Introduction

1. Welcome

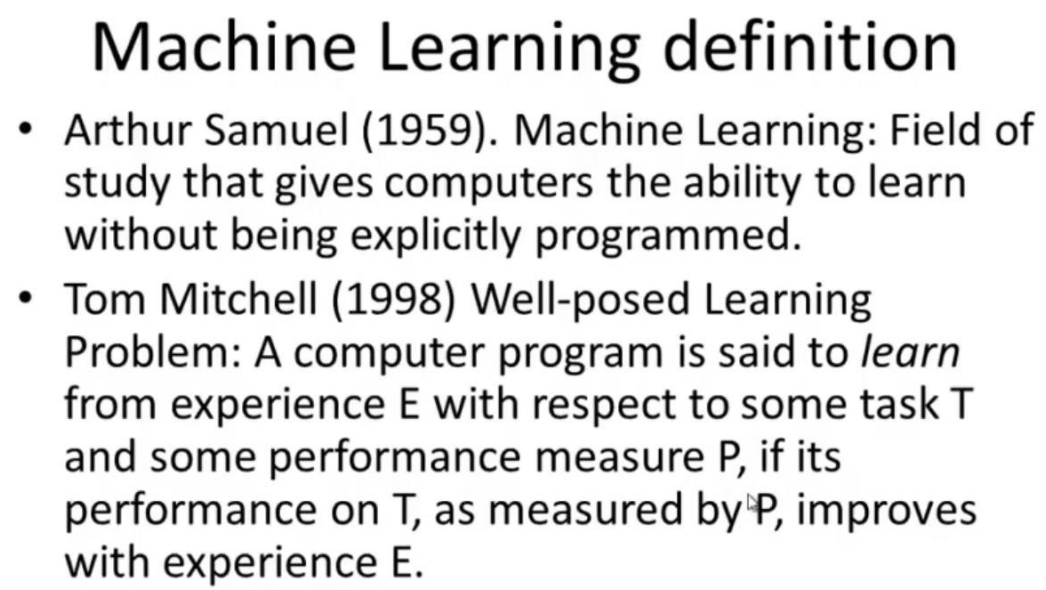
Machine Learning

- Grew out of work in AI
- New capability for computers

Examples:

- Database mining
- Applications can't program by hand
- Self-customizing programs
- Understanding human learning(brain, real AI)

2. What is machine learning



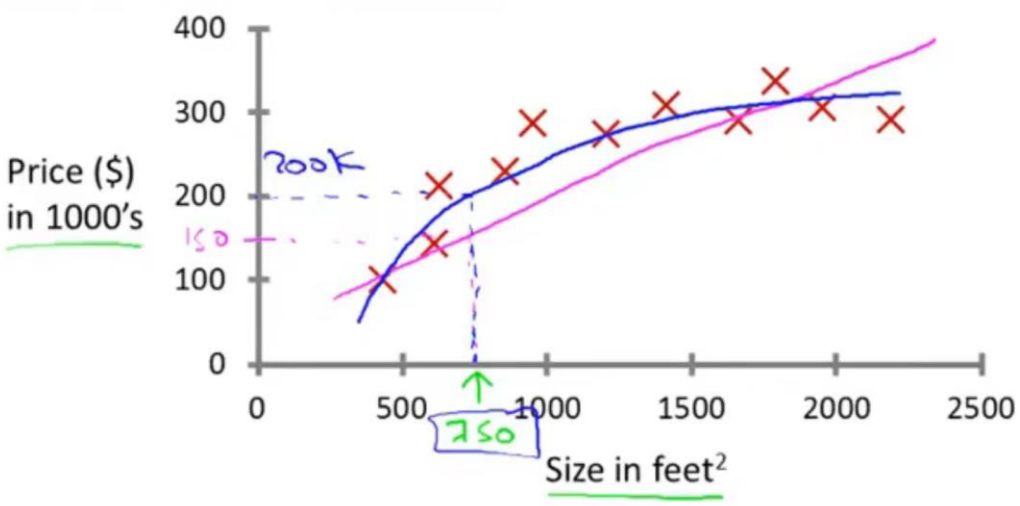
Machine learning algorithms

- Supervised learning
- Unsupervised learning

Others: Reinforcement learning, recommender systems.

