PROBLEM SET 5: CAT OR DOG?

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

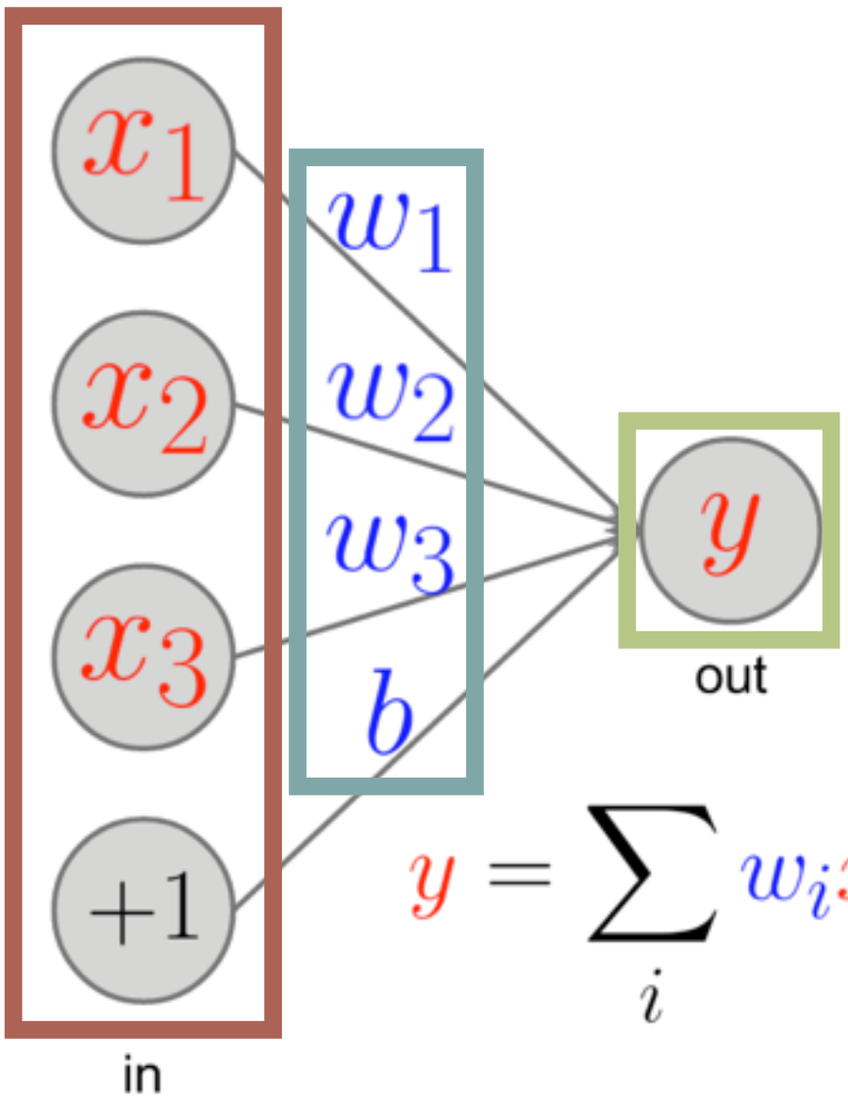
NEURAL NETWORK

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

Binary: Cat?

