Deep Learning / Machine Learning Seminar

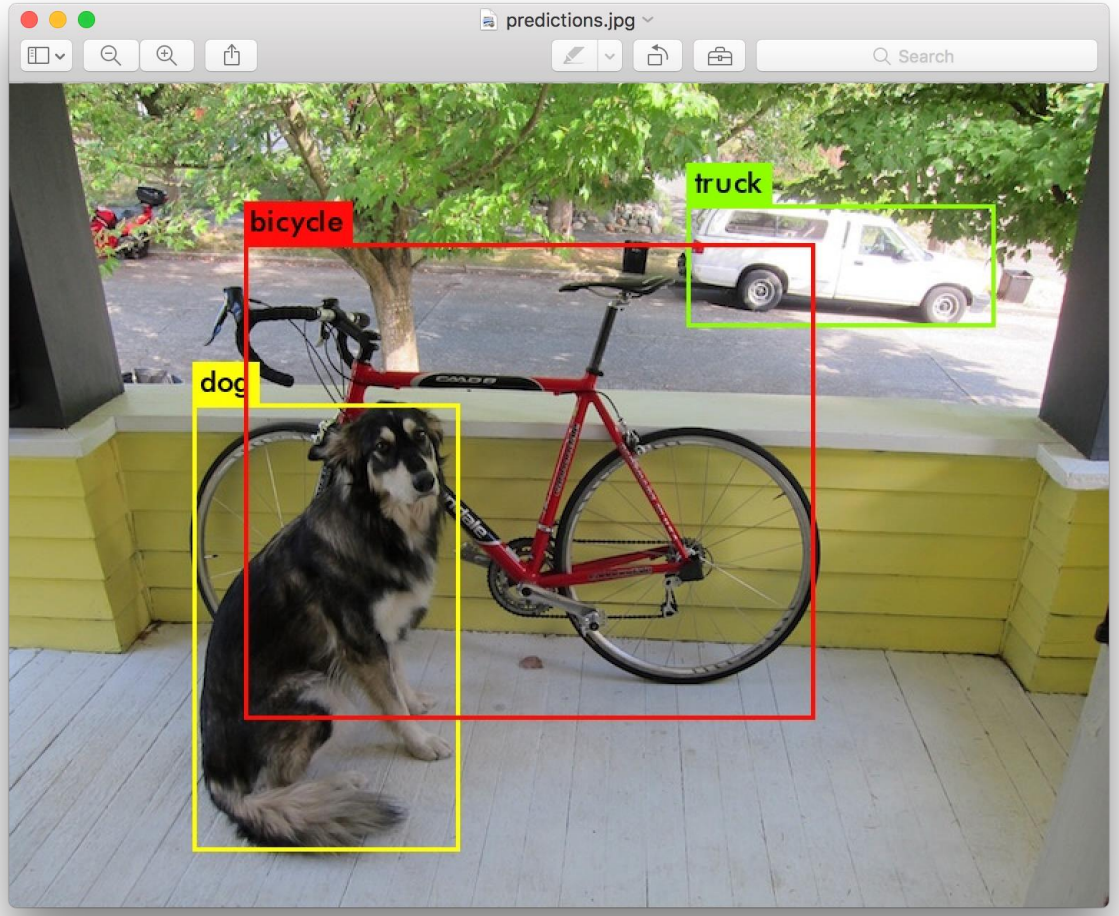
- YOLO / GAN -

Index

- YOLO
- GAN
- Conclusion (RL short review)

