# LIVE-EYE PROJECT PROPOSAL

BIG DATA ECOSYSTEMS

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# LARGE SCALE RECOGNITION

**Data Diversity**
Data needs to have sufficient variety to represent the real world.

**Algorithm Complexity**
Algorithms need to be powerful enough to learn from the data.

**Data Annotation**
Data needs to contain enough information for algorithms to learn more.

**Algorithm Speed**
Algorithms need to be fast enough to process the large data.

# OBJECTIVE

Aim : Object detection and classification (out of 80 predefined object classes) in the given set of images using deep learning methods.

- Object Segmentation
- Recognition in Context
- Multiple objects per image

Microsoft
Common Objects in Context

## MS COCO 2015

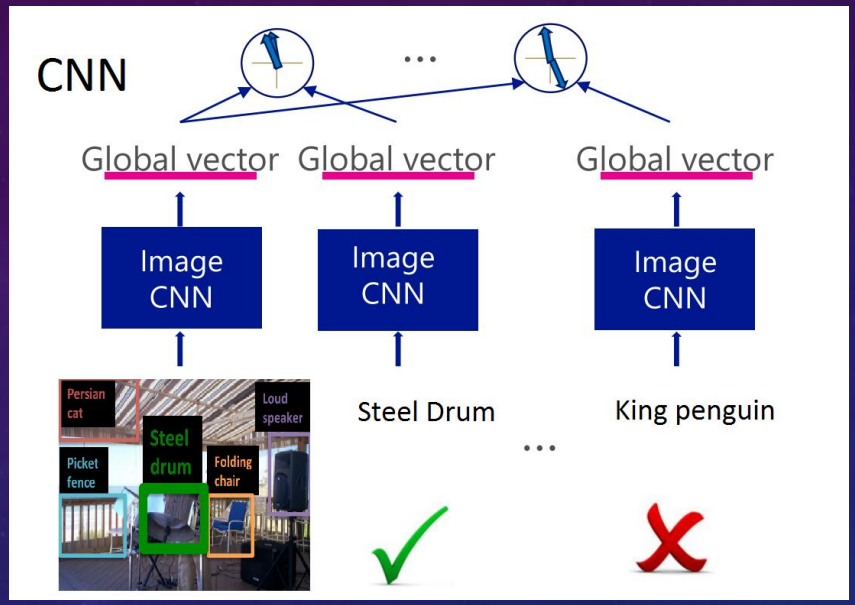
Early 2015

- 80-100 object categories
- 330k images
- 2M+ instances (700k people)
- Every instance segmented

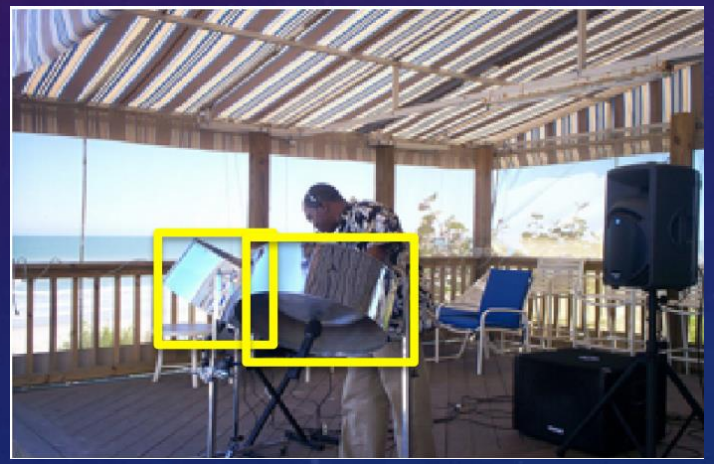
http://mscoco.org

# DEEP LEARNING - USING CNN?

Convolutional neural network makes sure that the incorrect local detections do not propagate in further layers.