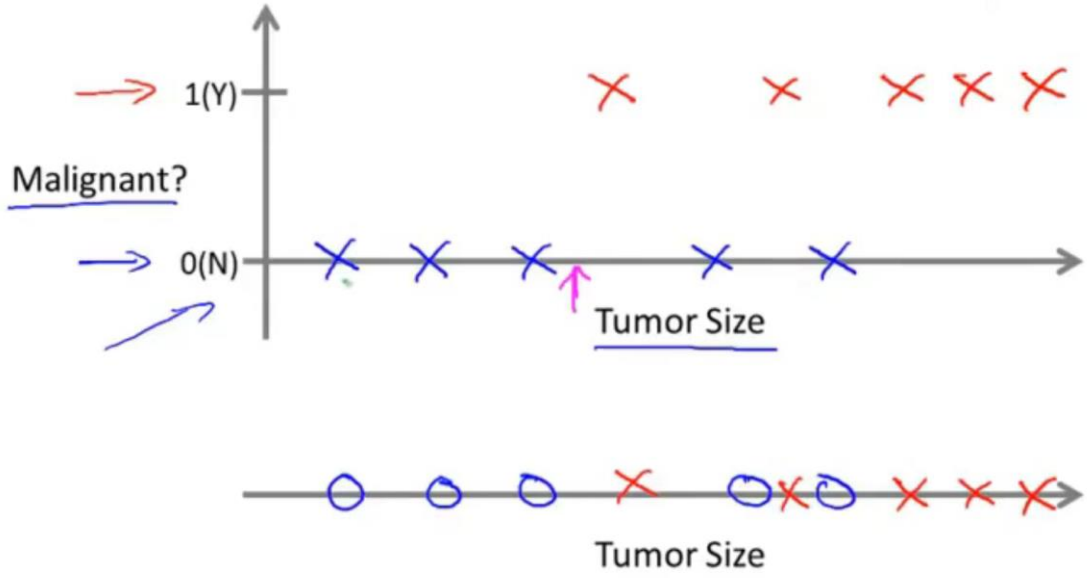
3. Supervised Learning

Housing price prediction



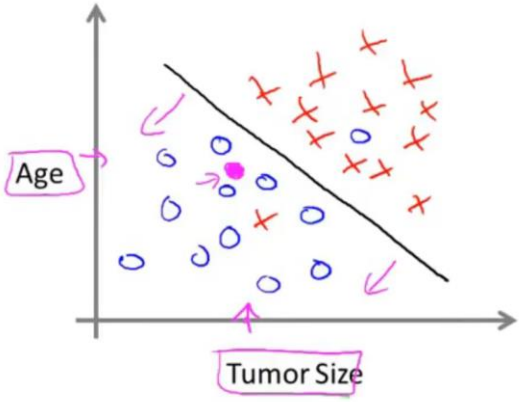
Supervised Learning: "right answers" given
Regression: Predict continuous valued output(price)

another example:
Breast cancer(malignant, benign)



Classification: Discrete valued output(0 or 1)

more features:



- Clump Thickness
- Uniformity of Cell Size
- Uniformity of Cell Shape

...

even infinite features

a question:

Problem 1: You have a large inventory of identical items. You want to predict how many of these items will sell over the next 3 months.

Problem 2: You'd like software to examine individual customer accounts, and for each account decide if it has been hacked/compromised. 0 – not hacked, 1 – hacked