NEURAL NETWORK

Neural Network in 5 minutes



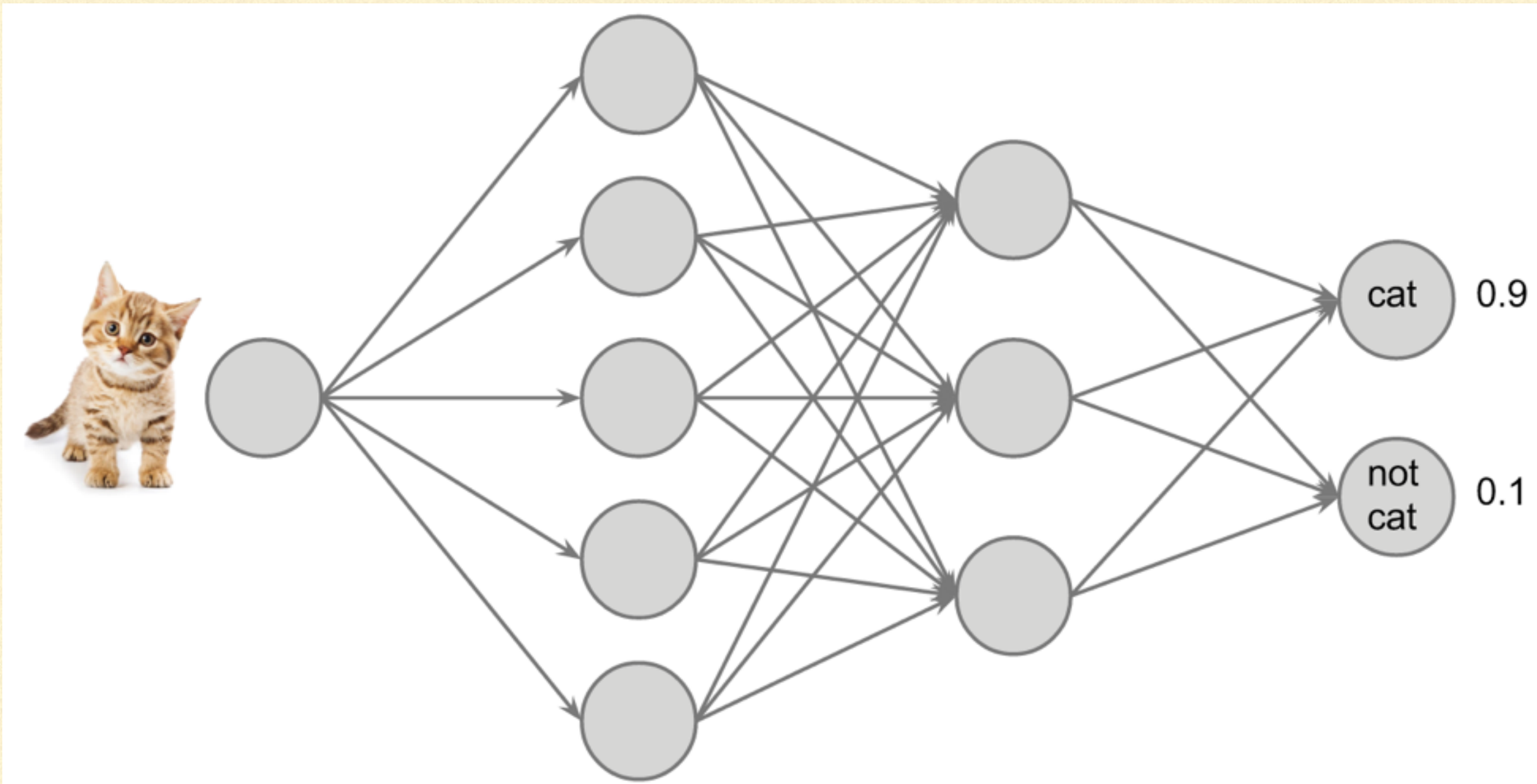
- Operations are called layers
- Results (in & out) are called responses (aka activation)

$$y = \sum_i w_i x_i + b$$

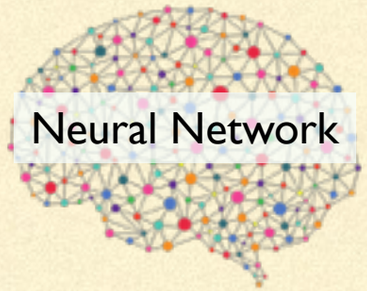
$$y = f(x)$$

any (almost) differentiable function

CAT OR DOG?



WHY DEEP LEARNING?