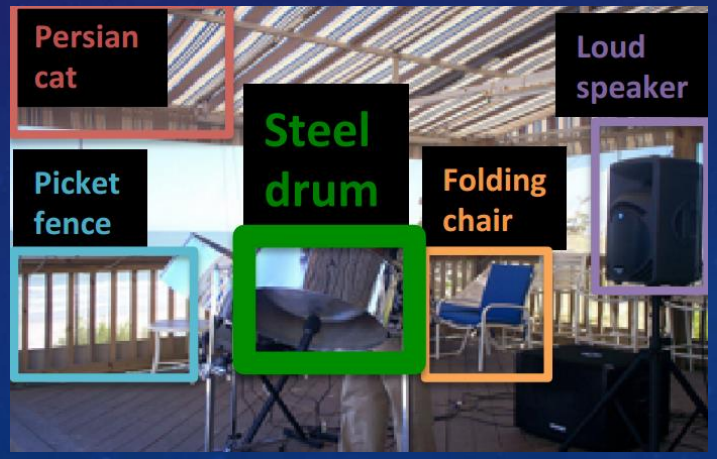



Raw Image



Prediction i


Prediction j



# TOOLS EMPLOYED





- Programming Language
  - Python
- Framework
  - Spark
- Running Environment
  - AWS/Google cloud/ Super computer
- Deep Learning Framework
  - Caffe/Torch/Theanu/Tensorflow

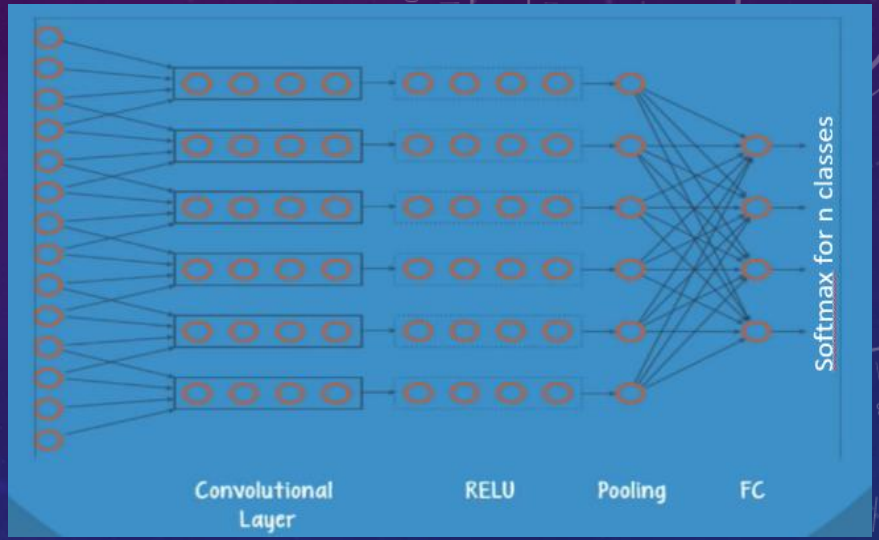
# DATA SET

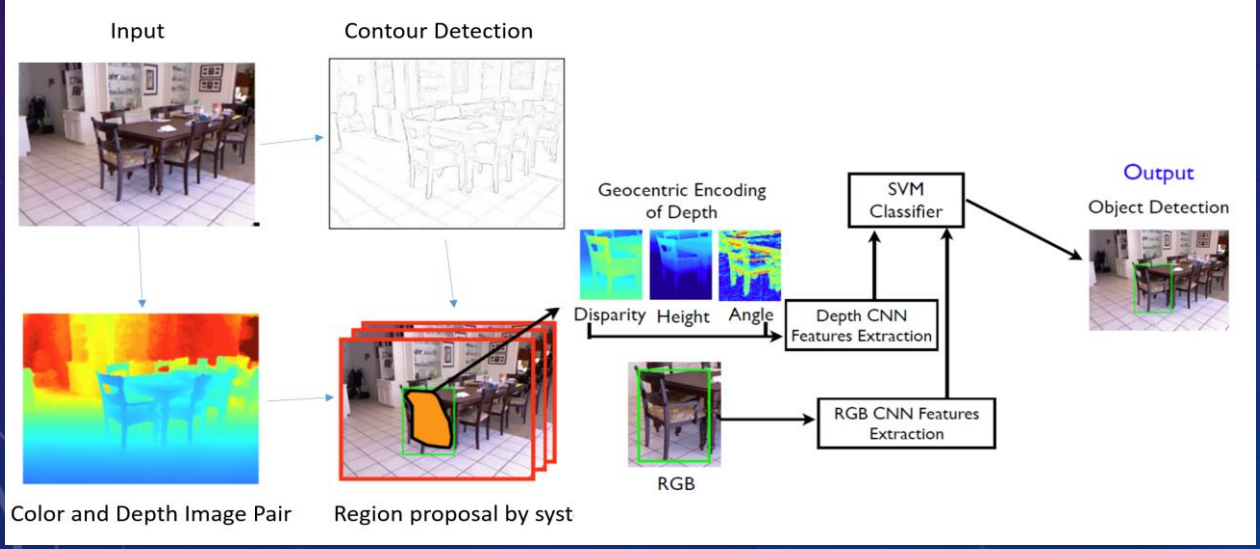
- The training, validation and test sets contain more than 200,000 images and 80 object categories.
- Training set - 13GB/80K
- Validation set-6.2GB/40k
- Testing Set1-6.2GB/40k
- Testing Set2-12.4GB/80k