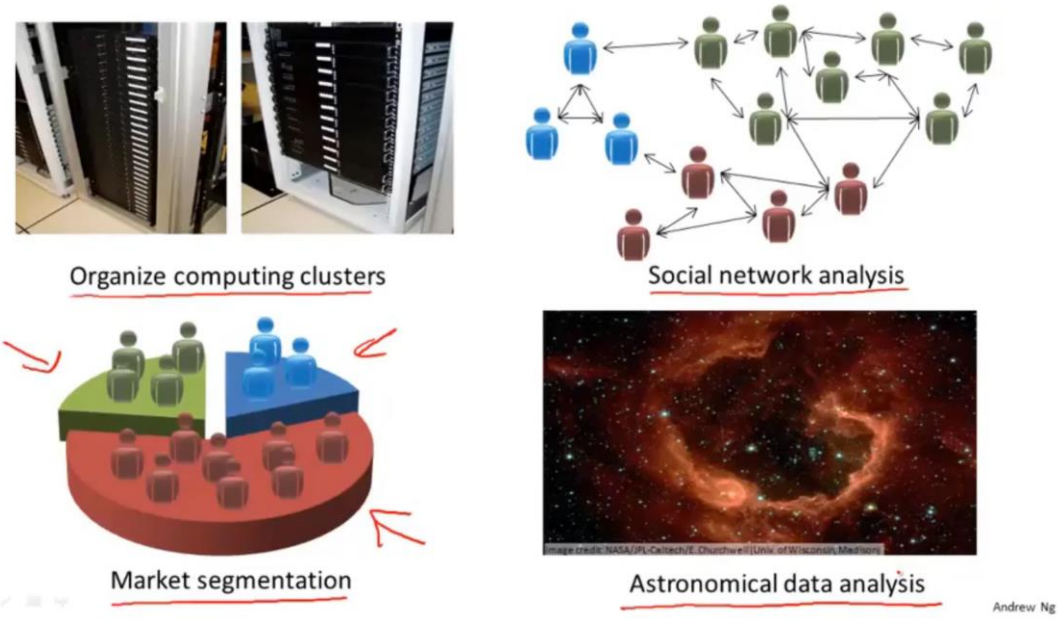
Should you treat these as classification or as regression problems?

- ○ Treat both as classification problems.
- ○ Treat problem 1 as a classification problem, problem 2 as a regression problem.
- → ○ Treat problem 1 as a regression problem, problem 2 as a classification problem.
- ○ Treat both as regression problems.

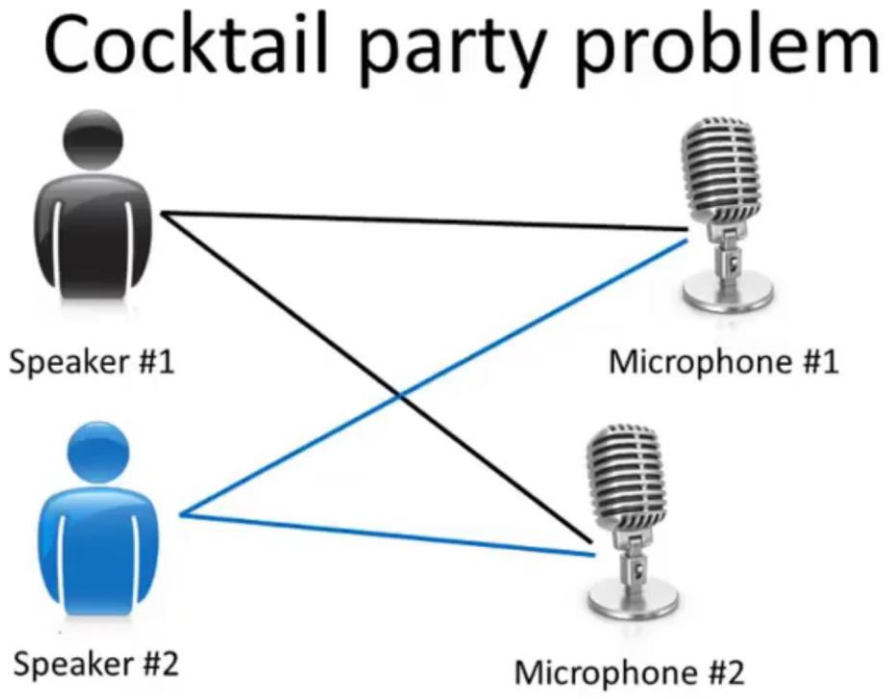
4. Unsupervised Learning

we are not giving the algorithm the right answer for the examples in my data set, this is Unsupervised Learning.

examples of clustering:



cocktail algorithm:



just one line of code:

```
[W,s,v] = svd((repmat(sum(x.*x,1),size(x,1),1).*x)*x');
```

a question:

Of the following examples, which would you address using an unsupervised learning algorithm? (Check all that apply.)

- [ ] Given email labeled as spam/not spam, learn a spam filter.
- [ ] Given a set of news articles found on the web, group them into set of articles about the same story.
- [ ] Given a database of customer data, automatically discover market segments and group customers into different market segments.
- [ ] Given a dataset of patients diagnosed as either having diabetes or not, learn to classify new patients as having diabetes or not.