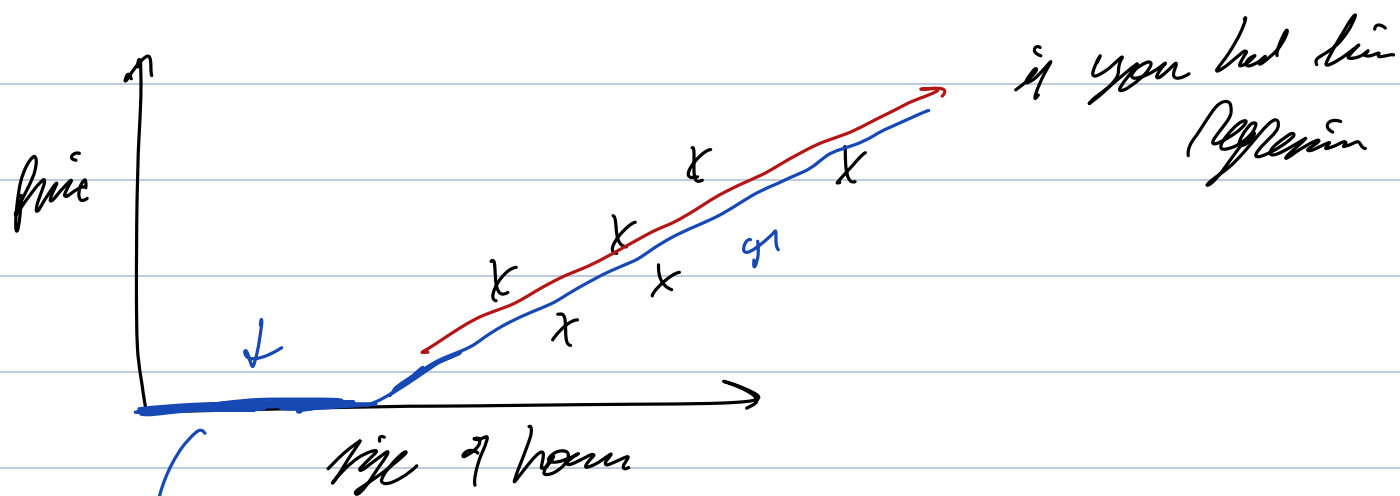


Deep Learning  $\rightarrow$  Training Neural Networks

What is a Neural Network Pt 1.



b/c price is never negative. Almost the simplest  
neural network



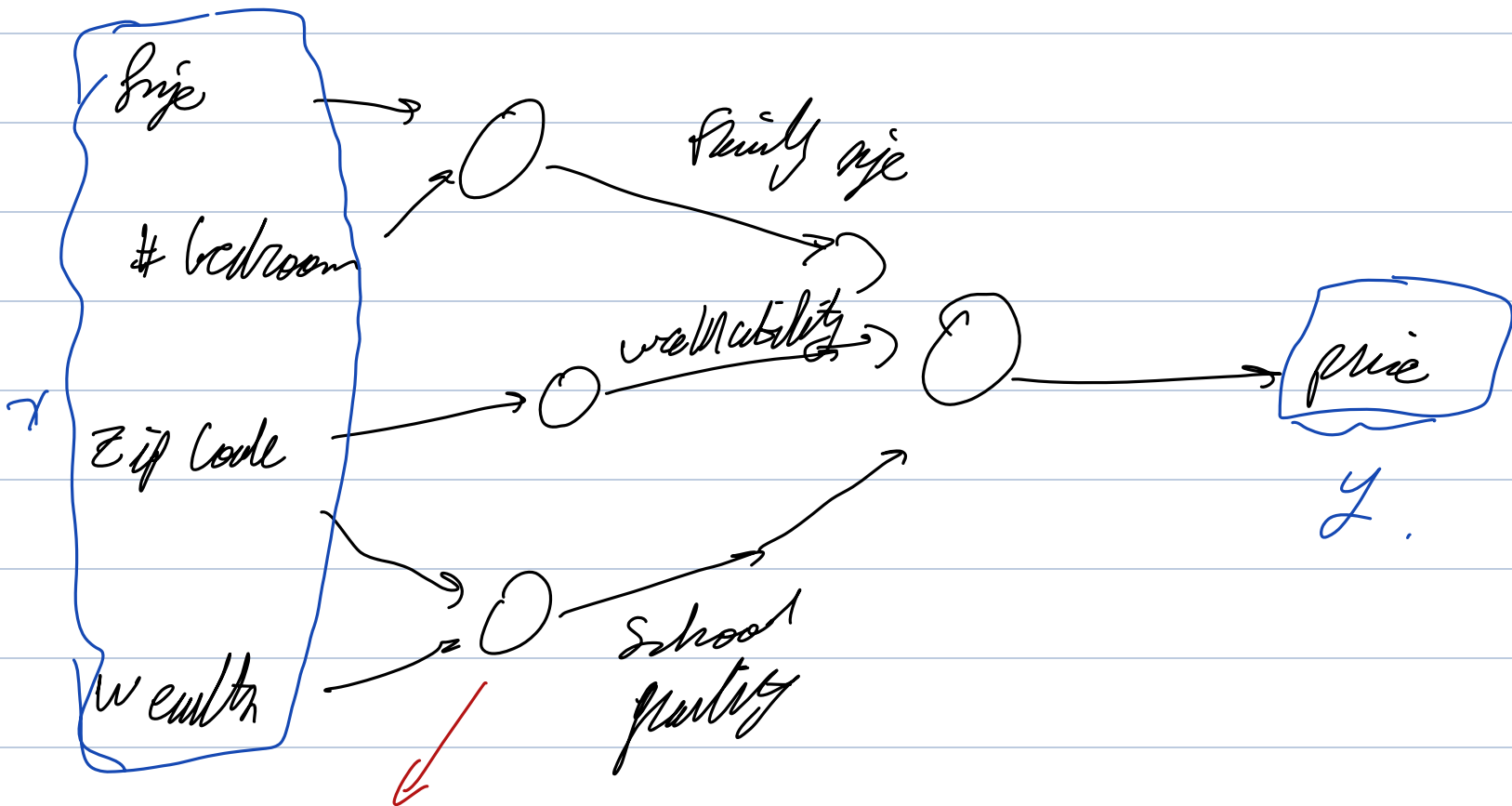
"neuron" is the function we should choose.

