

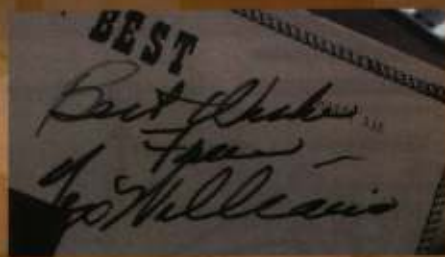
Neural Network For Handwrites Recognition

Chen Yuxuan 1W15BG12

3	5	9	2	4	7	6	6	9	8
6	9	3	7	9	1	5	6	4	1
4	6	7	3	7	9	7	5	5	4
4	7	2	7	9	1	7	1	8	0
6	8	8	4	8	9	0	3	8	2
1	0	3	1	7	5	0	3	1	9
7	0	4	3	1	3	0	9	8	2
0	8	7	5	9	2	0	0	7	1
5	9	1	7	2	4	1	5	8	9
3	9	0	7	8	1	9	8	8	5

This title should be a "take-home" message, e.g. "Neural networks can be used to recognise handwriting"

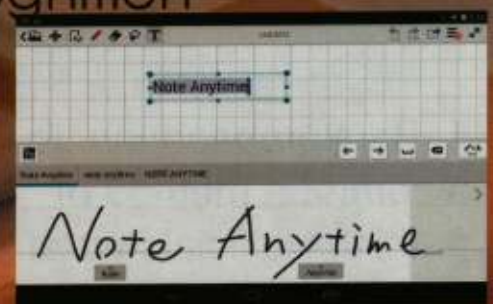
Definition and Engine of Recognition



Signature of country star, Tex Williams

0	4	7	9	2	1	3	1	7	3
5	3	6	1	2	2	7	6	2	4
0	9	7	1	2	4	3	2	7	5
8	6	2	0	5	6	0	3	6	1
8	7	9	3	9	8	5	5	3	3
0	2	1	9	2	0	9	4	7	4
4	6	0	4	5	6	1	0	0	1
7	1	6	3	0	2	7	7	2	8
0	2	6	7	8	5	9	0	4	6
7	4	6	8	0	7	8	3	7	5

Numbers of Recognition



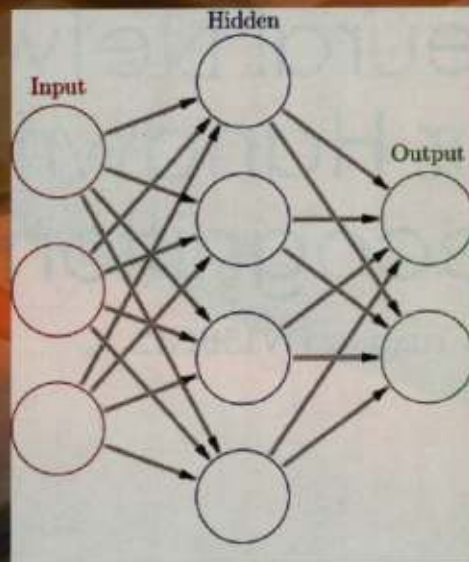
OCR software

Artificial Neural Network

Neural Networks as the Brain

- Basic Concepts
- Configuration
- Cost Function

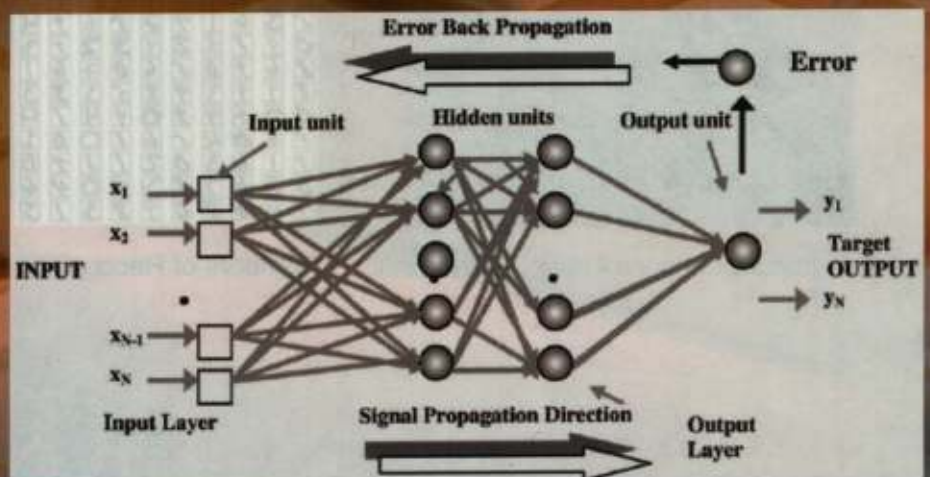
Each circular node represents an artificial neuron and an arrow represents a connection from the output of one neuron to the input of another