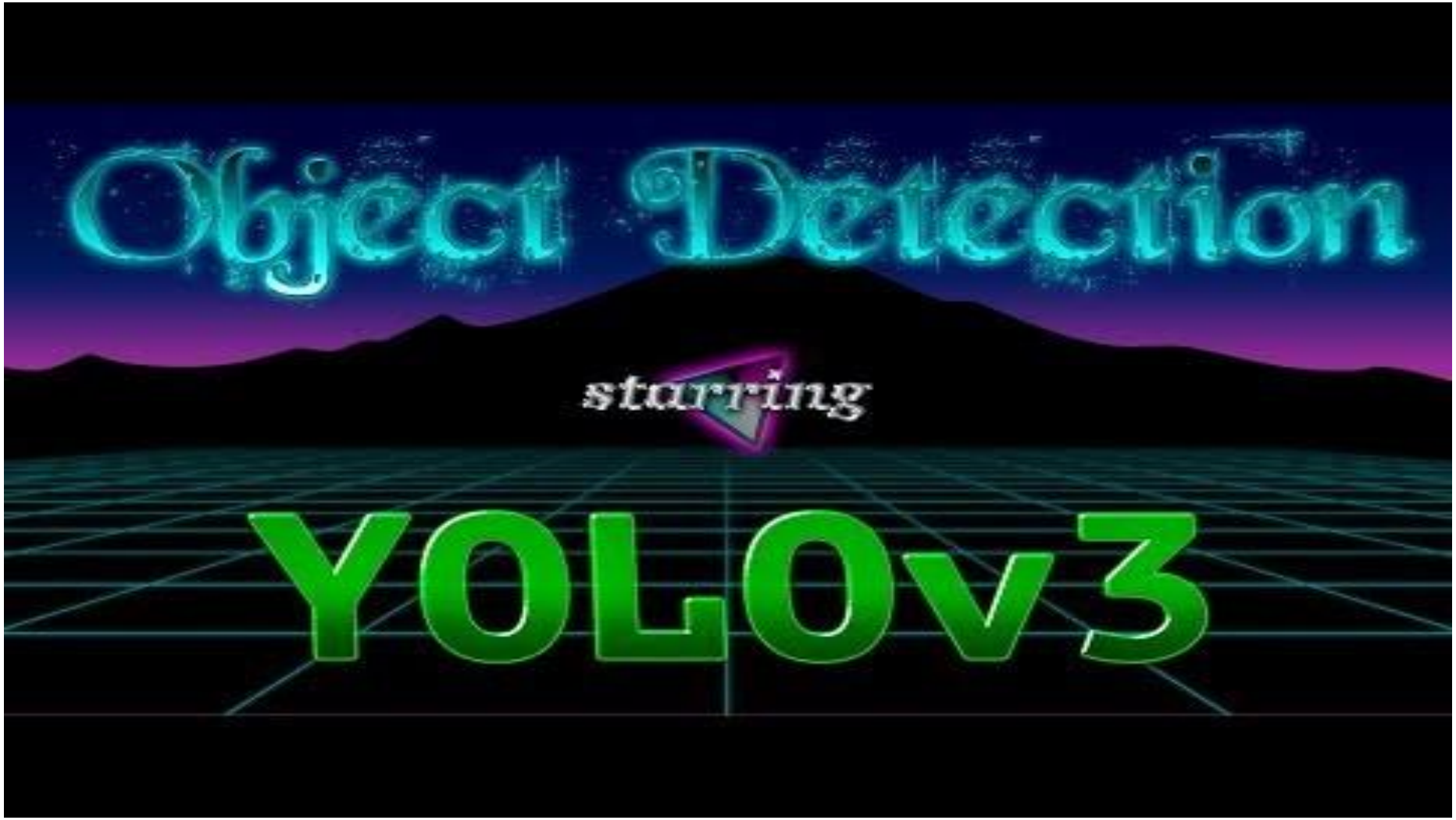
YOLO

- What is YOLO?
- You Only Live Once? [x]
- You Only **Look** Once!
- https://pjreddie.com/darknet/yolo/



YOLO

https://youtu.be/MPU2HistivI



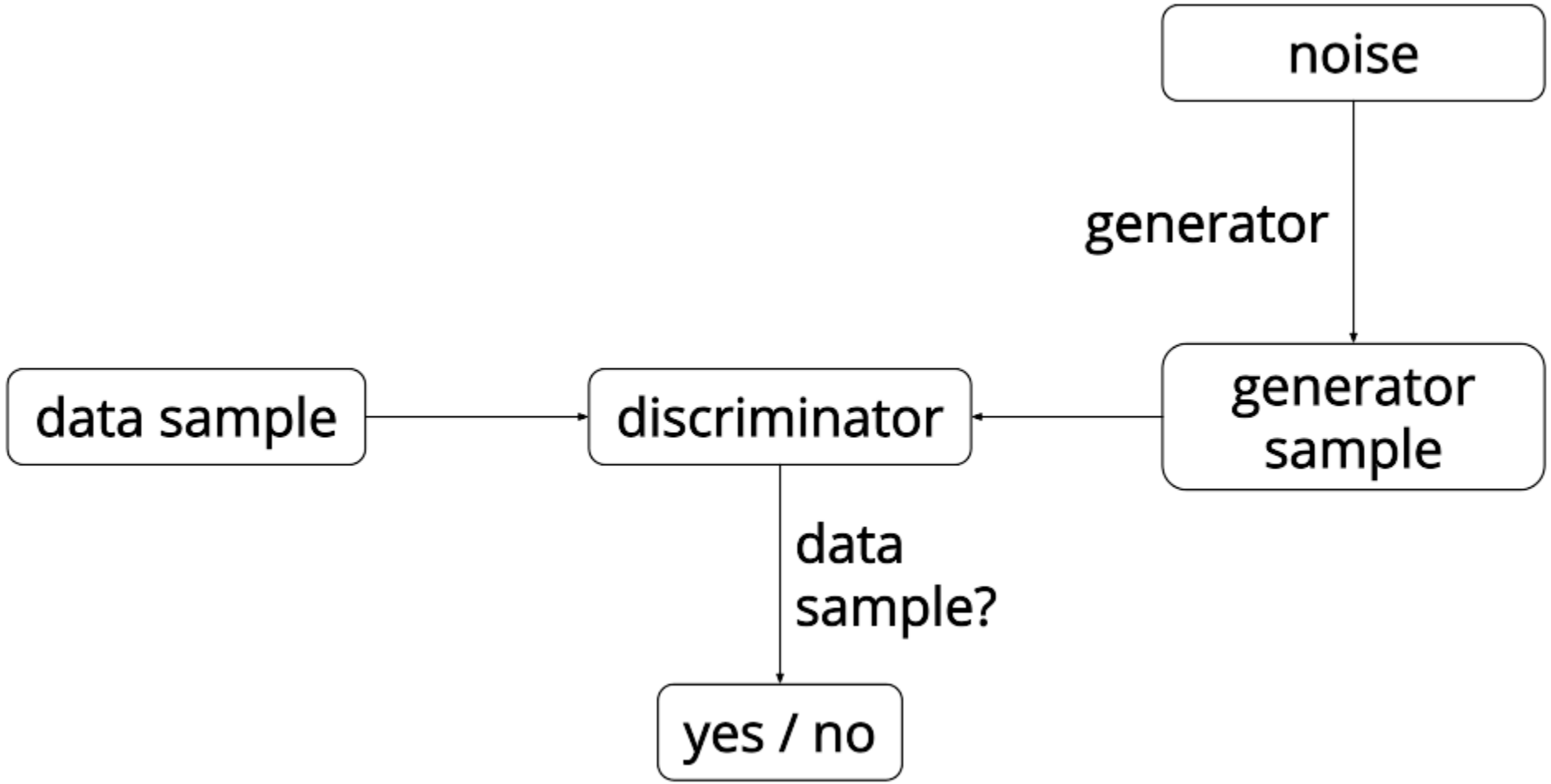
YOLO

- How to Use?
- Check out the darknet site…
- Wide application! ex] image detection / real-time image detection…
- Would be veeeeeery useful if you are doing autonomous driving proj.

