Generative Adversarial Networks

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Intro

What are some recent and potentially upcoming breakthroughs in deep learning?

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There are many interesting recent development in deep learning, probably too many for me to describe them all here. But there are a few ideas that caught my attention enough for me to get personally involved in research projects.

The most important one, in my opinion, is adversarial training (also called GAN for Generative Adversarial Networks). This is an idea that was originally proposed by Ian Goodfellow when he was a student with Yoshua Bengio at the University of Montreal (he since moved to Google Brain and recently to OpenAI).

Adversarial Networks

- First paper published July 2014
- Two networks - generator and discriminator battle and learn from each other
- Generator
  - Produce artificial images that can fool the discriminator
- Discriminator
  - Distinguish between real images and images made by the generator
- Goal is for the generator to create images that can fool a human
- Both use deep convolutional layers (DCGAN)

Company of Interest

- OpenAI
  - Non-profit artificial intelligence startup
  - HQ in San Francisco
  - Backed by Elon Musk
  - Hired the creators of GANs
  - Highly encourage checking out their website: https://openai.com/

Image generation

Image translation

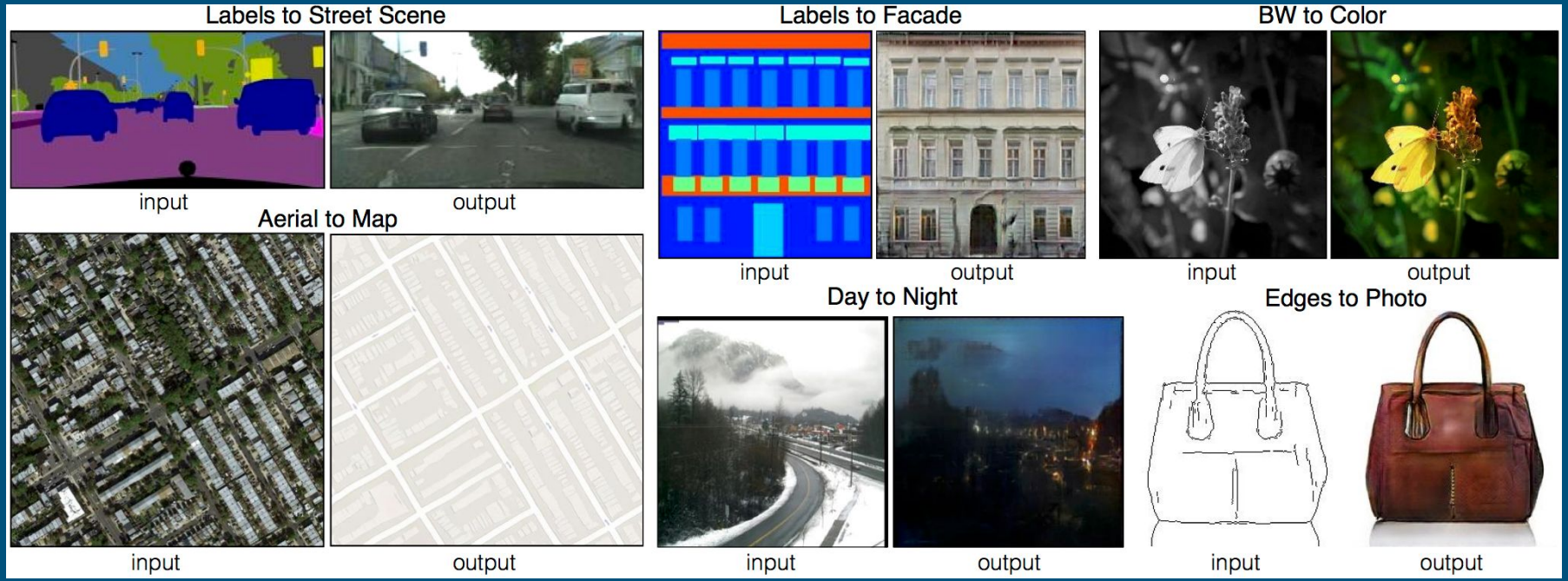


Image generation from sketches

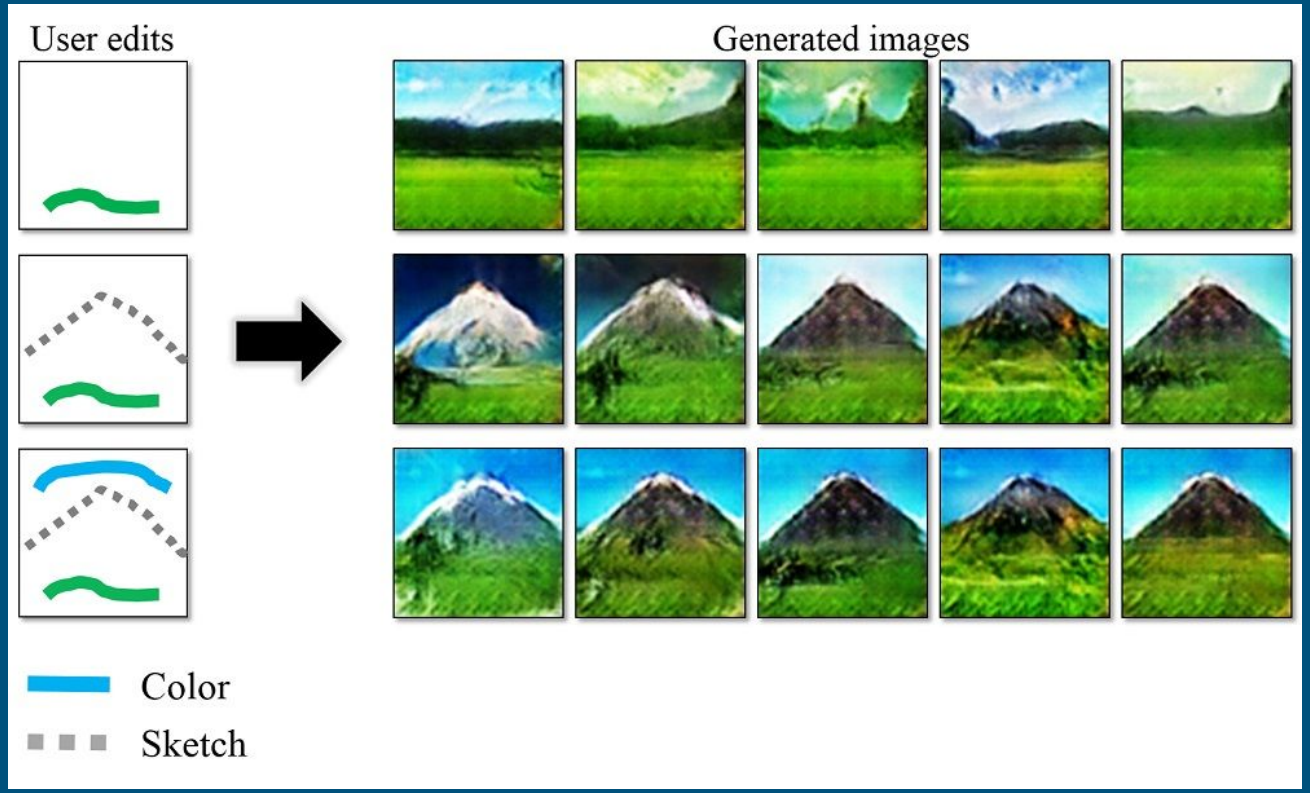
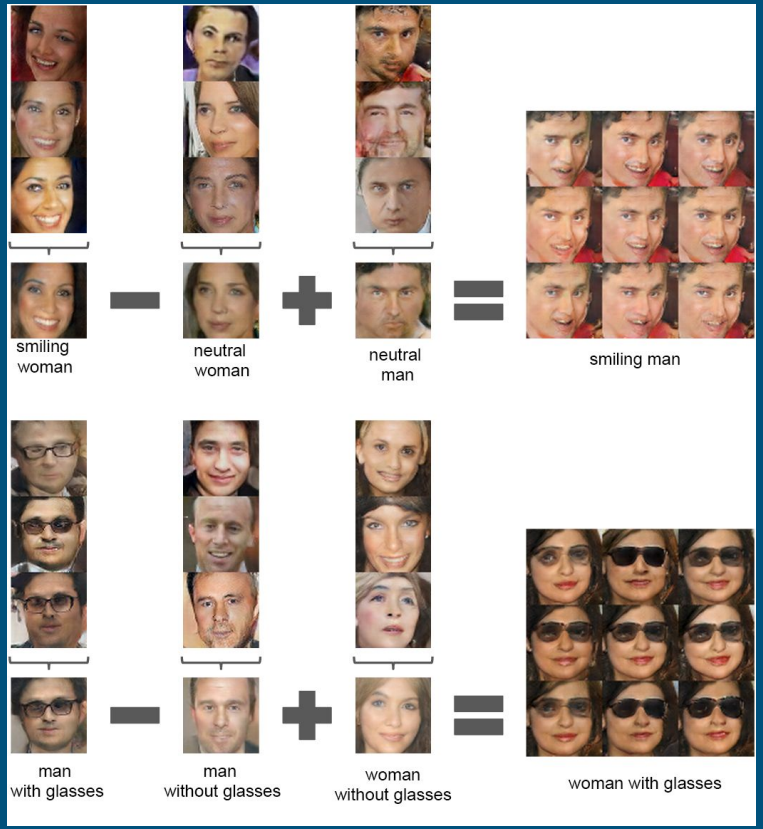


Image autocompletion

Deblurring images

Enhance!

Vector arithmetic



Text to image synthesis

Caption	Image
a pitcher is about to throw the ball to the batter	
a group of people on skis stand in the snow	
a man in a wet suit riding a surfboard on a wave	

Video generation

Projecting the future from images

References

https://phillipi.github.io/pix2pix/

https://github.com/junyanz/iGAN

https://github.com/mikesj-public/dcgan-autoencoder

http://web.mit.edu/vondrick/tinyvideo/

https://github.com/bamos/dcgan-completion.tensorflow

https://github.com/reedscot/icml2016

https://github.com/Newmu/dcgan_code

https://github.com/carpedm20/DCGAN-tensorflow