Quick Introduction

Artificial
Intelligence

Problem Solving by Searching

Logic and Ontology

Machine
Learning

⋮

Classification
& Clustering

Natural Language
Processing

Reinforcement Learning

Probabilistic
Graphical Model

Computer Vision

Logistic Regression

Speech Recognition

⋮

Intelligent Robot

Deep Learning

Autonomous Vehicle

Artificial Intelligence (AI)

- AI is the new Electricity
- Electricity had once transformed countless industries: transportation, manufacturing, healthcare, communications, and more

- AI will now bring about an equally big transformation

What you'll learn in this course

1. (Artificial) Neural Networks and Deep Learning
   - The foundations of neural networks
   - How to build a (deep) neural network
   - How to train it on data
   - Build a deep neural network to recognize (e.g., cat images)

2. Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
   - The practical aspects of deep learning
   - How to actually get the neural network to perform well
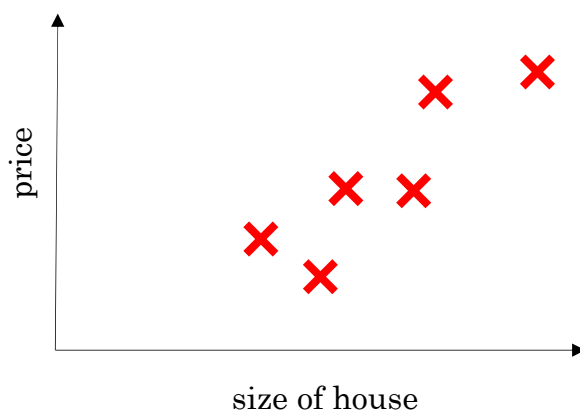
What you'll learn in this course

3. Structuring your Deep Learning Practices
   - Strategy for building a machine learning system
   - Switch your data into train/dev/test sets
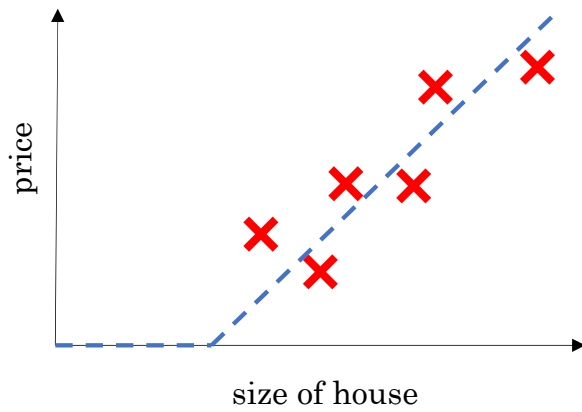   - End-to-end deep learning

4. A Variety of Deep Learning Models
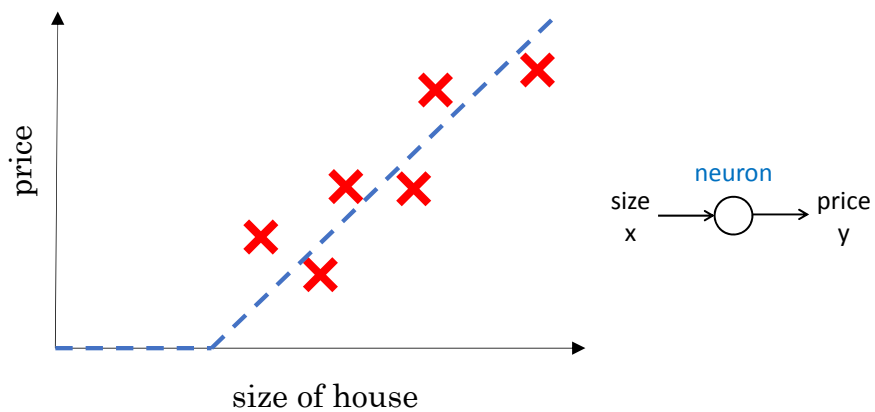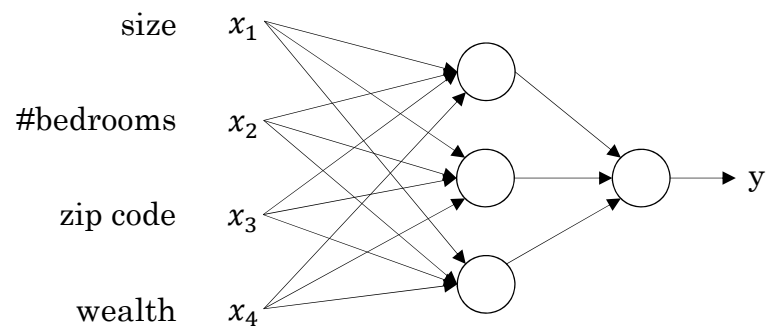   - Usually applied to images and texts

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Housing Price Prediction

Housing Price Prediction

price

size of house

Housing Price Prediction

price

size of house

neuron

size
x → ◯ → price
y

Housing Price Prediction

$$size \quad x_1$$
$$\#bedrooms \quad x_2$$
$$zip\ code \quad x_3$$
$$wealth \quad x_4$$

y

Supervised Learning

Input(x)	Output (y)	Application
Home features	Price	Real Estate
Ad, user info	Click on ad? (0/1)	Online Advertising
Image	Object (1,…,1000)	Photo tagging
Audio	Text transcript	Speech recognition
English	Chinese	Machine translation
Image, Radar info	Position of other cars	Autonomous driving