Input with fixed dimension → 

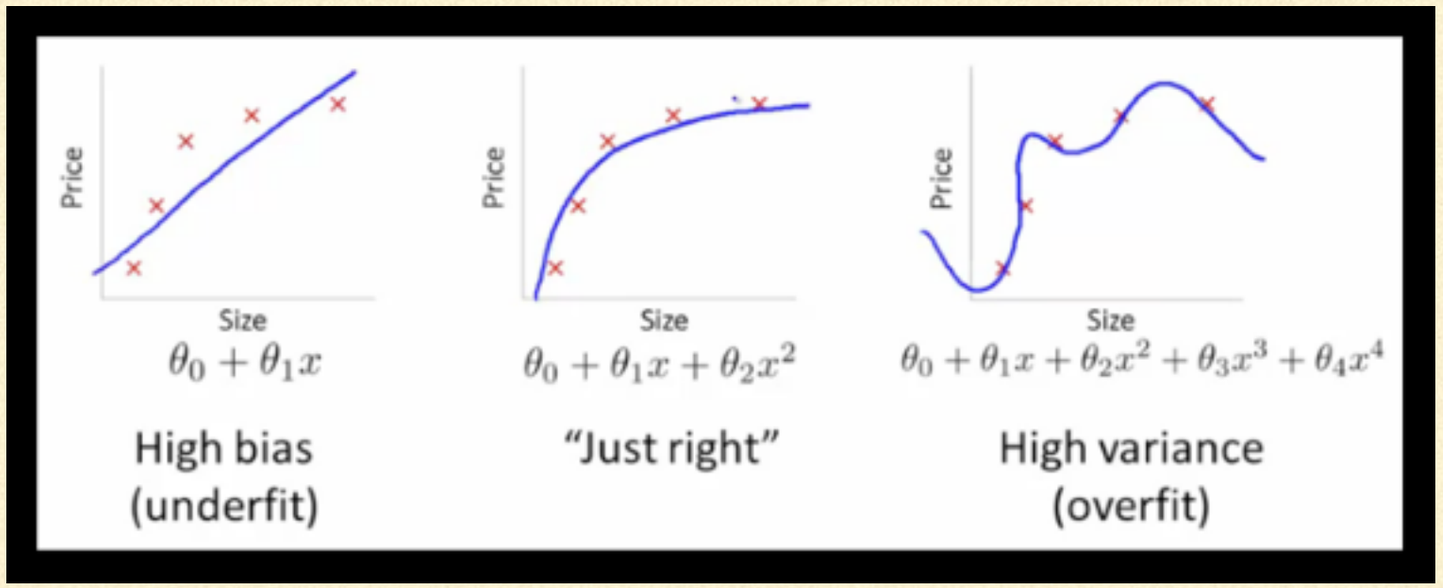
→ Output with fixed dimension

Output = F(Input)

