Assisted Excitation In Deep Learning

To Appear in CVPR'19

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+10M Customers
+400K Daily Rides
+ ETA
+ Pricing
+ Ridesharing

+ 500K Customers
+ 12K Service Providers
+ 1000 Daily Services
+ 400 Categories
+ Pricing
Image Recognition Problems

Classification

Classification + Localization

Object Detection

Instance Segmentation

CAT

CAT

CAT, DOG, DUCK

CAT, DOG, DUCK

Single object

Multiple objects
Image Classification Over Time (Error rate)

- 2010: 28%
- 2011: 26%
- 2012: 16%
- 2013: 12%
- 2014: 7%
- Human: 5%
- 2015: 3.6%
- 2016: 3%
- 2017: 2.3%
Object Detection Benchmark

Average Precision vs. Frames Per Second

- Retina-101 (500x500)
- Retina-50 (800x800)
- Retina-50 (500x500)
- YOLOv3+ (608x608)
- YOLOv3 (608x608)
- YOLOv3+ (416x416)
- YOLOv3 (416x416)
- YOLOv3+ (320x320)
- YOLOv3 (320x320)
- YOLOv2+ (544x544)
- YOLOv2 (544x544)
- Faster R-CNN
- ResNet (512x512)
- Faster R-CNN
- VGG-16
- SSD (300x300)
- SSD (512x512)
Demo

- **Iterations:** 000,973
- **Learning rate:** 0.01
- **Activation:** ReLU
- **Regularization:** None
- **Regularization rate:** 0
- **Problem type:** Classification

**DATA**
- Which dataset do you want to use?
- Ratio of training to test data: 50%
- Noise: 0
- Batch size: 5
- REGENERATE

**INPUT**
- Which properties do you want to feed in?

**HIDDEN LAYER**
- 1 HIDDEN LAYER
- 8 neurons

**OUTPUT**
- Test loss 0.018
- Training loss 0.007
- Colors show data, neuron and weight values.
- Show test data
- Discretize output
Assisted Excitation
Assisted Excitation
Assisted Excitation
(N x N)

Stage 0 1 2 3 4 5
Stride N N/2 N/4 N/8 N/16 N/32

- Convolution
- Detection
- Downsampling
- Assisted Excitation (Ours)
Results

mAP vs. Object Size

- YOLOv3+
- YOLOv3
- YOLOv2+
- YOLOv2

mean Average Precision (%)

Small  |  Medium Object Size  |  Large

0      |  10                  |  20
10     |  20                  |  30
20     |  30                  |  40
30     |  40                  |  50
40     |  50                  |  60
Discussion
Thank you