WEEK 1.

INTRO

* AI is the new electricity !!

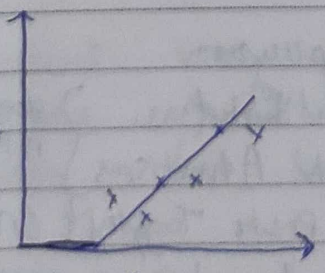
Courses:

1. Neural Networks and Deep Learning
   - we'll study fundamentals and make a cat recognition model
2. Improving Deep NN : Hyperparameter, tuning Regularization and Optimization
3. Structuring your ML Project
4. Convolutional NN - used for images
5. Sequence Models
   - include RNNs, LSTM
   - applied in NLP, ~~etc~~ 'sequence of data', speech recogn", Music generat", etc

What is NN

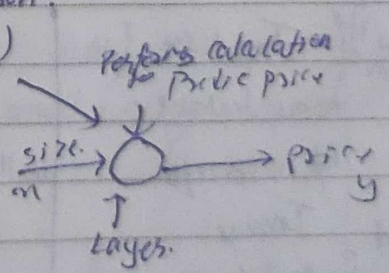
Deep Learning = training NNs (usually large ones)

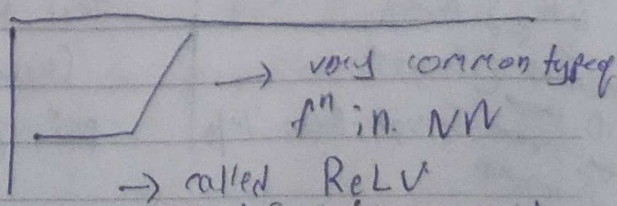
NN is a type of ML algo
(consider housing price predict" lol



we tried to predict using Linear regression

in terms of NN



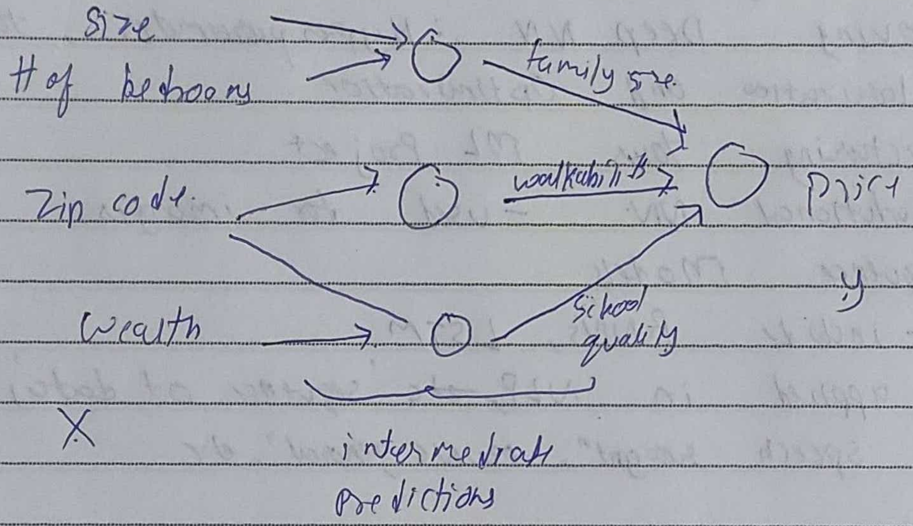


→ very common type of f" in NN

→ called ReLU Rectified Linear Unit

taking Max with zero.

that was a simple NN
usually NN's have multiple inputs which predict some intermediate feature, then they predict some more intermediate features and so on until a final output is generated



if all neuron connects to all other neurons of next layer — densely connected

Supervised Learning with NN.

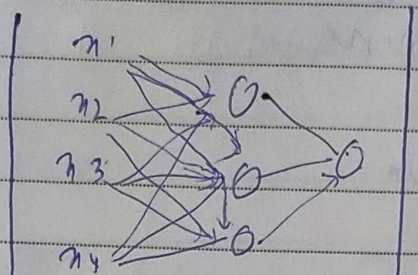
→ most (good) of NNs are supervised.

Input (x)	Output (y)	Application	
home feature	price	Real Estate	standard NN
Ad, user info	will click on ad?	Online Advertising	standard NN
Image	Object (1...1000)	Photo Tagging	CNN
Audio	Text transcript	Speech recognition	RNN
English	Chinese	Machine Translation	RNN
Image, Radar Info	pos^n. of other car	Autonomous driving	Complex/hybrid NN

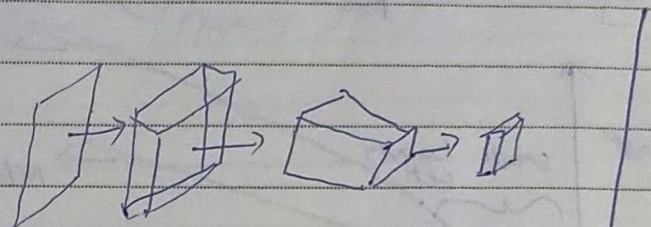
To make complete sense, you need to find relations b/w entire parts of x (Image)

sequenced data (Audio, English) ↓ think as 1D stream of incoming data.