ReLU  
Rectified  
Linear Unit

A larger Neural Network would be made by combining these

Neurons

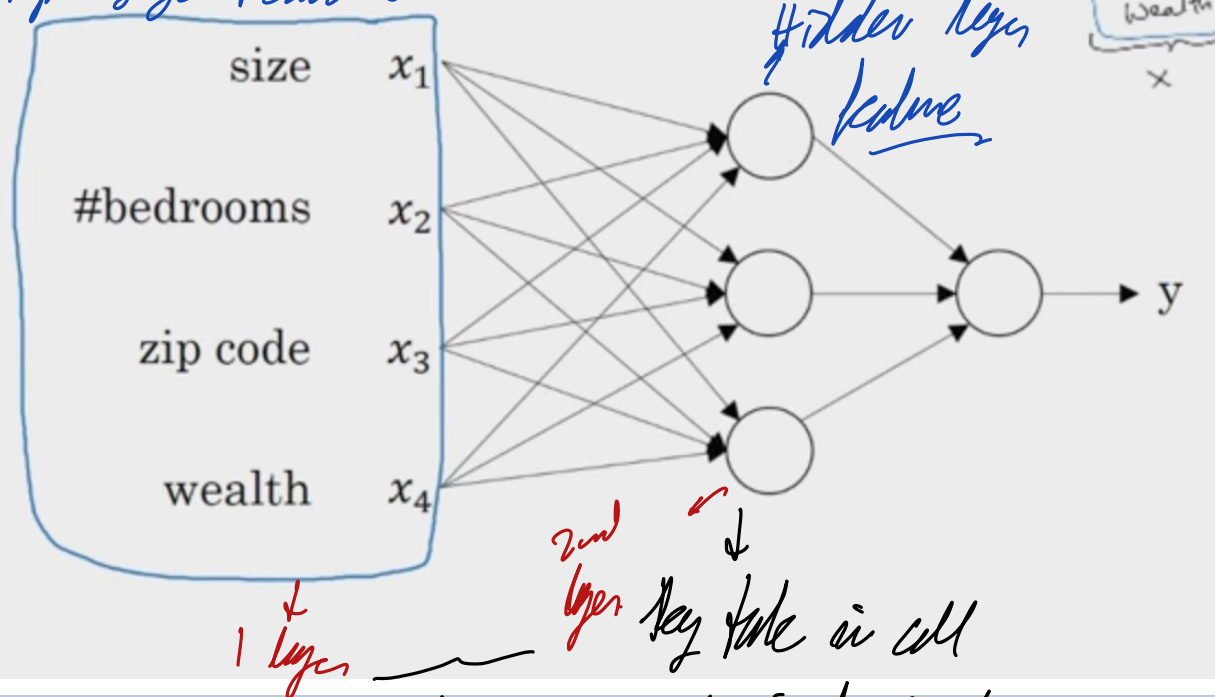
## Housing Price Prediction



These neurons

can all be like the  
where, some sort  
of fix

Input Layer Features



1 layer

densely connected

2nd layer

key role in cell

4 input features

All the input features are provided at each neuron and that neuron decide what to do w/ it.