GAN

- What is GAN?
- GAN stands for Generative Adversarial Networks
- 대부분의 여러분들이 개쩐다!라고 생각했던 딥-러닝은 GAN응용
- Applications : image synthesis, image generator,

GAN


noise
generator
generator sample
data sample
discriminator
data sample?
yes / no

GAN

- A **discriminative** model learns a function that maps the input data (*x*) to some desired output class label (*y*). In probabilistic terms, they directly learn the conditional distribution *P(y|x)*.

- A **generative** model tries to learn the joint probability of the input data and labels simultaneously, i.e. *P(x,y)*. This can be converted to *P(y|x)* for classification via Bayes rule, but the generative ability could be used for something else as well, such as creating likely new *(x, y)* samples.

GAN

for number of training iterations **do**

  for k steps **do**

- Sample minibatch of m noise samples $\{\boldsymbol{z}^{(1)}, \ldots, \boldsymbol{z}^{(m)}\}$ from noise prior $p_g(\boldsymbol{z})$.
- Sample minibatch of m examples $\{\boldsymbol{x}^{(1)}, \ldots, \boldsymbol{x}^{(m)}\}$ from data generating distribution $p_{\text{data}}(\boldsymbol{x})$.
- Update the discriminator by ascending its stochastic gradient:

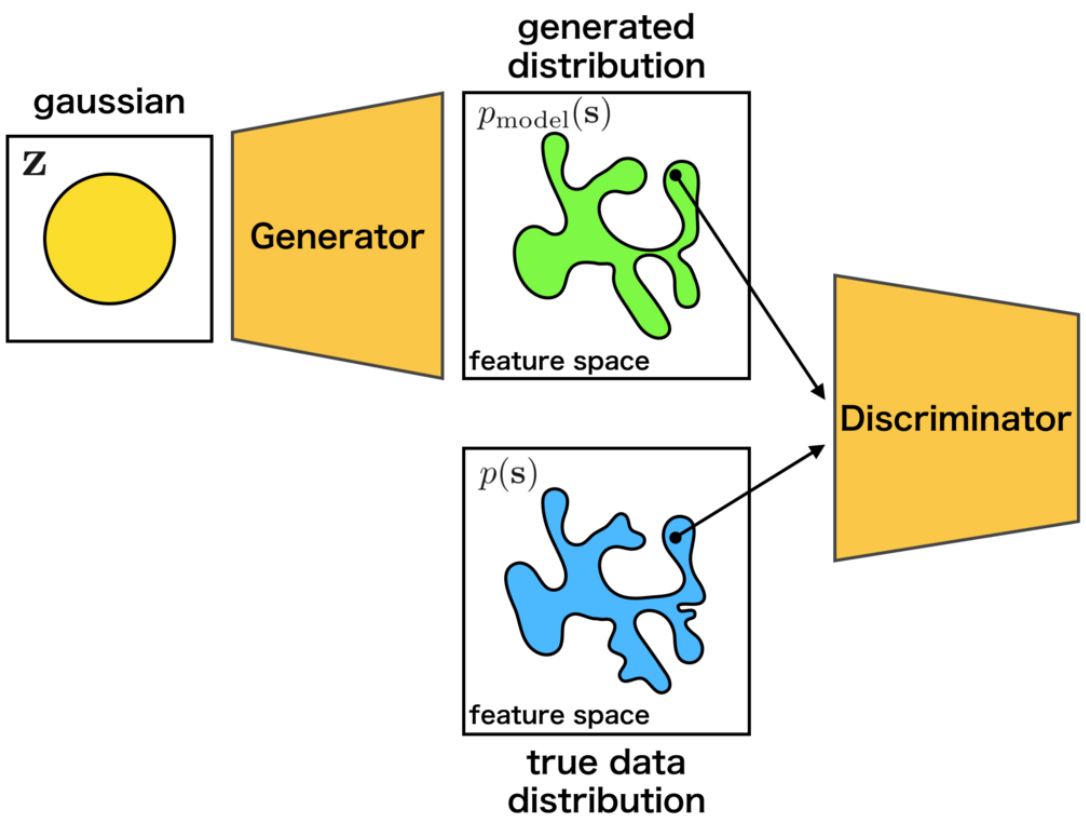
$$\nabla_{\theta_d} \frac{1}{m} \sum_{i=1}^{m} \left[\log D\left(\boldsymbol{x}^{(i)}\right) + \log\left(1 - D\left(G\left(\boldsymbol{z}^{(i)}\right)\right)\right) \right].$$

  end for

- Sample minibatch of m noise samples $\{\boldsymbol{z}^{(1)}, \ldots, \boldsymbol{z}^{(m)}\}$ from noise prior $p_g(\boldsymbol{z})$.
- Update the generator by descending its stochastic gradient:

$$\nabla_{\theta_g} \frac{1}{m} \sum_{i=1}^{m} \log\left(1 - D\left(G\left(\boldsymbol{z}^{(i)}\right)\right)\right).$$

