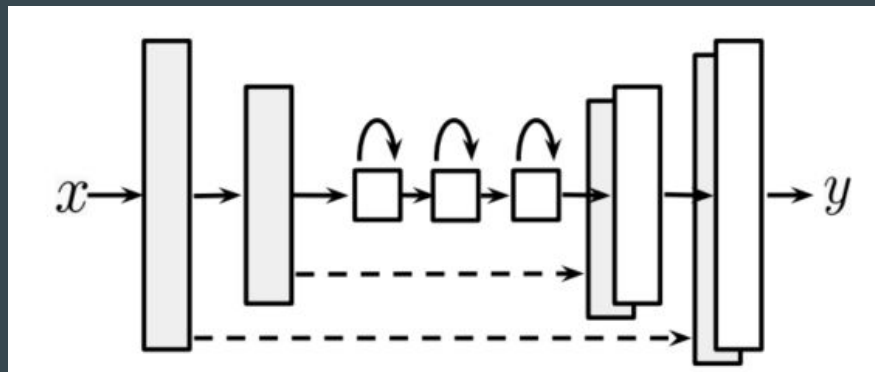
- Dva GAN-a



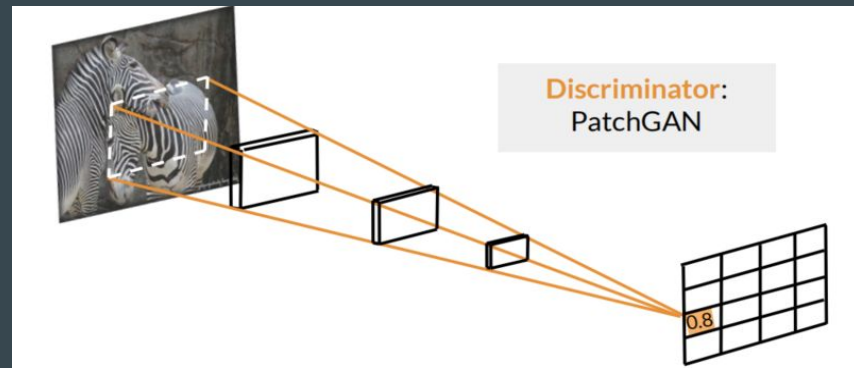
Slika 10: 2 umesto 1 GAN-a

# CycleGAN arhitektura

Generator



Discriminator

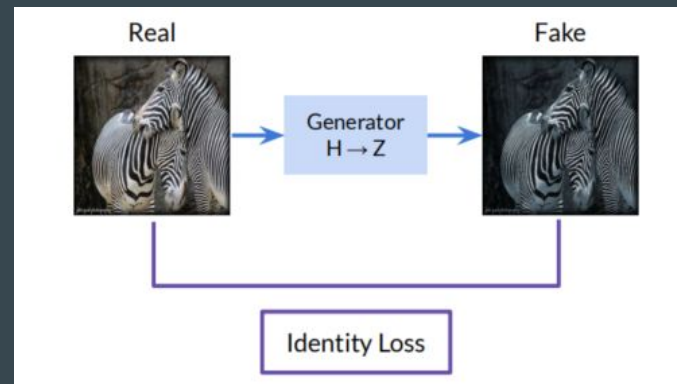
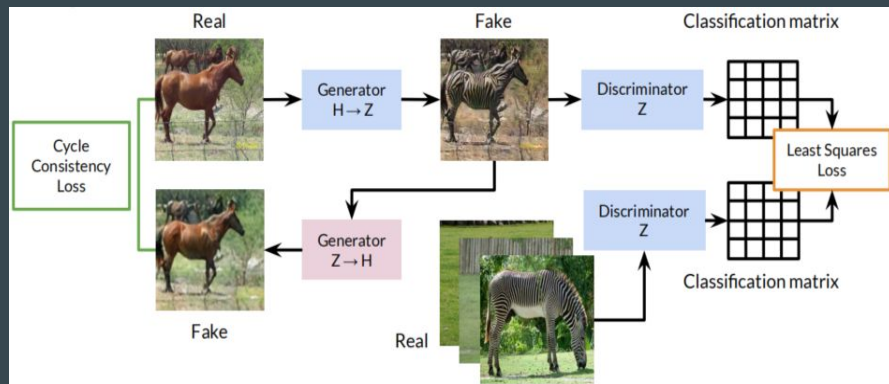


Slika 11: CycleGAN arhitektura



# CycleGAN loss

- Adversarial loss
- Cycle consistency loss
- Identity loss



Slika 12: Losses

# Podaci

- Flickr + WikiArt Ukiyo-e dataset za pejzaže
- CelebA + WikiArt Cubism dataset za portrete