Given  $(x, y)$  for enough data set you can get good models.

↳ based on supervised learning.

## Question

True or false? As explained in this lecture, every input layer feature is interconnected with every hidden layer feature.

☐ False

☒ True

✓ Correct

Skip

Continue

# Pt 2. Supervised Learning

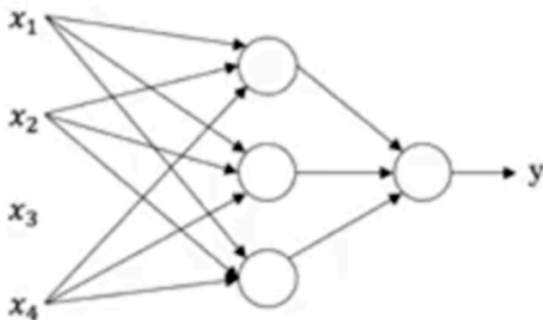
## Supervised Learning

Input(x) <span style="color: blue;">↙</span>	Output (y) <span style="color: blue;">↙</span>	Application
Home features	Price	Real Estate
Ad, user info <span style="color: blue;">↙</span>	Click on ad? (0/1)	Online Advertising
Image	Object (1,...,1000)	Photo tagging <span style="color: blue;">} CNN</span>
Audio	Text transcript	Speech recognition <span style="color: blue;">} RNN</span>
English	Chinese	Machine translation
Image, Radar info	Position of other cars	Autonomous driving <span style="color: blue;">} custom hybrid</span>

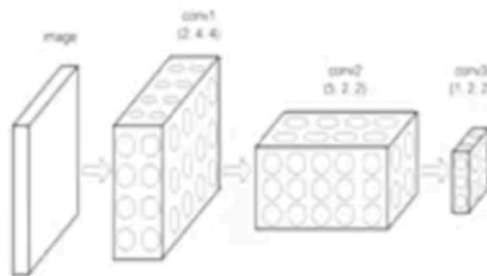
*Diff neural networks for diff problems*

## Neural Network examples

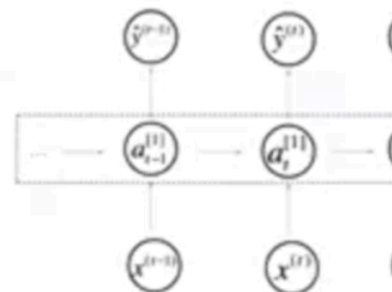
*Eg.*



Standard NN



Convolutional NN



Recurrent NN

# Supervised Learning

## Structured Data

Size	#bedrooms	...	Price (1000\$)
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

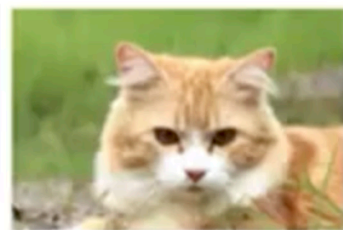
Usually able  
to take as input

much harder for computers  
to deal with  
better.