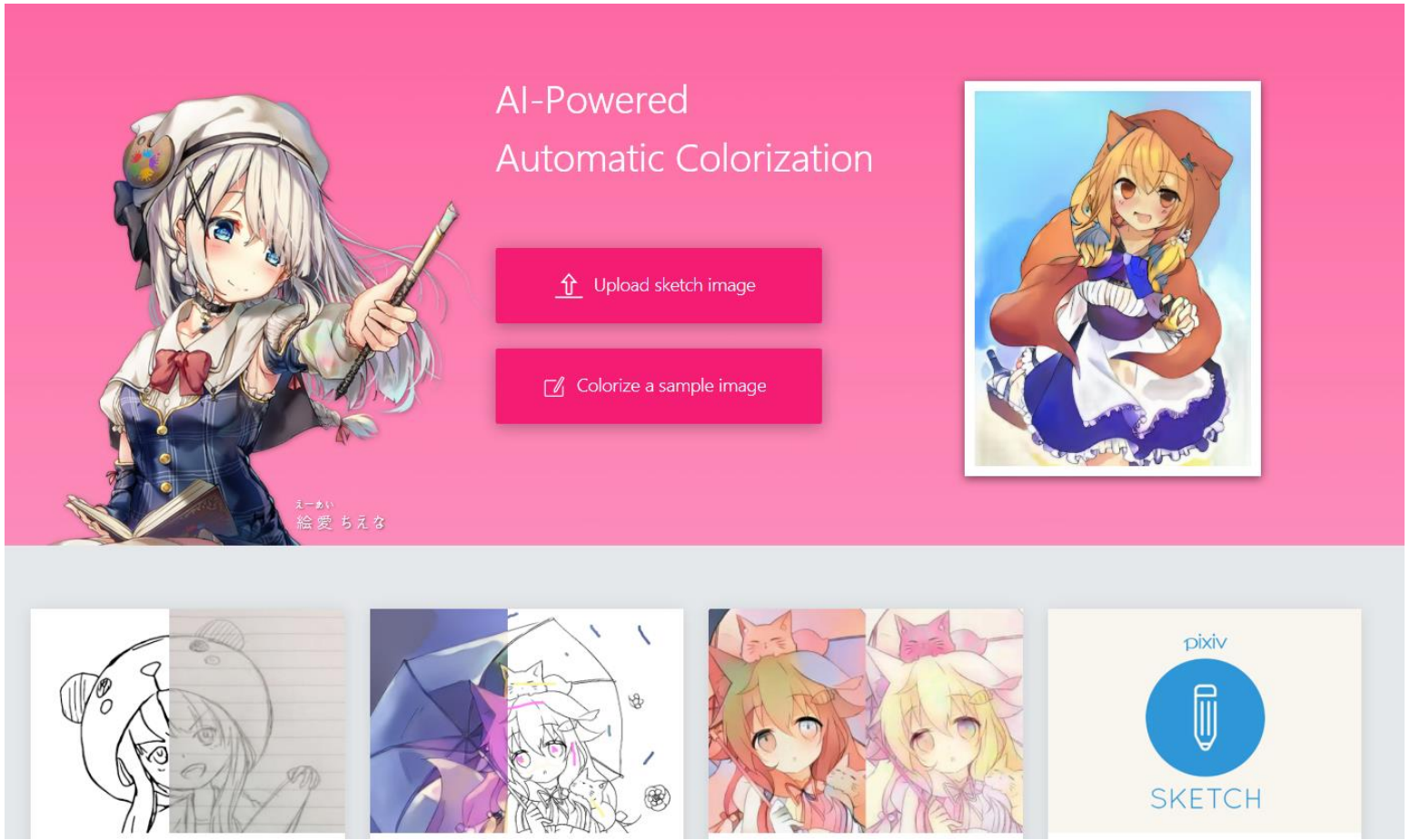
end for



GAN

- Applications

1] https://paintschainer.preferred.tech/index_en.html // auto-sketch



GAN

- Applications

2] https://arxiv.org/pdf/1710.10196.pdf // progressive GAN (super resolution)

Figure 5: 1024 × 1024 images generated using the CELEBA-HQ dataset. See Appendix F for a larger set of results, and the accompanying video for latent space interpolations.