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

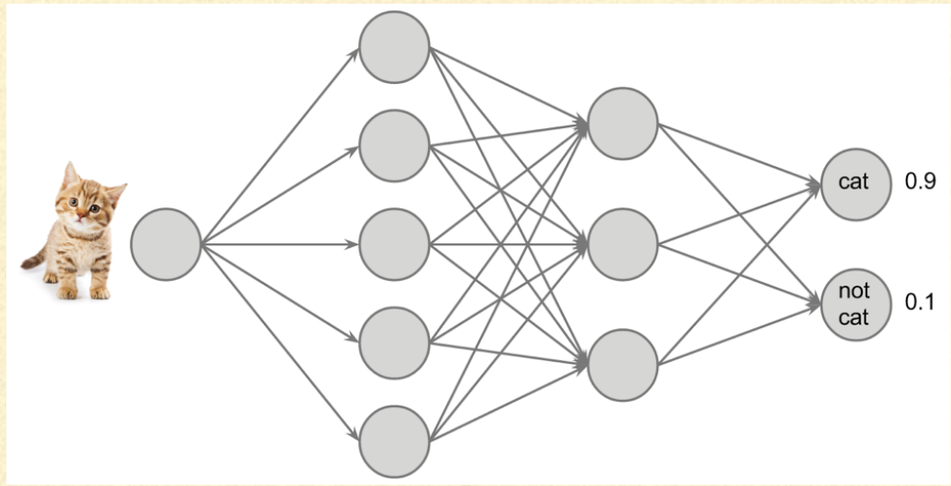
Mini-batch training

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

