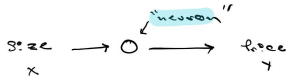
W1 - Introduction to Deep Learning

Tuesday, June 2, 2020 12:05 AM

What is a Neural Network?

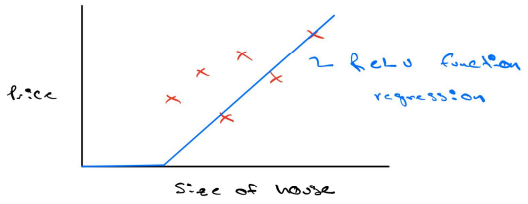
- the simplest possible neural network can be a single linear regression "fit".



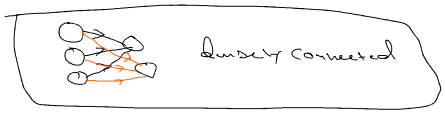
- ReLU function: rectified linear unit
  - this starts the function off at 0.

- Large neural nets are formed by stacking and grouping lots of these "neurons" together.

Housing Prediction Example



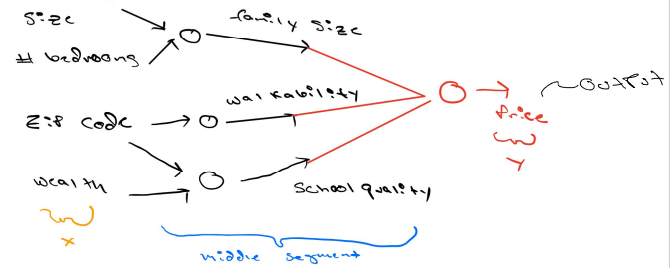
- In a densely connected neural network every neuron in the previous layer is connected to each neuron in the subsequent layer



Housing prediction Neural Net

~ input features

Variables



- In a neural network model, we will feed the algorithm examples of the parameters, x & y, and it will determine the middle neurons.

- the middle circles are known as hidden units

- Given a lot of examples of x & y, neural nets are remarkable at finding functions that accurately map from x to y.

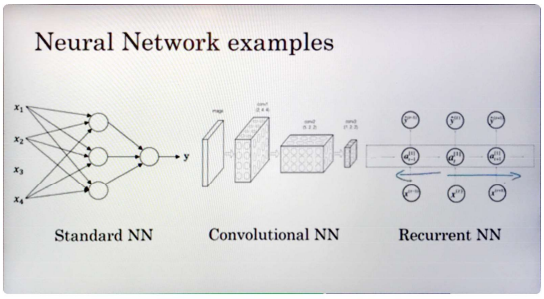
- each neuron is a relu or another non-linear function.

Supervised learning with Neural Nets

- In supervised learning, you have an input x and want some kind of function that maps output y.

- For real estate, advertisement we use a standard neural network

- images: CNNs ~ convolutional nets
- audio, translation: RNNs ~ recurrent nets (temporal component / time series)
- other more custom/complex networks can also be employed



Supervised learning examples

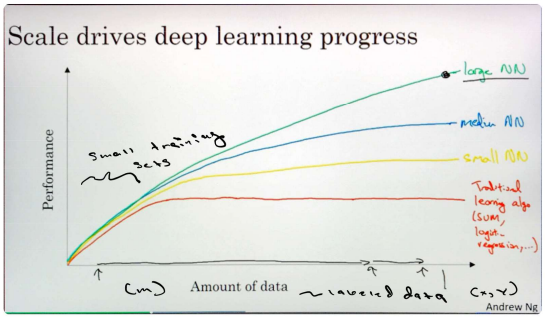
input	output	application
home features	$ price	Real Estate
ad, user info	click on ad?	Online advertising
image	class: classification index	Photo tagging

Structured vs unstructured data

- Structured
  - databases of data
  - well defined meaning for parameters
- unstructured data
  - audio
  - images
  - text

} historically, these problems have been harder to solve

Main Drivers behind the rise of DL



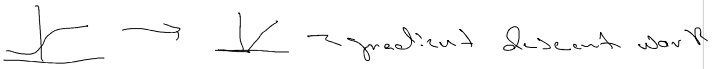
- SVM: support vector machines & logistic regressions
- Scale of data and scale of the

neural net (hidden layers & parameters) leads to an increase in their performance.

- in small data cases engineering features are of importance and can make traditional algorithms be better than neural nets
- the get wildly as more data is available

Big factors...

- Data
- Computation power
- Algorithms
  - making neural nets run faster
  - ex. switching from a sigmoid to a ReLu function for the activation function.
    - in sigmoid the gradient of the function is Continuously



gradient descent work much better on ReLu