GAN

- Applications

3] https://arxiv.org/pdf/1708.05509.pdf // auto-anime character generation

Figure 7: Generated samples

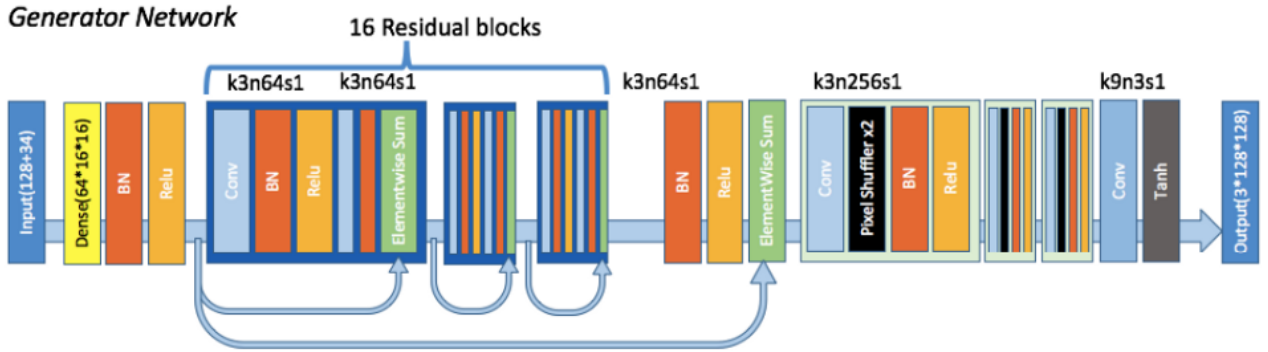


Figure 3: Generator Architecture

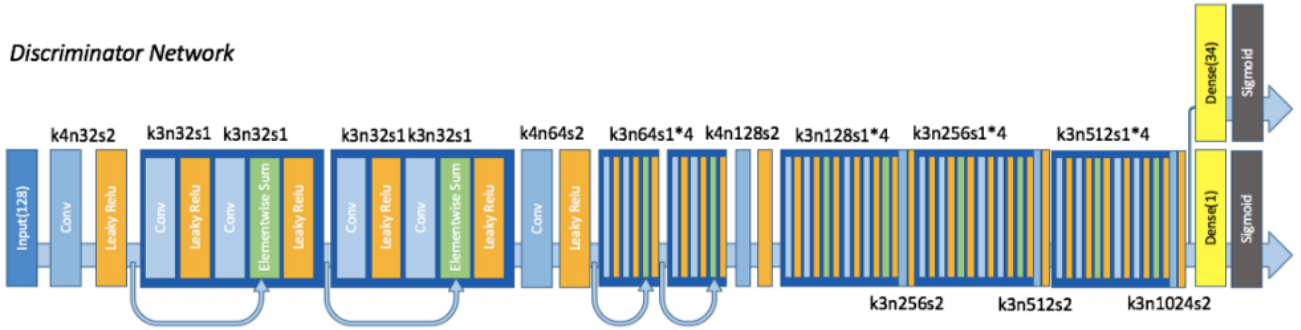
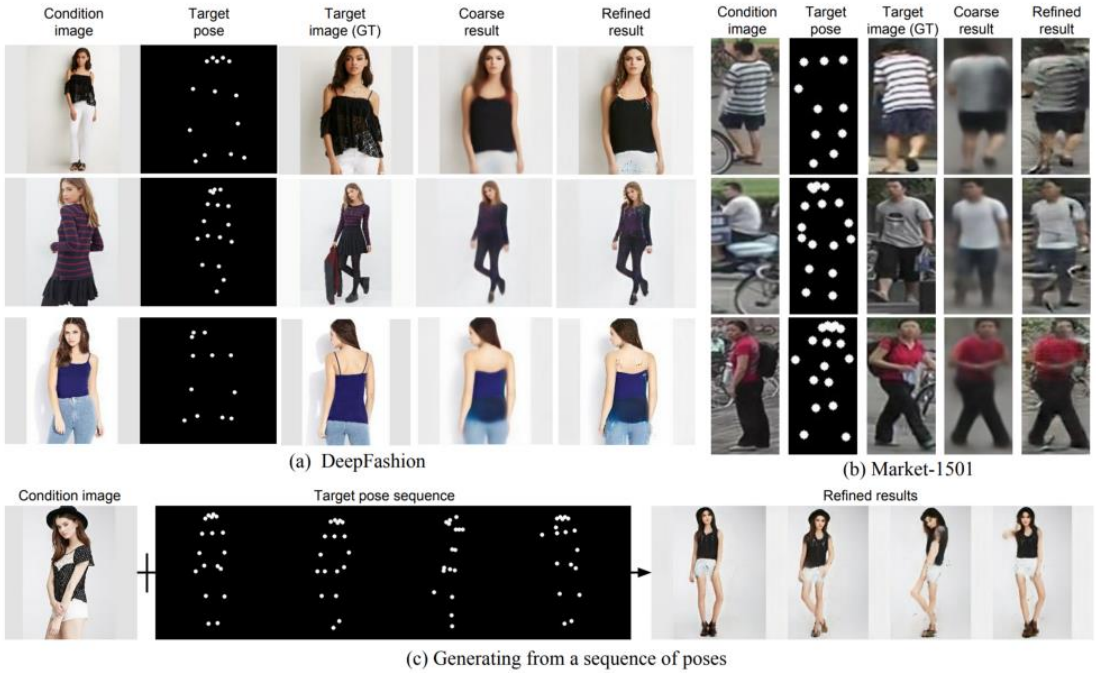


