C1M1 - INTRODUCTION TO DEEP LEARNING

Welcome

AI is the new electricity → transforming multiple industries.

This specialization:
- C1. Neural networks & deep learning.
- C2. Improving deep neural networks: hyperparameter tuning, regularization, optimization.
- C3. Structuring machine learning projects.
- C4. Convolutional neural networks.
- C5. Natural language processing: building sequence models.

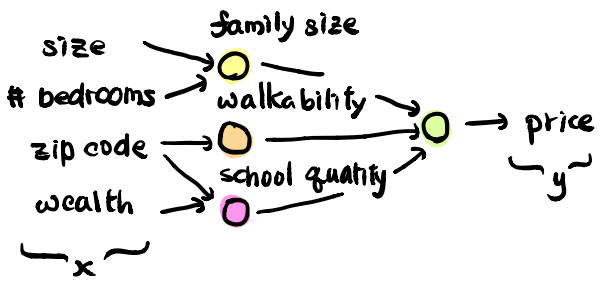
This course:
- M1. Introduction.
- M2. Basics of neural-network programming.
- M3. One-hidden-layer neural networks.
- M4. Deep neural networks.

What's NN

Housing price prediction:

Neuron: size (x) → ReLU → price (y)

⇒ Neural network: stacking neurons together.



⇒ Instead of manually creating intermediate features, fully connected NN does automatic feature engineering given enough (x, y) pairs!

Supervised learning w. NNs

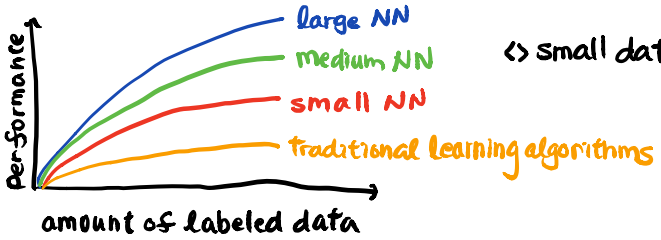
input (x)	Output (y)	Applications	
home features	price	real estate	} standard NN
ad, user info	click on add	online advertising	
image	object	photo tagging	} CNN
audio	text transcript	speech recognition	} RNN
english	chinese	machine translation	
image, radar info	positions of other cars	autonomous driving	} custom, hybrid

Structured data: tabular data ; each feature has a well-defined meaning.

Unstructured data: raw audio, image, text. ↘ easy for humans but historically challenging for machines... til NNs!

Why is DL taking off

① **Larger amount of data:** large NN consistently outperforms ⇒ **Scale drives deep learning progress.**



<> small data: relative ordering not well-defined.
↳ depends on skill at hand-engineering features.

② **Improved algorithms:** eg. using ReLU to tackle vanishing-gradient problem & speed up GD.

③ **Faster computation:** eg. GPU ⇒ can go over iterative cycles faster & try out more ideas.