# Getting Started

## Session 1

Computer Vision Group
IIT Madras

November 1, 2014

# Outline

# Installing OpenCV
Windows 7/8

- Install Anaconda 2.0.1
- Download OpenCV 2.4.9 and extract to a convenient location
- Go to opencv/build/python/2.7 folder
- Copy cv2.pyd to INSTALL_DIRECTORY/Python/lib/site-packages
- Open IPython QT console.
- import cv2

If you don't get any errors, its a success.
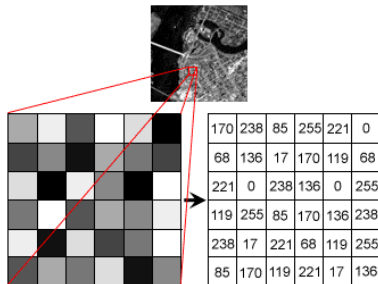
# Installing OpenCV
Ubuntu

## Using the apt-get tool

sudo apt-get install python-opencv

Installs an older version of OpenCV. Build from source to get the latest version.

- Basic building blocks of an image
- Color represented as a tuple (R, G, B)

# Image Processing
Recap

- Thresholding

# Image Processing
## Recap

- Thresholding
- Erosion

# Image Processing
## Recap

- Thresholding
- Erosion
- Dilation

# Image Transformations
Recap

- Rotation

# Image Transformations
Recap

- Rotation
- Translation

# Image Transformations
Recap

- Rotation
- Translation
- Cropping

# Image Transformations
## Recap

- Rotation
- Translation
- Cropping
- Warping

# Feature Extraction
What are features?

## Feature Extraction in Images

Transforming rich content of images into a set of values. Feature
extraction is a crucial part in Machine Learning.

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## Example

Histograms are commonly used for extracting set of features. More feature extraction techniques coming up.

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## Digit Recognizer

We'll be using Machine Learning to build a digit recognizer in tomorrow's session.

# Feature Extraction
## Why we need features?

Lets say you are in an unkown country. To know about the country, you can see each and every house in it, and using the reference information about all houses (location and shape) in every country, you can find which country you are in. That sounds bad, lets take an helicopter and fly. What you can see now are not houses, but streets filled with houses. You now have a feature set of smaller size (All street names in the country) which you can use to deduce the country. Even that can be difficult, so you can fly further up and now you see cities, which should make the task fairly easy. It is the same case with feature extraction. You look at the dataset from a higher abstraction, extract relevant features (like City names) and train your machine. The catch here is you cannot fly so high that you see the country as a whole to directly find what it is. Using whatever abstraction possible (Similar to city names), you try to learn higher levels of abstraction (Country names).

# Feature Extraction Tools
There are many more available

1. Binarized pixel values

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2. Intensity histogram

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1. Binarized pixel values
2. Intensity histogram
3. Histogram of Oriented gradients
4. SIFT

# Summary

## Today's session

- Image processing/transformations
- Feature Extraction

## Tomorrow's session

- Machine Learning Basics
- Training a classifier for handwritten digit recognition