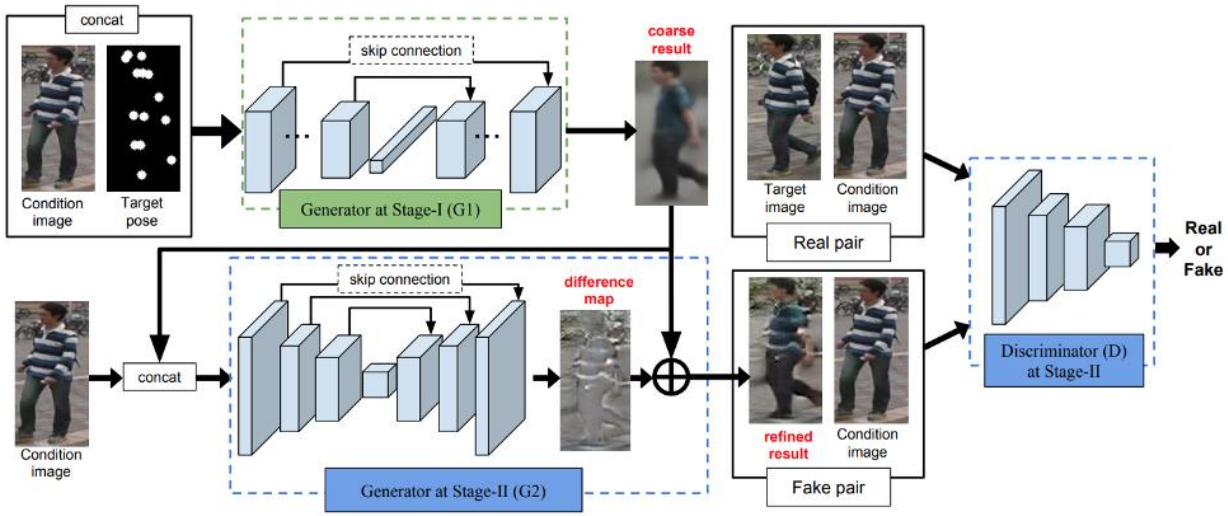
Figure 4: Discriminator Architecture

GAN

- Applications

4] https://papers.nips.cc/paper/6644-pose-guided-person-image-generation.pdf // pose-guided person image generation





GAN

- Applications

5] https://github.com/junyanz/CycleGAN // image - synthesis (cycleGAN)

GAN

- Applications

6] https://tcwang0509.github.io/pix2pixHD/ // pix-pix HD (reverse of image segmentation)

GAN

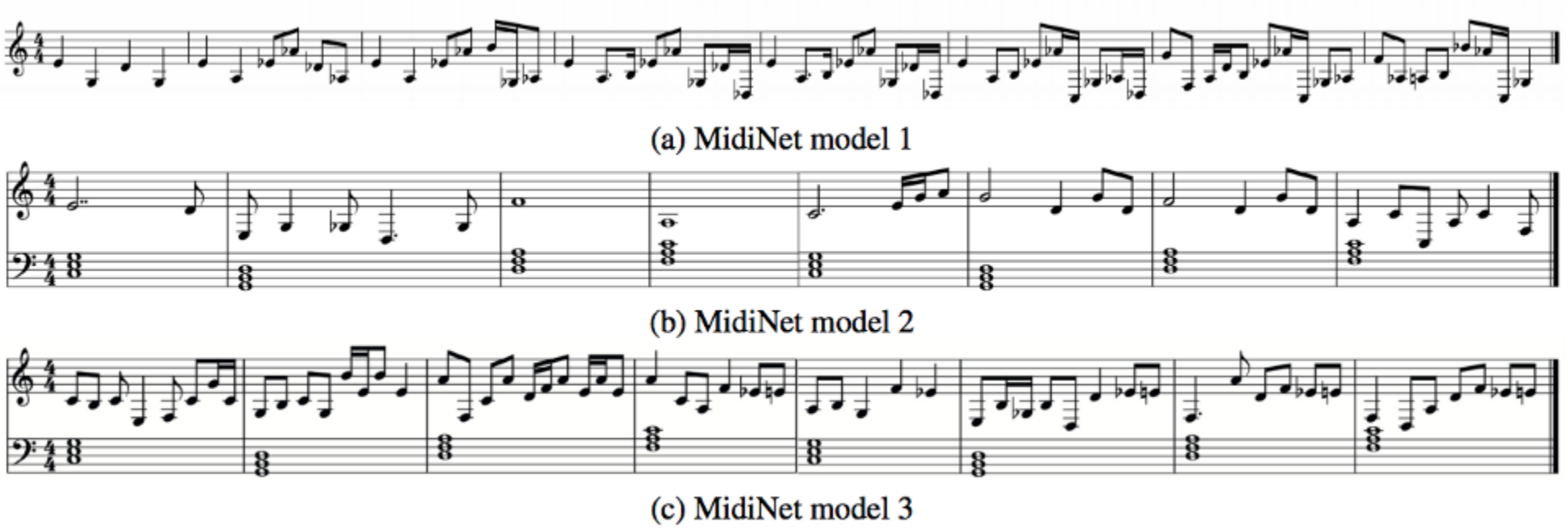
- Applications

7] https://github.com/hanzhanggit/StackGAN // stack GAN (text->image)

GAN

- Applications

8] https://arxiv.org/pdf/1703.10847.pdf // midi GAN (music generator)



(a) MidiNet model 1

(b) MidiNet model 2

(c) MidiNet model 3

Figure 3. Example result of the melodies (of 8 bars) generated by different implementations of MidiNet.