Take your time covering these two slides.
Whether your presentation is understandable
depends strongly on these slides.

Neural Networks and Common Algorithm

1. Backpropagation, is a common method of training artificial neural networks
2. Optimization method such as gradient descent

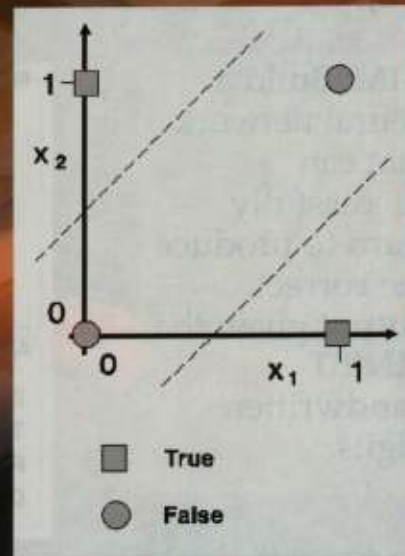


Take-home message: "A neural network can be trained to solve an XOR problem".

A simple example of Neural Network: XOR problem

- A neural network that can learn to produce the correct output given the XOR problem.

Given this input		Produce this output
x_1	x_2	y
0	0	0
0	1	1
1	0	1
1	1	0



put the XOR table on here too.

Successfully Trained XOR problem

Iterations	Result of 0,0	Deviation J
1000	0.47689	0.69423
68000	0.026558	0.037856
100000	0.019090	0.025859

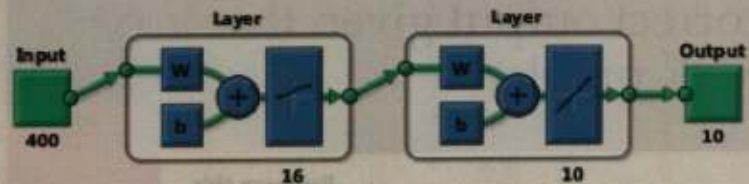
- Network guesses small numbers (close to 0) for the first and last XOR examples and high (close to 1)
- Result is more accurate when Iterations is larger.
- Successfully trained!

Handwritten Digits Recognition



- AIM: Build a neural network that can successfully learn to produce the correct output given the MNIST handwritten digits.

Neural Network



Algorithms

Data Division: Index (divideind)
 Training: Levenberg-Marquardt (trainlm)
 Performance: Mean Squared Error (mse)
 Derivative: Default (defaultderiv)

Trained Handwritten Digits Recognition

Accuracy	Samples	Hidden Neruons
23.3%	120	4
66.7%	120	16
95.5%	5000	25

- Training set accuracy is around 63% with the small sample (120) and small hidden neurons (16).
- While, larger sample (5000), and more hidden neurons (25) yields 95%.
- Sucessfully Trained!

TRAINLM, Epoch 0/200, MSE 0.902926/0, Gradient 600.48/1e-010
 TRAINLM, Epoch 21/200, MSE 0.0738405/0, Gradient 0.0262333/1e-010
 TRAINLM, Validation stop.

SIMULATION...

Training Set Accuracy: 23.333333

>>

not needed

remove title.

What we learned so far... And more

So Far:

- Basic Concepts of Neural Network
- A Neural Network For XOR problem
- A Neural Network For Handwritten Recognition

Future:

- More Difficult Recognition
- Possibilities of solving any problems.
- Neural Network that can exceed human beings.

Overall, this is becoming a nice presentation. Just remember

- speak slowly
- don't rush the start (explain the fundamental concepts clearly)
- don't assume the audience are specialists

* Your mission with this presentation is to make people think
"That's interesting - I'd like to know more".