annotation{
"id" : int,
"image_id" : int,
"category_id" : int,
"segmentation" : RLE or [polygon],
"area" : float,
"bbox" : [x,y,width,height],
}

# ALGORITHM AND ARCHITECTURE

a. use any of the methods, preferably Selective search to generate a sample of (in our case, 1000) category-independent sample regions of the input image.
b. Extract a fixed length feature vector from each sample region using CNNs. Features can be extracted by forward-propagating the image through a number of convoluted and fully connected layers.
c. Classify each region with category specific linear SVMs.



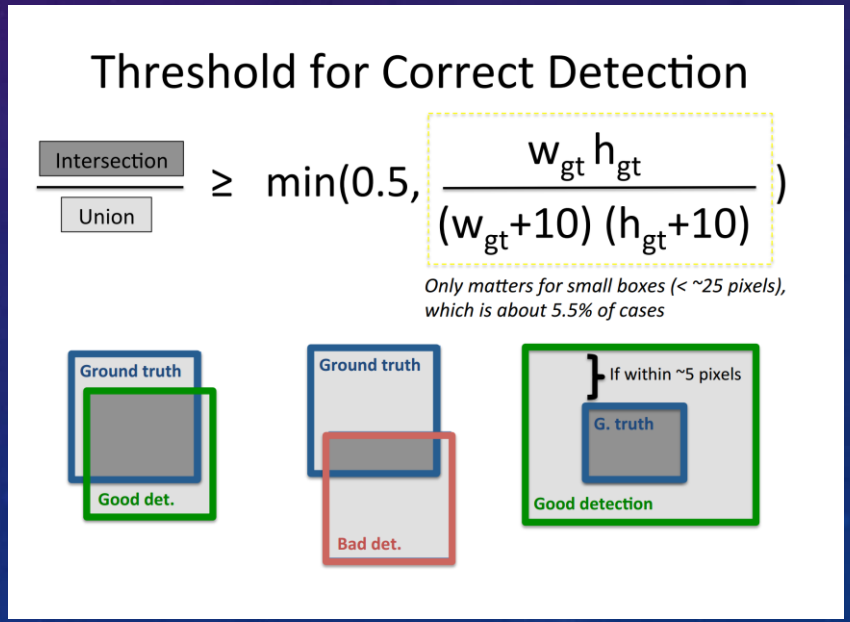



# CHALLENGES

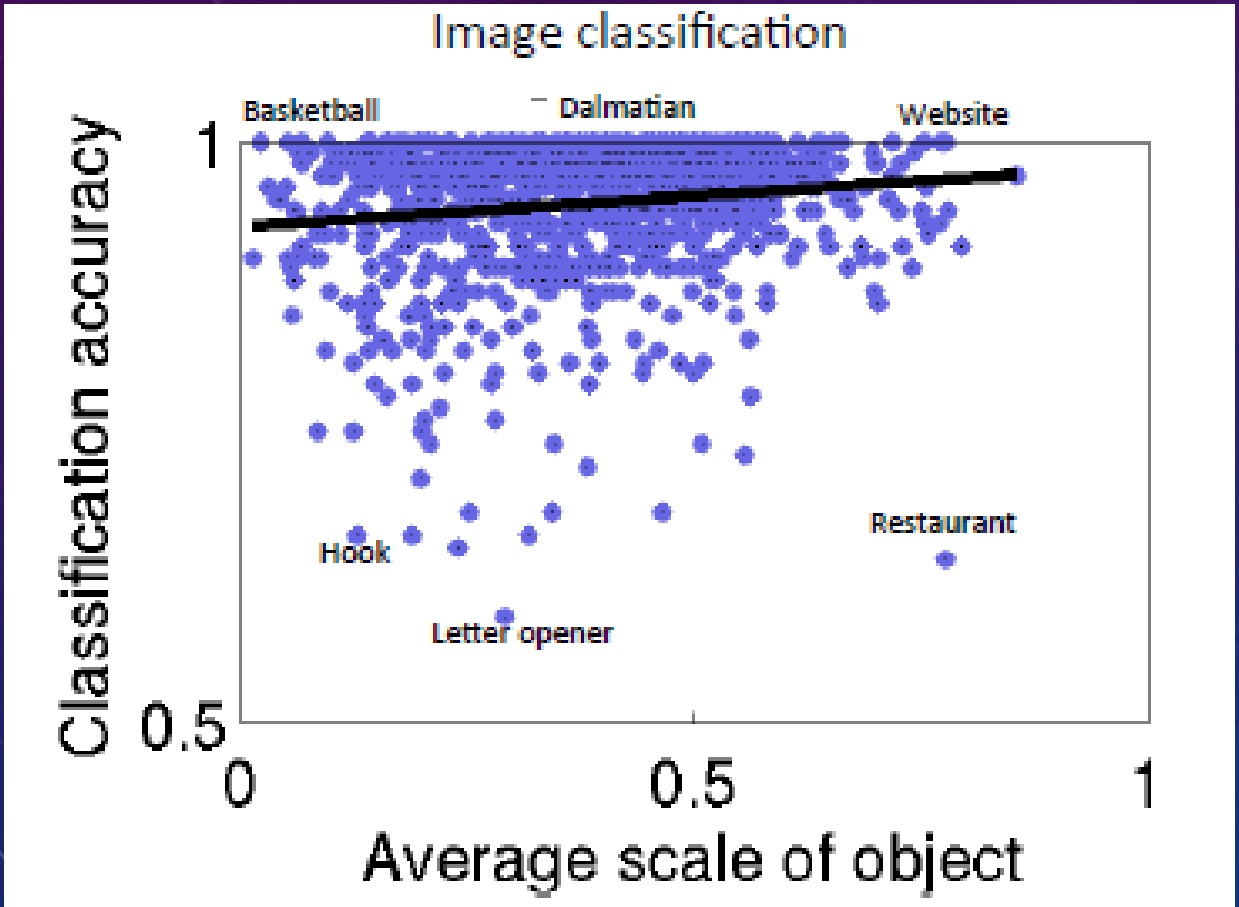
- Diversity of Images to be identified. (Size, Texture)
- Identify the various images in any setting. Are we done?
- Classification together with localization may change the perception of the image.
- Man made deformable objects are difficult to train.

# ERROR RATE CONTROL

- Algorithm outputs a list of bounding box detections with confidences.
- A detection is considered correct if overlap with ground truth is big enough.
- Evaluated by average precision per class.
- Global detection will overwrite the incorrect local detections.
- Most object categories will be from the predefined categories (which is 80 in the dataset considered).
- All instances of all target object classes expected to be localized in all test images.



# SMALLER OBJECTS ARE NOT NECESSARILY HARD TO CLASSIFY.




- Each Dot is an Object Class
- X-axis: Average fraction of image area occupied by an instance of that class on a validation set.
- Y-axis : Highest accuracy achieved by any method.


xkcd: Tasks

"The Virtually Impossible"

# THANK YOU!!