## Unstructured Data



Audio



Image

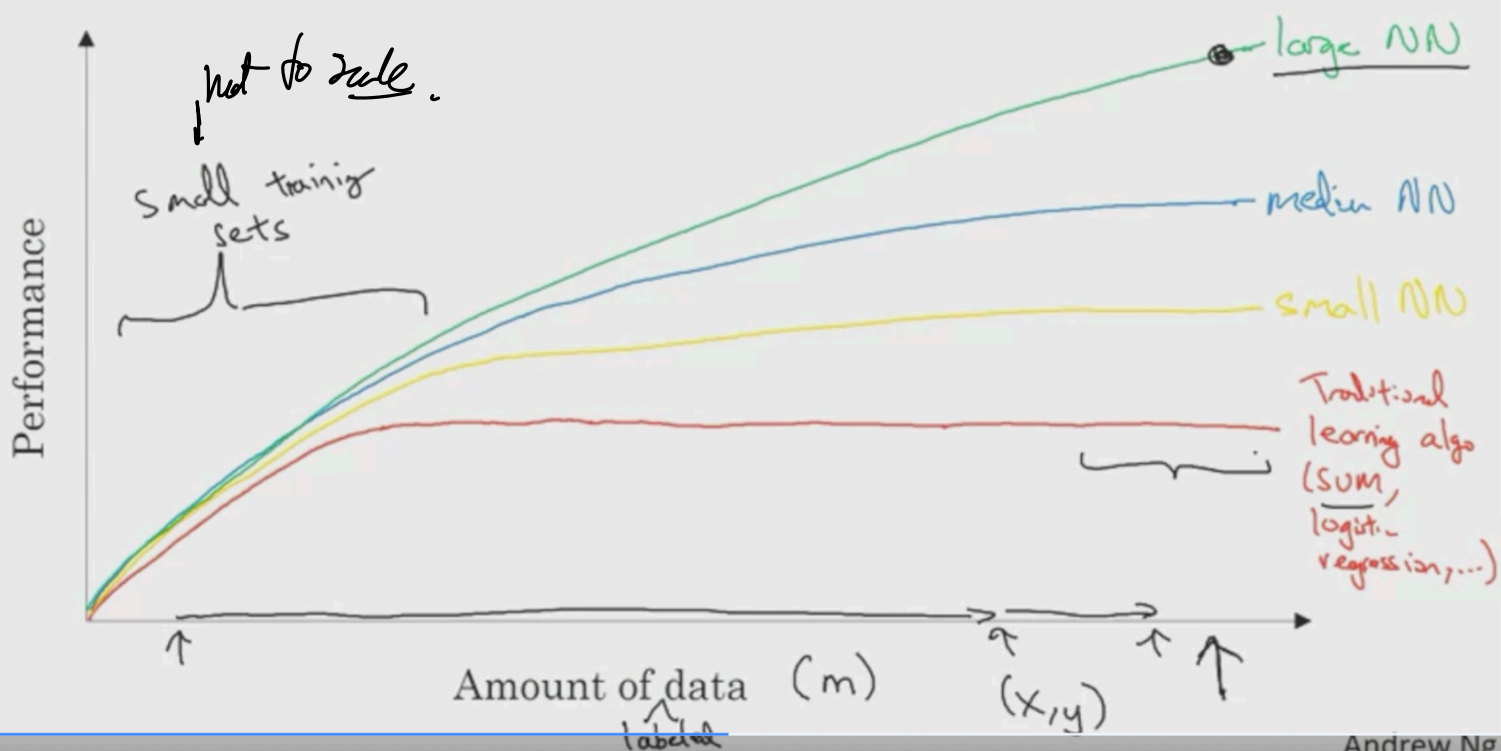
Four scores and seven  
years ago...

Text

Pt 3. Why is Rep Learning Testing Off?

$m \rightarrow$  size of training set, # of training examples.

# Scale drives deep learning progress



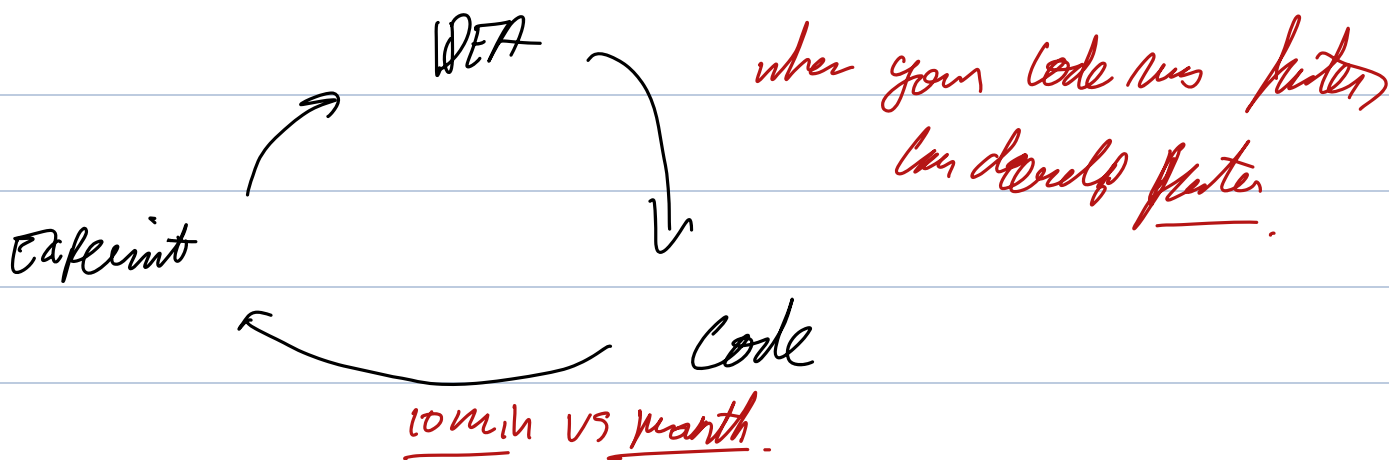
Data  $\rightarrow$  we have more data.

Computation  $\rightarrow$  can have larger NN w/ more features.

Algorithms  $\rightarrow$

sigmoid  
slow learning  
slow learner

ReLU  
 $\Rightarrow$  makes gradient descent better



pt 4. Outline -

wk 1. Intro

wk 2. Basics of Neural Network programming

wk 3. One hidden layer neural networks

wk 4. Deep Neural Networks