

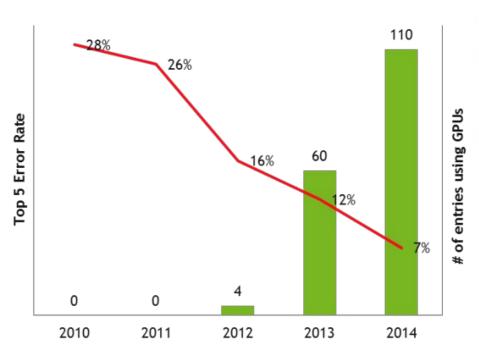
# Image Classification based on CNN

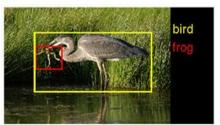
T11 - PangCloud (Tianyang Liu, Yicheng Wang, Su Pu)

### Motivation and Background

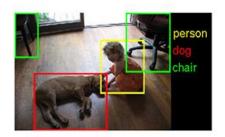
Deeper learning! Need GPU! Cloud! Cloud! Cloud!

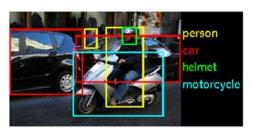






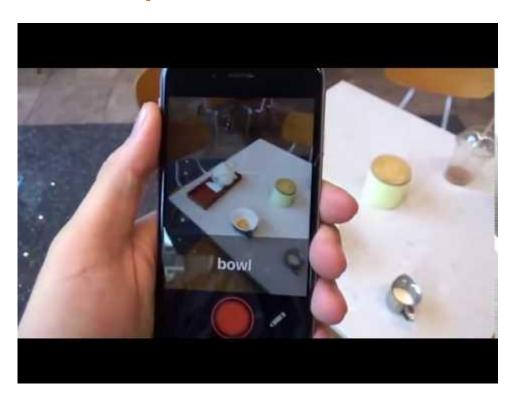






Reference: http://image-net.org/

## Why Cloud?

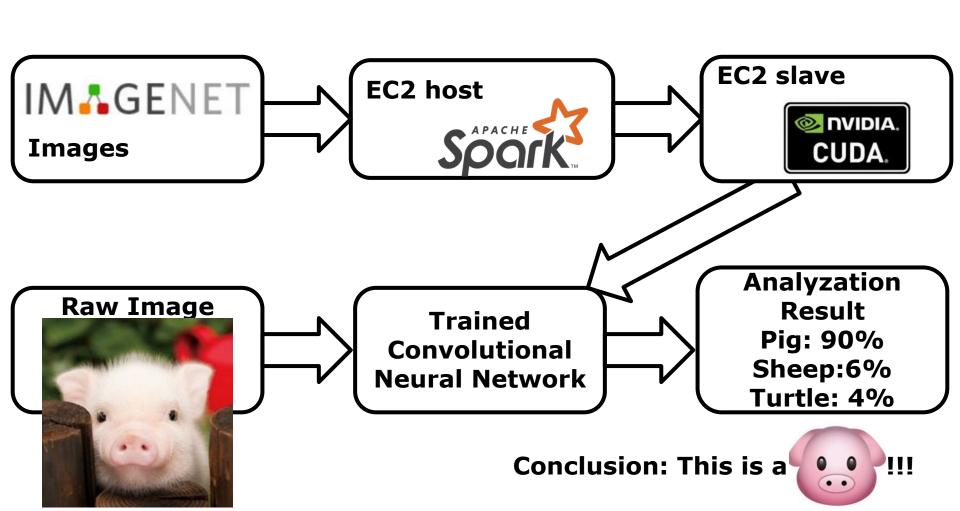


#### OR

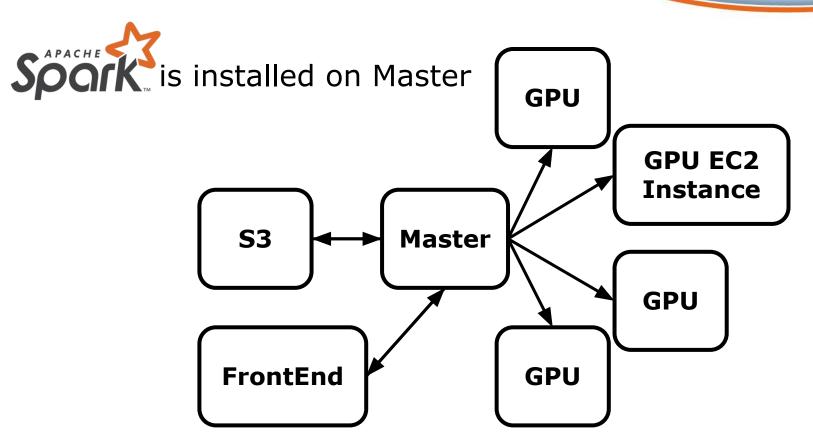
Hey Siri, what's this?

Aipoly Vision App which recognizes objects on iphone, but is limited on hundreds of objects.

#### **Overview Architecture**

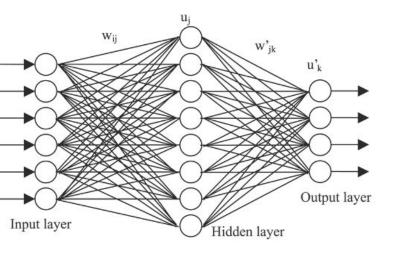


#### Platform and Framework



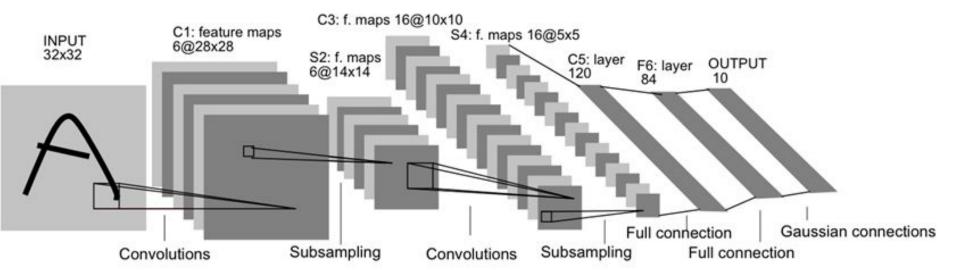
Have TensorFlow / cuDNN / Numba for CNN training

#### Convolutional Neural Networks



The full connection algorithm of ordinary Neural Network would lead to tremendous computation.

