

Pattern Recognition

<http://github.com/yungbyun/pr>

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Pattern is every where.

- Image
- Voice (speech)
- Text
- in various data



Pattern Recognition

a branch of **machine learning** that focuses on the recognition of patterns in the **data**

in Wikipedia

Pattern Recognition

- is a **mature** but exciting and fast developing field
- such as computer vision, image processing, text and document analysis and neural networks.
- It is closely akin to machine learning, and also finds applications in biometrics, bioinformatics, multimedia data analysis and most recently data science.

by Elsevier

Approaches for PR

- Structural approaches
- Statistical methods
- Machine Learning with SVM, XGBoost, and others
- Deep Learning with Neural Networks, CNN

Trainable NN

- Back-propagation problem in 2006,
- initialize weights carefully, next, do back-propagation, then it works.
- call it **deep learning** (by Geoffrey Hinton & Ruslan Salakhutdinov).
- however, still not better than other methods

Big results using NN

- In 2010,
- in **speech recognition**

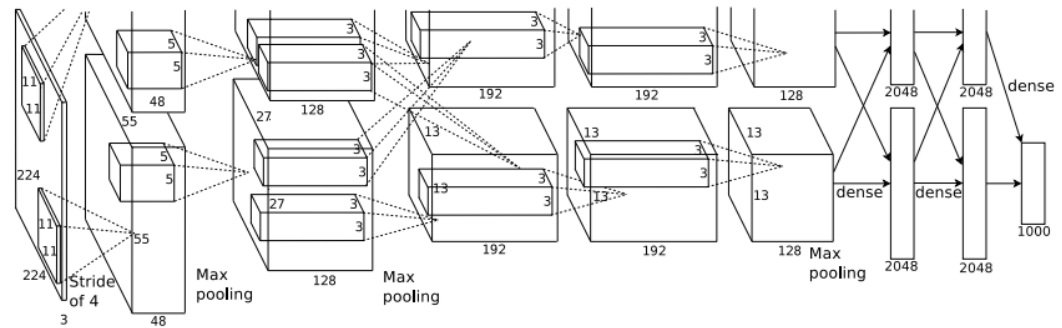
*Context-Dependent Pre-trained Deep Neural Networks
for Large Vocabulary Speech Recognition*
George Dahl, Dong Yu, Li Deng, Alex Acero, 2010

- better than other methods
including kernels or SVM's

Huge improvements

- CNN in 2012
- it played out even more dramatically in the domain of visual recognition.
- AlexNet, ImageNet classification
- The first time neural networks really gave huge improvements
- So big attention in deep neural networks

CNN, Convolutional Neural Networks



Full (simplified) AlexNet architecture:

[227x227x3] INPUT

[55x55x96] **CONV1**: 96 11x11 filters at stride 4, pad 0

[27x27x96] **MAX POOL1**: 3x3 filters at stride 2

[27x27x96] **NORM1**: Normalization layer

[27x27x256] **CONV2**: 256 5x5 filters at stride 1, pad 2

[13x13x256] **MAX POOL2**: 3x3 filters at stride 2

[13x13x256] **NORM2**: Normalization layer

[13x13x384] **CONV3**: 384 3x3 filters at stride 1, pad 1

[13x13x384] **CONV4**: 384 3x3 filters at stride 1, pad 1

[13x13x256] **CONV5**: 256 3x3 filters at stride 1, pad 1

[6x6x256] **MAX POOL3**: 3x3 filters at stride 2

[4096] **FC6**: 4096 neurons

[4096] **FC7**: 4096 neurons

[1000] **FC8**: 1000 neurons (class scores)



How this class goes...

Self-driven research and presentation
using the **open sources** in



kaggle.com



github.com

Keywords for code retrieval

- CNN, AlexNet, ResNet, DenSeNet, LeNet, VGG
- Image classification
- Linear Regression
- Voice recognition
- Cancer detection
- Disease Classification
- others

Presentation Schedule

Week	Presenter(s)
1	
2	Introduction (Y. Byun)
	Holiday(Chuseok)
3	Convolutional Neural Networks
4	Presentation1 {리즈완 아티프, 장림초}
5	Presentation2 {과웁 피자, 차트라지 수바지, 칸 아남 나와즈}
6	Presentation3 {자밀 하룬, 김용준}
7	Mid-term Evaluation

Presentation Schedule

Week	Presenter
8	Presentation4 {자파리 사디카, 허윤경,사르워 수레만}
9	Presentation5 {장철희, 김재민}
10	Presentation6 {임규영, 오지훈, 김동현}
11	Presentation7 TBA
12	Presentation8 TBA
13	Presentation9 TBA
14	Presentation10 TBA
15	Presentation11 TBA

From now on,
you can find open source and
take it in advance.

See you on **September 28th**
at 7pm online!