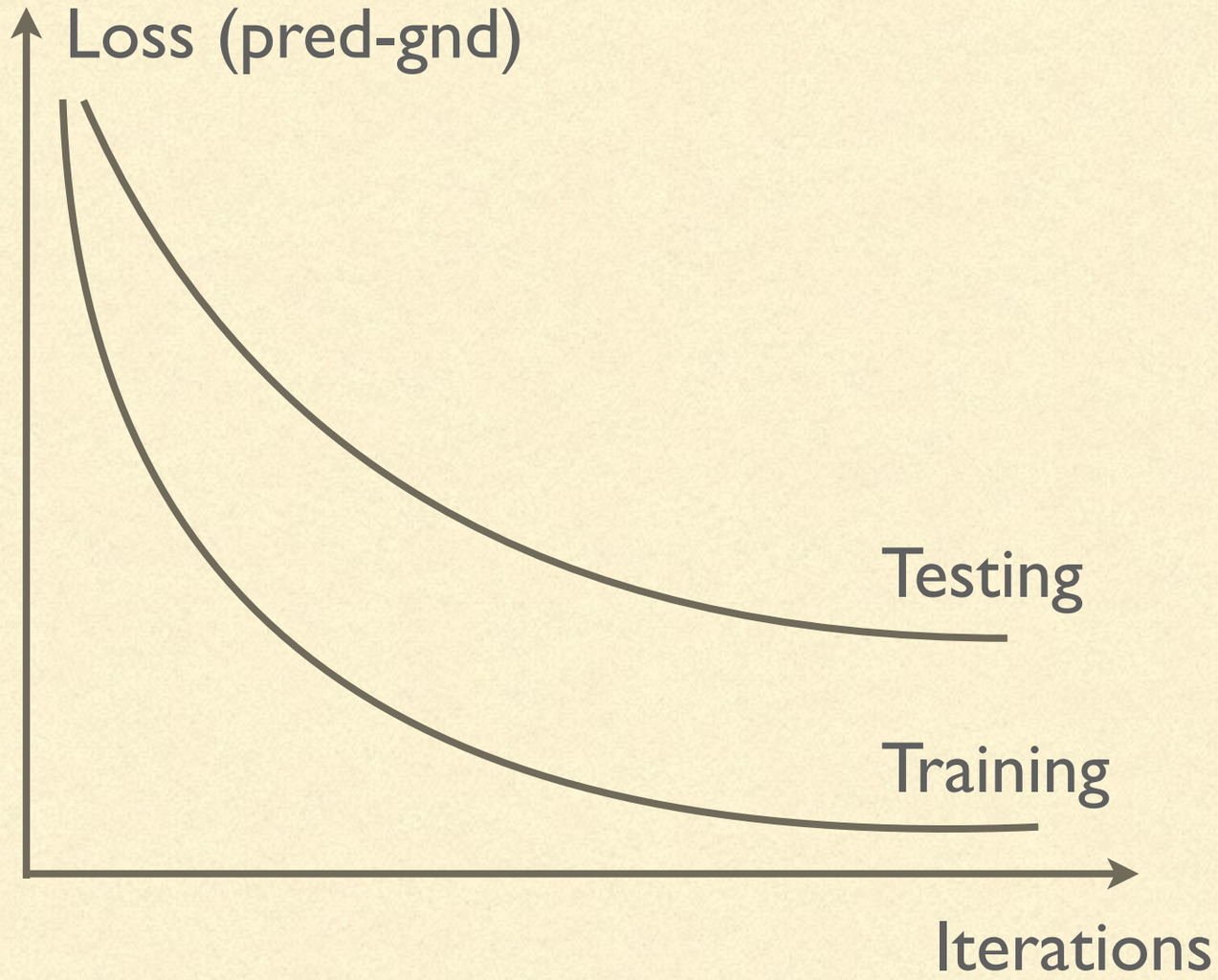
Prepare data

Modify alexnet.json

Train from scratch

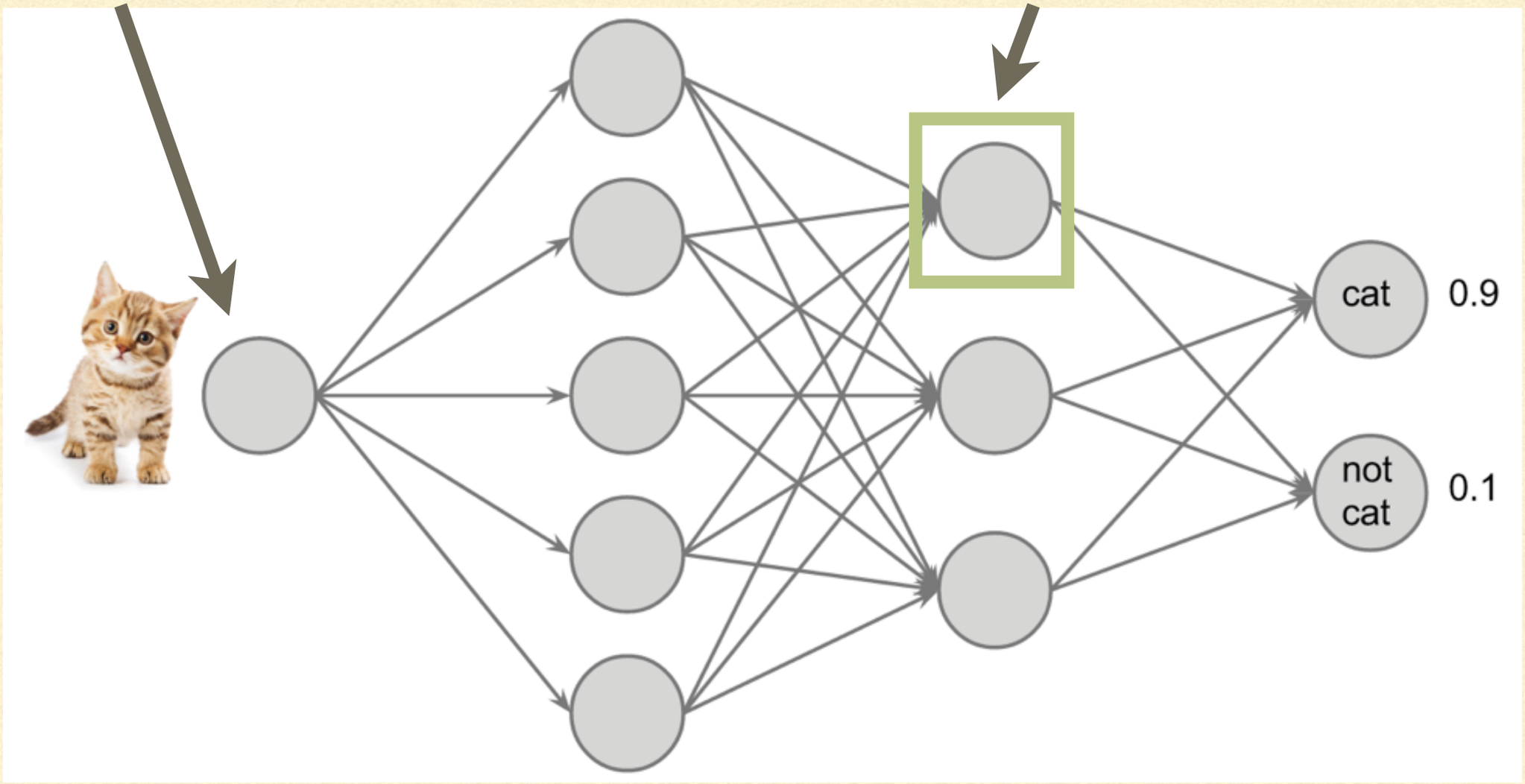
Train by fine-tune

Overfitting?