Supervised Learning

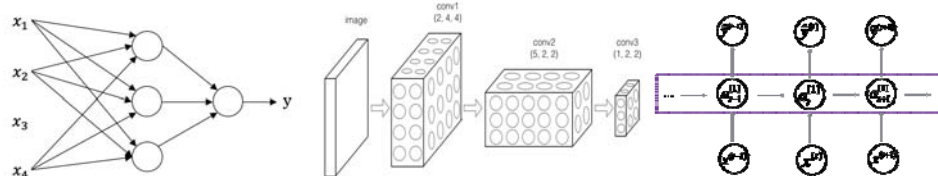| Input(x)	Output (y)	Application	
Home features	Price	Real Estate	Standard NN
Ad, user info	Click on ad? (0/1)	Online Advertising	
Image	Object (1,…,1000)	Photo tagging	CNN
Audio	Text transcript	Speech recognition	RNN
English	Chinese	Machine translation	
Image, Radar info	Position of other cars	Autonomous driving	Hybrid

Neural Network examples

Standard NN   Convolutional NN   Recurrent NN

Supervised Learning

Structured Data

Size	#bedrooms	...	Price (1000$s)
2104	3		400
1600	3		330
2400	3		369
⋮	⋮		⋮
3000	4		540

User Age	Ad Id	...	Click
41	93242		1
80	93287		0
18	87312		1
⋮	⋮		⋮
27	71244		1

Unstructured Data

Audio

Image

Four scores and seven years ago…

Text

Supervised Learning Good for Deep Learning!

Structured Data

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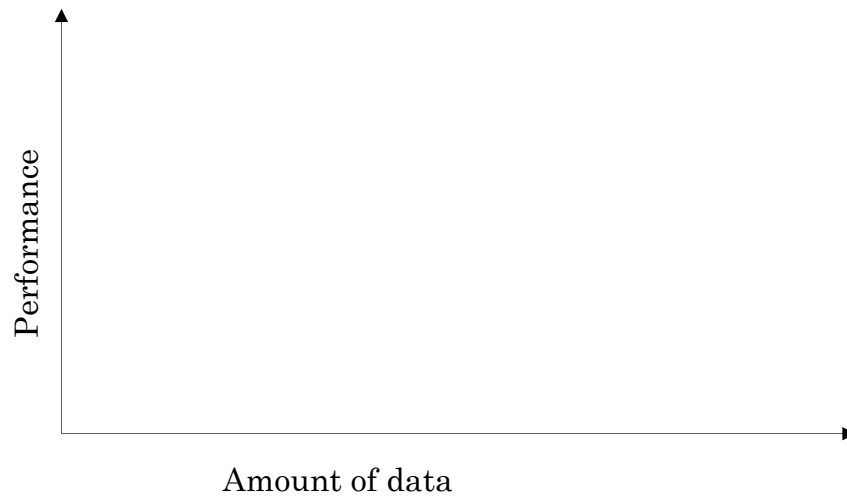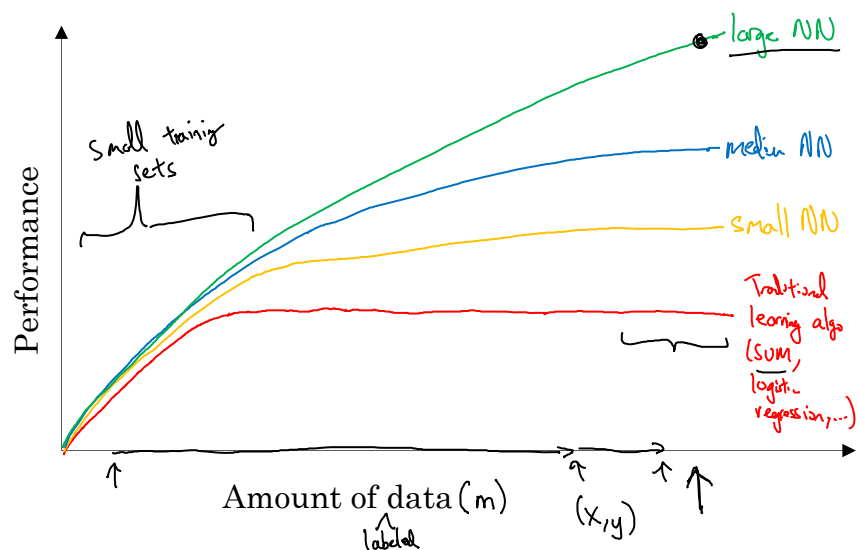## Unstructured Data

Audio

Image

Four scores and seven years ago…
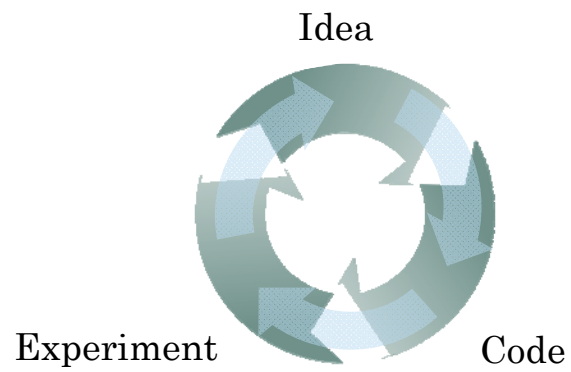
Text

Scale drives deep learning progress

Scale drives deep learning progress

Scale drives deep learning progress

- Data

- Computation

- Algorithms

Idea

Experiment

Code

- End -