Slika 13: Ukiyo-e



Slika 14: Cubism

# Vizuelno poređenje - Ukiyo-e

Original

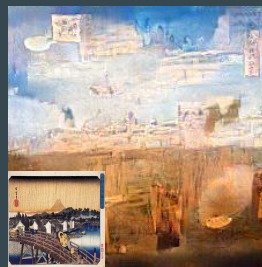
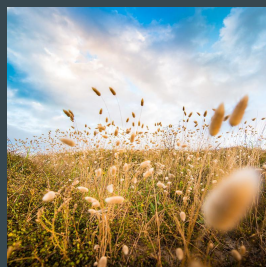
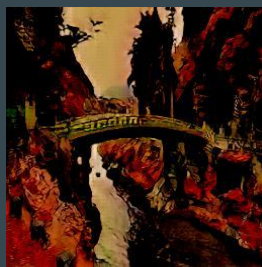
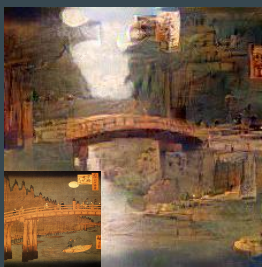
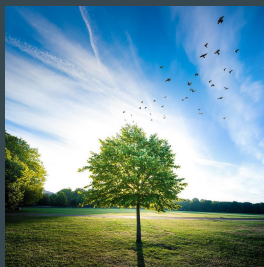
NST

CycleGAN

Original

NST

CycleGAN

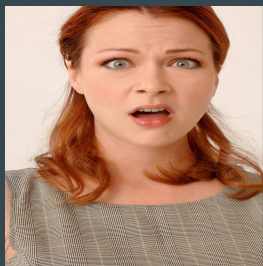


Slika 15: Pejzaži + Ukiyo-e



# Vizuelno poređenje - Cubism

Original



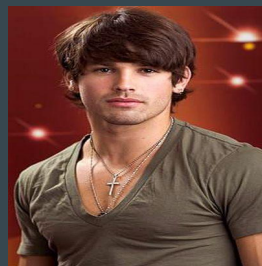
NST



CycleGAN



Original



NST



CycleGAN



Slika 16: Portreti + Cubism

# Prednosti, mane i zaključci

## NST

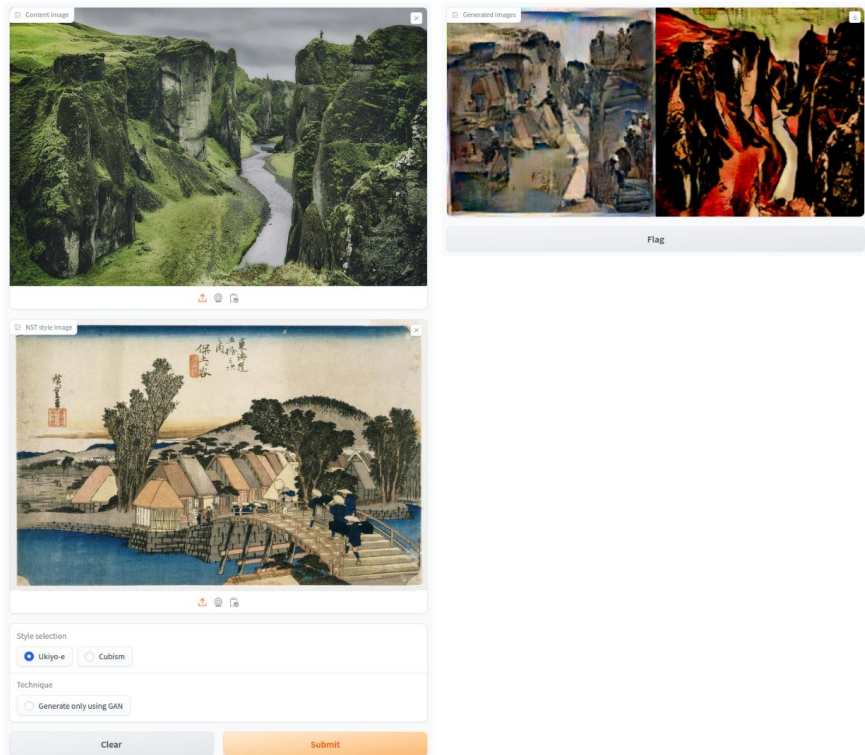
1. Postiže impresivne rezultate
2. Ne zahteva standardan trening, samim tim i manje vremena, ali...
3. Generiše sliku na osnovu jedne stilske slike
4. Snalazi se lošije kada stil nema izrazite karakteristike
5. Unosi umetnički šarm

- Konačan izbor zavisi od:
  - Vremena i resursa
  - Balansu između realizma i umetnosti
  - Oka posmatrača

## CycleGAN

1. Postiže impresivne rezultate
2. Zahteva trening, samim tim i više vremena, ali...
3. Generiše sliku na osnovu kolekcije stilskih slika
4. Odlično primenjuje karakteristike stila, čak i kad one nisu izrazite
5. Više se ističe u realizmu

# UI demo



Slika 17: Demo

**HVALA NA PAŽNJI!**