



Perception

Image Classification


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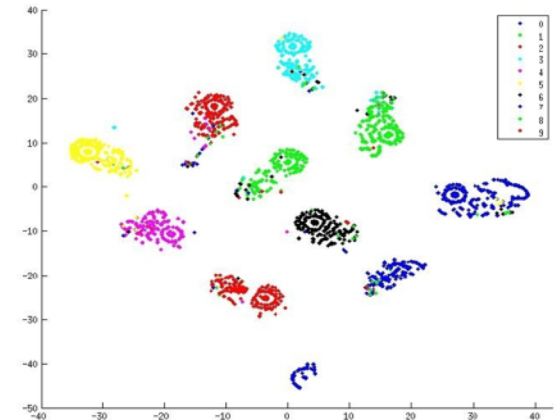
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Problem Definition

$$F(\text{) = \textit{CAT}$$

- | **Image classification (or object recognition):**
Identifying objects in an image
- | **F:** Classifier to be learned
- | **Input:** Image
- | **Output:** Object label

General Workflow



Feature
Extraction



Feature



Classification
Models

| Image Classification:

- A classification task is usually not built upon images directly – representations (or features) are used.

Relevant Methods



| Classification Methods:

- Random Forest
- Support Vector Machine (SVM)
- Multi-Layer Perceptron

| Feature Extraction Methods:

- Simple textual features + handcrafted model
- Feature Descriptor (SIFT, HOG, SURF)
- Deep Convolutional Neural Network (AlexNet, VGG Net, ResNet)

Reading Materials



| Classification Tutorials:

- Machine Learning, CMU

| Image Feature Tutorials:

- Detectors and Descriptors

| Deep Learning Based:

- Convolutional Neural Network
- CNN in Computer Vision, Stanford
- Residual Network

“Machine Learning,” Machine Learning 10-601: Lectures. [Online]. Available: <http://www.cs.cmu.edu/~ninamf/courses/601sp15/lectures.shtml>. [Accessed: 11-May-2019].

Detectors and descriptors In-text: (Savarese, 2019) Available at: http://cvgl.stanford.edu/teaching/cs231a_winter1415/lecture/lecture10_detector_descriptors_2015.pdf [Accessed 11 May 2019].

Unsupervised Feature Learning and Deep Learning Tutorial. [Online]. Available: <http://deeplearning.stanford.edu/tutorial/supervised/ConvolutionalNeuralNetwork/>. [Accessed: 11-May-2019].

He, Kaiming, et al. "Deep residual learning for image recognition." Proceedings of the IEEE conference on computer vision and pattern recognition. 2016.