GAN

- Applications

9] http://papers.nips.cc/paper/6096-learning-a-probabilistic-latent-space-of-object-shapes-via-3d-generative-adversarial-modeling.pdf // 3d-GAN

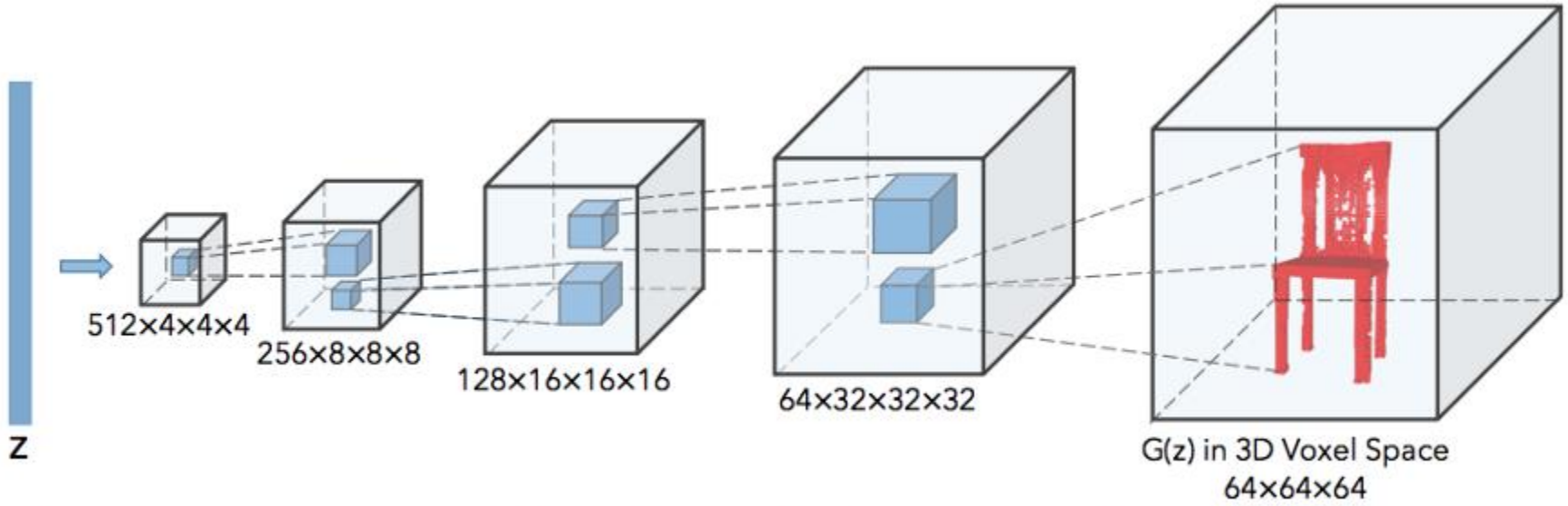
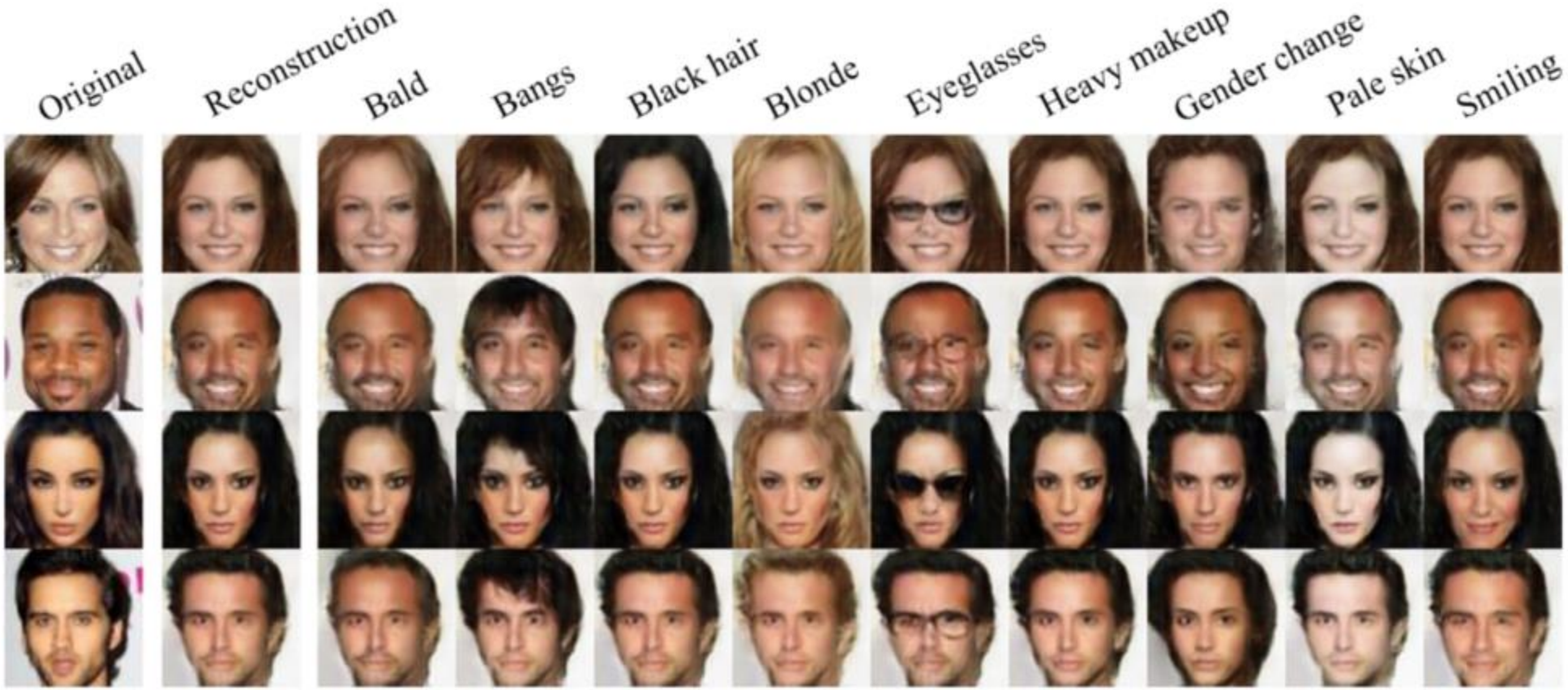


Figure 1: The generator in 3D-GAN. The discriminator mostly mirrors the generator.