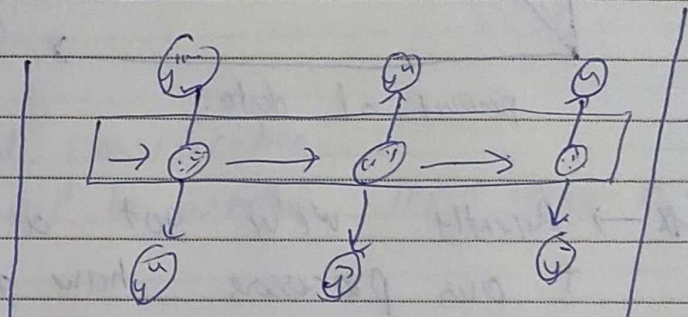
eg:-



Standard NN.



Convolution NN



this is by these types of NN are usually represented

good of for ID sequenced dat which has temporal component. ← Recurrent NN

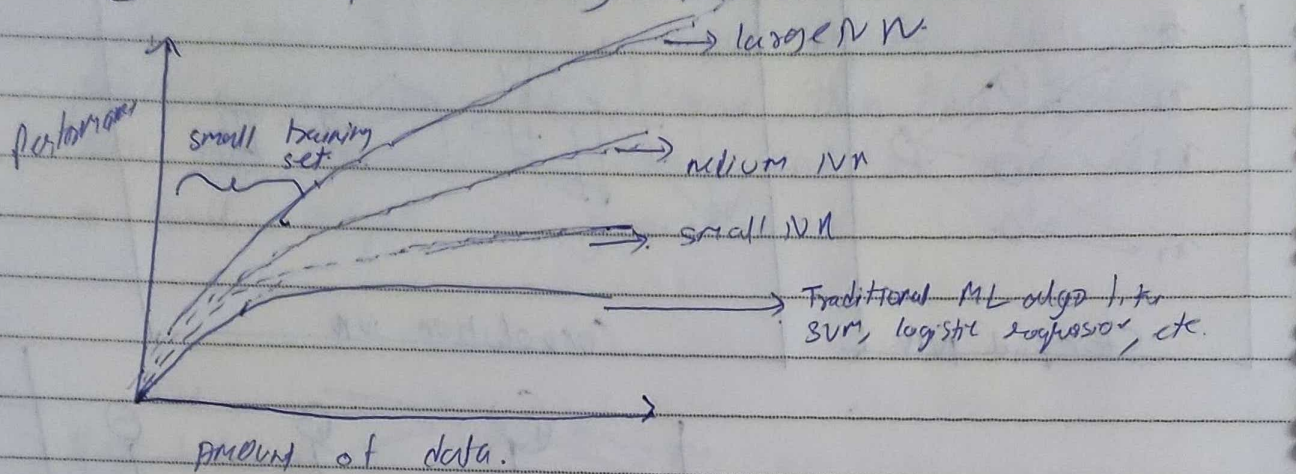
- Structured data → Deeper ↑ databases of data. → organised in proper tables, kind of
- Unstructured data → images, ~~text~~ natural raw, data

Historically it was harder for computers to make unstructured data.
Thanks to DL and NN, they're pretty good now.

current very common NNs (standard NN) have usually imposed short term economic value by using structured data for big companies

* NN, DL have been out there for a long time, so why're they becoming so popular now?

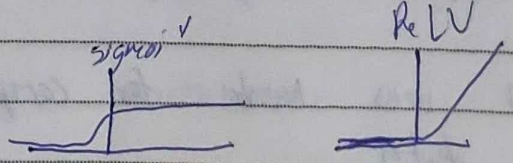
Why is Deep Learning taking off?



* → Recently we've got a lot of data + our processors have got much computationally faster.

for small data NNs are about the same as other ML algo's, however other ML algo's don't make use of a lot data to improve performance, but NNs do.

Scale drives DL progress
* Data
* Computation
* Algorithms.



(sigmoid fn is not that good - because its slope is ~ 0 for almost all the graph ∈ except near x=0) this causes gradient descent to learn very slow ⇒ i.e. parameters change very slowly - learn slow)
ReLU becomes a better choice - slope is big, - learns faster

so basically using ReLU over sigmoid makes your NN faster

→ Training a NN is an iterative process
Idea → Code → Experiment
↑ ↓

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So you need good amt of computation, and time.
1 month > 1 day > 6min (training time)