Lecture 1

Machine Learning Basics

Sung Kim <hunkim+ml@gmail.com>

Basic concepts

- What is ML?
- What is learning?
  - supervised
  - unsupervised
- What is regression?
- What is classification?

Machine Learning

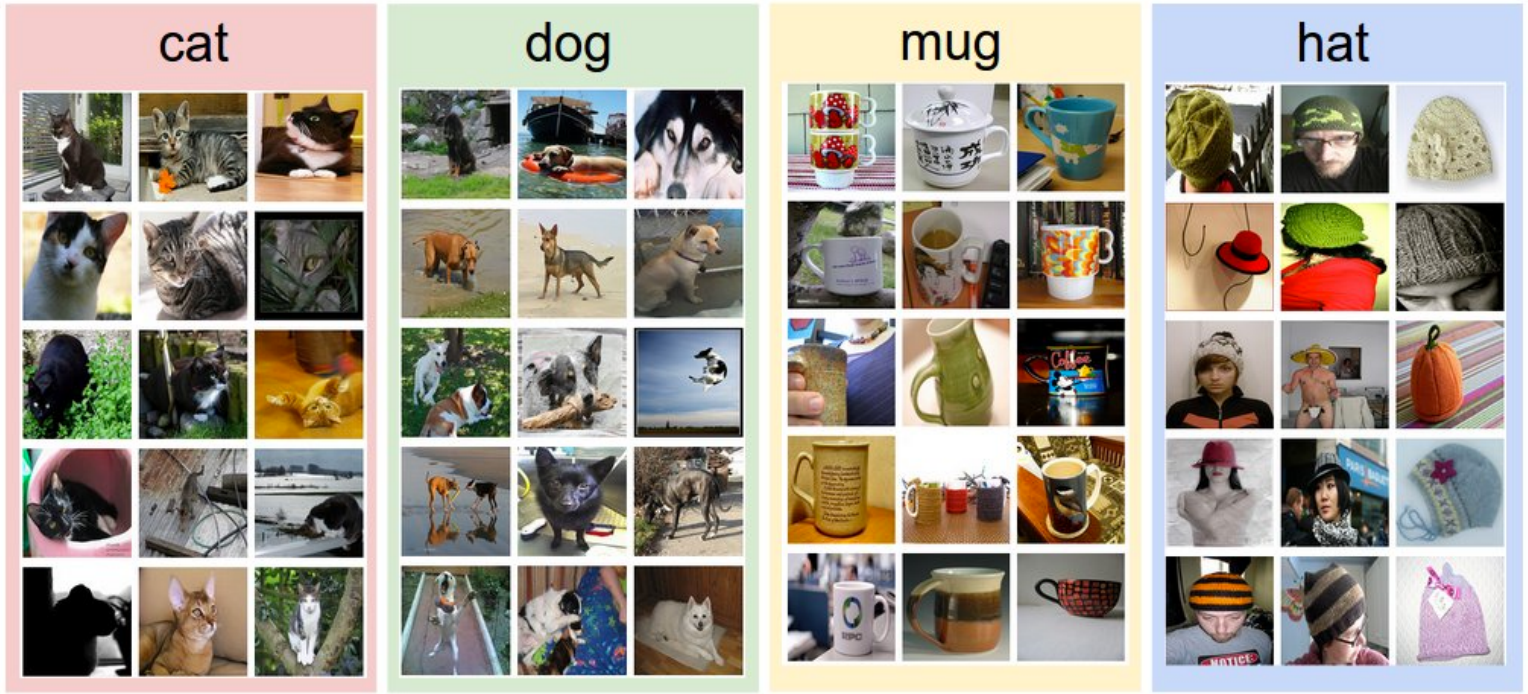
- Limitations of explicit programming
  - Spam filter: many rules
  - Automatic driving: too many rules
- Machine learning: "Field of study that gives computers the ability to learn without being explicitly programmed" Arthur Samuel (1959)

Supervised/Unsupervised learning

- Supervised learning:
  - learning with labeled examples - training set

Supervised learning

An example training set for four visual categories.



http://cs231n.github.io/classification/

Supervised/Unsupervised learning

- Supervised learning:
  - learning with labeled examples
- Unsupervised learning: un-labeled data
  - Google news grouping
  - Word clustering

Supervised learning

- Most common problem type in ML
  - **Image labeling:** learning from tagged images
  - **Email spam filter**: learning from labeled (spam or ham) email
  - **Predicting exam score**: learning from previous exam score and time spent

Training data set

AlphaGo

Types of supervised learning

- Predicting final exam score based on time spent
  - regression
- Pass/non-pass based on time spent
  - binary classification
- Letter grade (A, B, C, E and F) based on time spent
  - multi-label classification

Predicting final exam score based on time spent

x (hours)	y (score)
10	90
9	80
3	50
2	30

Pass/non-pass based on time spent

x (hours)	y (pass/fail)
10	P
9	P
3	F
2	F

Letter grade (A, B, …) based on time spent

x (hours)	y (grade)
10	A
9	B
3	D
2	F

Next

Linear regression