GAN

- Applications

10] https://github.com/Guim3/IcGAN // Image Editing (IcGAN)



GAN

- Applications

11] https://arxiv.org/pdf/1611.02200.pdf // emoji (charcter)

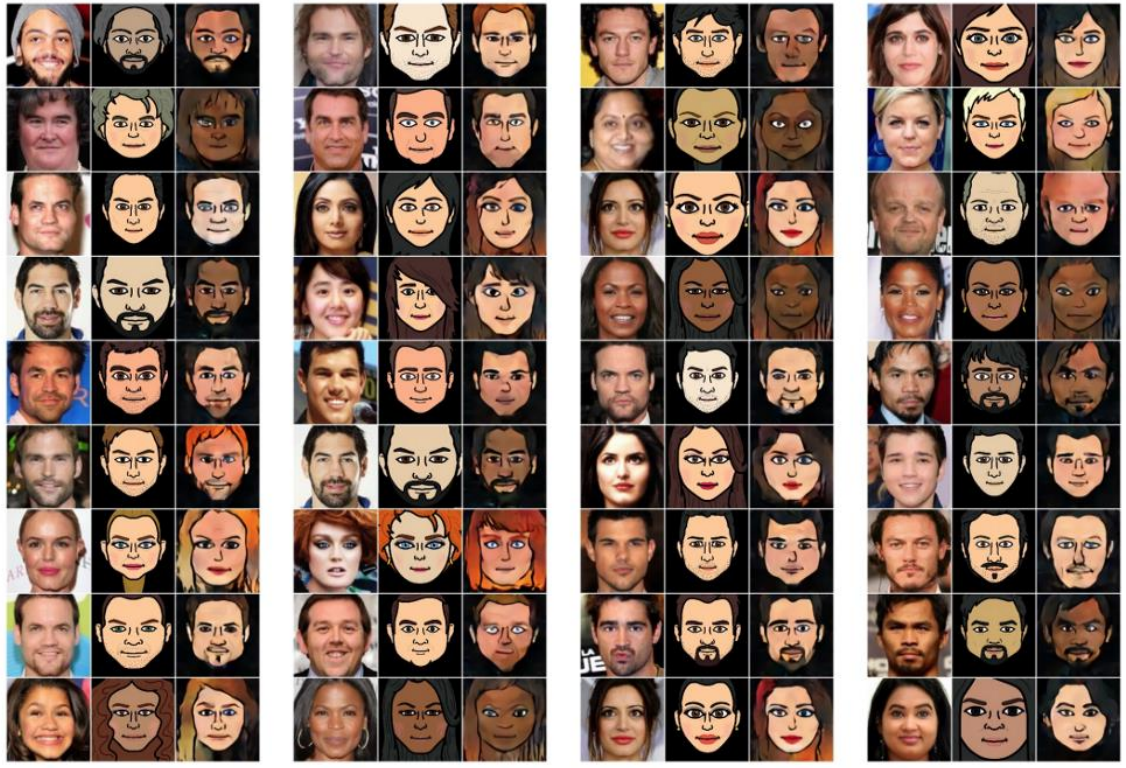


Figure 4: Shown, side by side are sample images from the CelebA dataset, the emoji images created manually using a web interface (for validation only), and the result of the unsupervised DTN. See Tab. 4 for retrieval performance.

Ref : https://medium.com/@jonathan_hui/gan-some-cool-applications-of-gans-4c9ecca35900

GAN

- Many GAN implementations are here!
- https://github.com/wiseodd/generative-models
- 이거 갖고 응용 / 본인의 데이터셋에 갖다 써보시고
- 그 이외의 GAN 모델들은 논문을 읽고 구현해야함.

Conclusion of DL - Seminar

- What we have learnt…

1] Python Basic (with codes)

2] Simple Linear / Logistic Regression (with codes)

3] SVM / KNN (with codes)

4] CNN (with codes)

5] RNN and LSTM (with codes)

6] YOLO (with materials only)

7] GAN (with codes)

Conclusion of DL - Seminar

- Deep Learning is **AWESOME**!
- “Almost” everything that you imagine can be implemented by DL
- Beyond Deep Learning ? **Reinforcement Learning**
- RL ? = Unsupervised Learning
- Super Mario AI : https://www.youtube.com/watch?v=qv6UVOQ0F44
- GTA AI : https://youtu.be/VRsmPvu0xj0?t=887

Conclusion of DL - Seminar

- Reinforcement Learning example

Q-Learning / DQN …

- See Lectures on Youtube :
- https://youtu.be/dZ4vw6v3LcA // (킹-한국어 강의임)
- https://youtu.be/xoxz-OmcL1Q // (waterloo 대학 강의)

Conclusion of DL - Seminar

- Thanks for your Attention!

딥러닝으로 시그마에서 다양한 프로젝트를 진행하시고, 공부하신 뒤에 후배들에게 딥러닝 세미나를 진행해주시길 부탁드립니다! ㅎㅎㅎㅎ

TRUST ME, I’M SIGMA