PROBLEM SET 5: CAT OR DOG?

Yinda Zhang @ 4:30pm-5:30pm, Room CS 105
NEURAL NETWORK

Input with fixed dimension → Neural Network → Output with fixed dimension

Binary: Cat?
Neural Network in 5 minutes

- Operations are called layers
- Results (in & out) are called responses (aka activation)

\[ y = \sum_{i} w_i x_i + b \]

Any (almost) differentiable function
CAT OR DOG?
WHY DEEP LEARNING?

Any reasonably well-behaved function can be approximated as close as we want by a two-layer network.

Then, why deep?
Then, why non-linear?
DEEP NEURAL NETWORK

Model is deep, need more parameters
Big data
Memory limitation
Convolutional Neural network
Mini-batch training
Cannot perform global optimization
Gradient descend
Need good initial
Fine-tune from a good initial
PROBLEM 1 & 2

Define a network: JSON
Train & Test Marvin: Call…
MNIST
Tensor
PROBLEM 3&4

Prepare data
Modify alexnet.json
Train from scratch
Train by fine-tune
Overfitting?
PROBLEM 5

Try many inputs and see which one cause high response
Problem 5

Alexnet is pre-trained for 1000-classification.
Low-level kernels detect simple geometry.
Top-level kernels respond to class-specific patterns.