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1. Artistic Style Transfer


Artistic Style Transfer for Video

- Vincent van Gogh

In [1]:

```html
<center><iframe src="https://youtube.com/embed/ckqemfh0JMM?rel=0"
width="560" height="315" frameborder="0" allowfullscreen"></iframe></center>

[iSystems] Video Style Transfer Gogh

- Picasso

In [2]:

```html
<center><iframe src="https://youtube.com//embed/nMwU4avioVo?rel=0"
width="560" height="315" frameborder="0" allowfullscreen"></iframe></center>

[iSystems] Video Style Transfer Picasso
Revisit CNN

- Hierarchical feature representation
  - Contents representation
  - Style representation

Style Transfer

- Image construction
2. Discriminant Model vs. Generative Models

Imbalanced Data

- Not enough data from faulty status
- Data Imbalance
  - Under sampling
  - Over sampling
  - Re-weighting
  - (Ada)Boosting

\[
L(x, y, \theta) = \sum_{i=1}^{N} \omega(y_i) \cdot l(y_i, \hat{y}_i)
\]
Generative Model

- Data imbalance
  - Problematic in reality
  - For example, 98% OK, 2% NG

Application

Theory

: Generative model

: NG data distribution
Revisit Autoencoder with MNIST Data

Latent space

- label = 1
- label = 5
- label = 6
3. Generative Adversarial Networks (GAN)

- original paper by Ian J. Goodfellow (https://arxiv.org/abs/1406.2661)
- https://blog.openai.com/generative-models/
• How to generate data?
  ■ Train through competition
  ■ Generator vs. Discriminator

\[ H(D(G(z)), 1) + H(D(x), 0) \]

\[ H(D(G(z)), 0) \]
4. Deep Learning Implementation

Computation Environment for Model Learning

- Development environment (open source)
  - Ubuntu 14.04
  - Python3
  - TensorFlow

- Machine
  - GPU: GeForce GTX TITAN X (PASCAL)
  - CPU: Intel i7-5930k 6 Core 3.5GHz processor

- Parallel computing
  - Multi GPUs

![Diagram showing parallel computing with multi GPUs]
Implementation of Deep Learning Model

In [3]:
```html
<center><iframe src="https://www.youtube.com/embed/-eqVRXtX44Y?rel=0"
width="560" height="315" frameborder="0" allowfullscreen></iframe></center>
```

In [4]:
```javascript
$.getScript('https://kmahelona.github.io/ipython_notebook_goodies/ipython_notebook_toc.js')
```