Input image 200\*200\*3

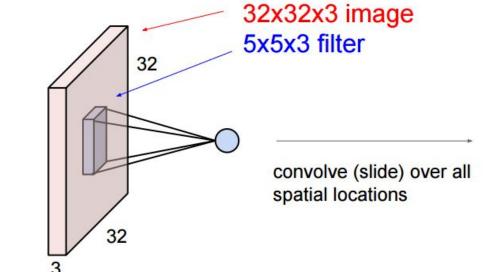


#### 1. Convolutional layer

#### activation map

28

28



| 1,  | 1,0 | 1,  | 0 | 0 |  |
|-----|-----|-----|---|---|--|
| 0,0 | 1,  | 1,0 | 1 | 0 |  |
| 0,1 | 0,0 | 1,  | 1 | 1 |  |
| 0   | 0   | 1   | 1 | 0 |  |
| 0   | 1   | 1   | 0 | 0 |  |

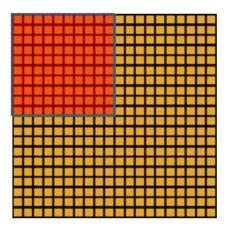
**Image** 

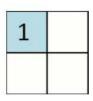
Convolved Feature

4

3

## 2. Pooling layer

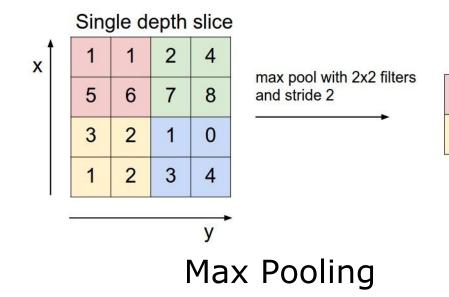




**Down sample** to make the representations smaller and more manageable

6

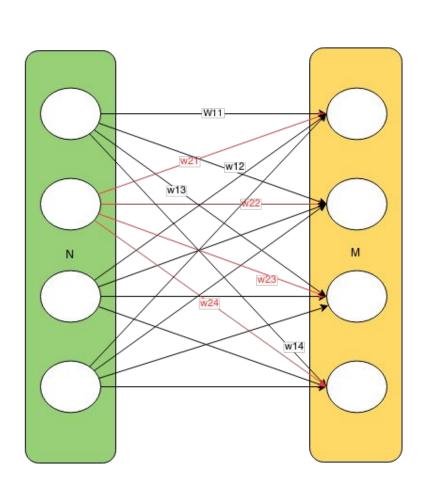
3



Convolved

Pooled feature feature

## 3. Fully-Connected layer



Just like the connection method in ordinary NN, the neurons of one layer connect all the neurons in the previous layer, which means there are N\*M parameters (N the number of neurons in present layer and M for the previous layer)

## **Assumption Result**

Evaluation criteria: error rate

The first application of CNN in Large Scale Visual Recognition Challenge (ILSVRC) achieved 15.3% error rate, there were some improvement on the structure in the following years.

So we expect to achieve around **10%** error rate.



#### Weekly Progress Plan

|         | Septem      | nber            |                   |             | Octo            | ber            |                |                         | N       | ovember                     |                 | De             | ecember         |
|---------|-------------|-----------------|-------------------|-------------|-----------------|----------------|----------------|-------------------------|---------|-----------------------------|-----------------|----------------|-----------------|
| 36 Week | 37 Week     | 38 Week         | 39 Week           | 40 Week     | 41 Week         | 42 Week        | 43 Week        | 44 Week                 | 45 Week | 46 Week                     | 47 Week         | 48 Week        | 49 Week         |
|         |             |                 |                   |             |                 |                |                |                         |         |                             |                 |                |                 |
|         |             |                 |                   |             | Cloud Comp      | outing: Class  | ification Imag | jes                     |         |                             | 1               |                |                 |
|         | Sep 1       | 3, 16:00, Propo | osal presentation | on          |                 |                |                |                         |         |                             |                 |                |                 |
|         | Install Spa | Install Spark   | on EC2 platfor    | m           |                 |                |                |                         |         |                             |                 |                |                 |
|         |             | Realize the     | CNN in the        | Realize the | CNN in the pape | er             |                |                         |         |                             |                 |                |                 |
|         |             |                 |                   |             | Oct 09, Upl     | oad midterm re | eport          |                         |         |                             |                 |                |                 |
|         |             |                 |                   |             | Oct 11, 1       | 6:03, Midterm  | presentation   |                         |         |                             |                 |                |                 |
|         |             |                 |                   | Modify      | network para    | meters         |                |                         |         |                             |                 |                |                 |
|         |             |                 |                   |             |                 |                | Optimize the   | network, create webpage |         | Optimize the network, creat |                 | ate w ebpage   |                 |
|         |             |                 |                   |             |                 |                |                |                         |         | Write fina                  | l report, finis | Write final re | port, finish pr |
|         |             |                 |                   |             |                 |                |                |                         |         |                             |                 | Nov 29         | , 16:30, Final  |