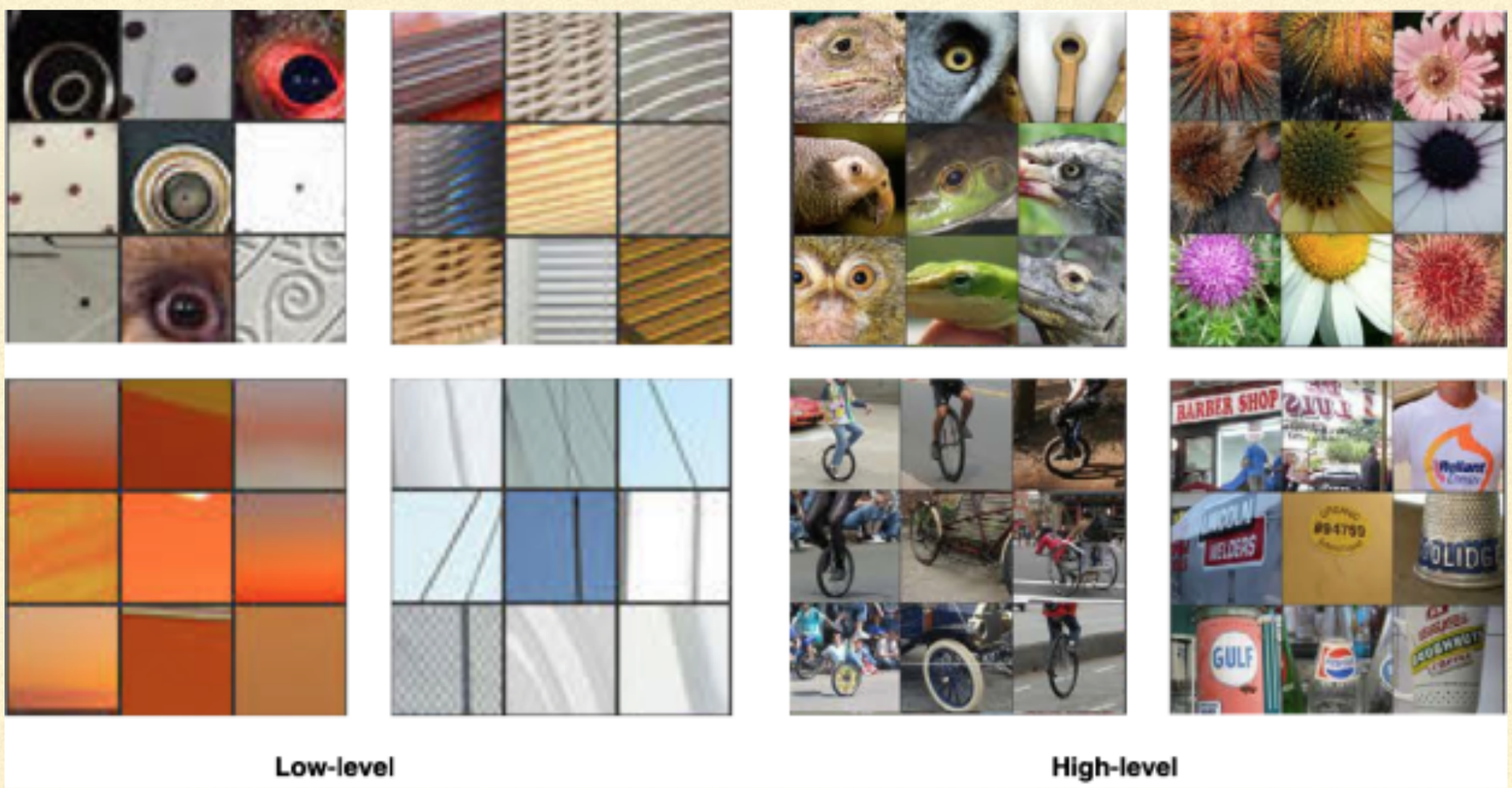
PROBLEM 5

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.



Low-level High-level