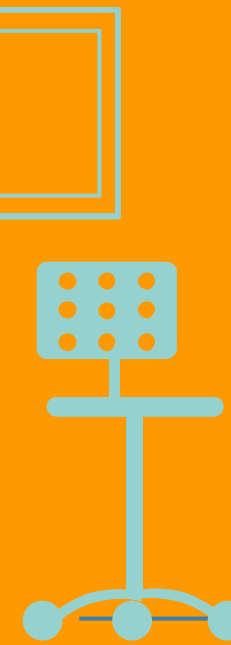
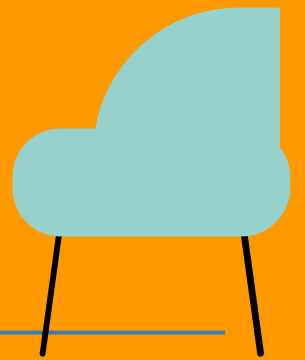
"Neural networks are like the brain of the machines, unlocking the potential for computers to not just compute, but to truly understand and learn from the world around us."





ArthurKakande

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ArthurKakande / README.md

Hi there 👋

I'm Arthur Kakande, i enjoy 🔬 turning data into insights and building intelligent solutions! 💡. Welcome to my GitHub profile!

About Me

- 🔭 I'm currently working on The Africa Knowledge Graph
- 🌟 I'm interested in AI and Intelligent Systems
- 💬 Ask me about Information Retreival, Semantic Technologies, Expert Systems, Natural Language Undertstanding, ML, Distributed AI, etc.
- 📫 How to reach me: https://twitter.com/arthurkakande

My Skills

- Programming languages: R, Python, Java, SQL
- Frameworks and libraries: Streamlit, R Shiny, Tensorflow, Langchain
- Tools and technologies: Protege, GraphDB
- Databases: PostgreSQL
- Other skills: Statistical Analysis

Get in Touch

Feel free to reach out to me if you have any questions, ideas, or just want to say hello! I'm always excited to connect with fellow developers and enthusiasts.

Let's collaborate, learn, and create amazing things together!

Introduction to Neural Networks and Deep Learning

In learning we don't give the computer instructions on how to perform a task, rather we give it data or information and let it learn some patterns to be able to perform a task on its own.

Supervised Learning;
Given a data set of input and output pairs, learn a function that maps inputs to outputs.

Classification;
A task in supervised learning that deals with mapping an input to a discrete category.

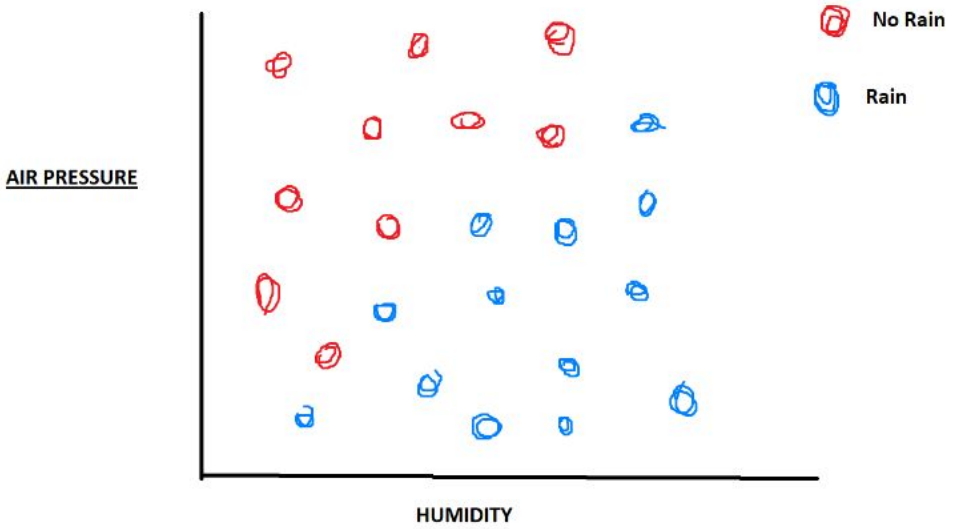

₹

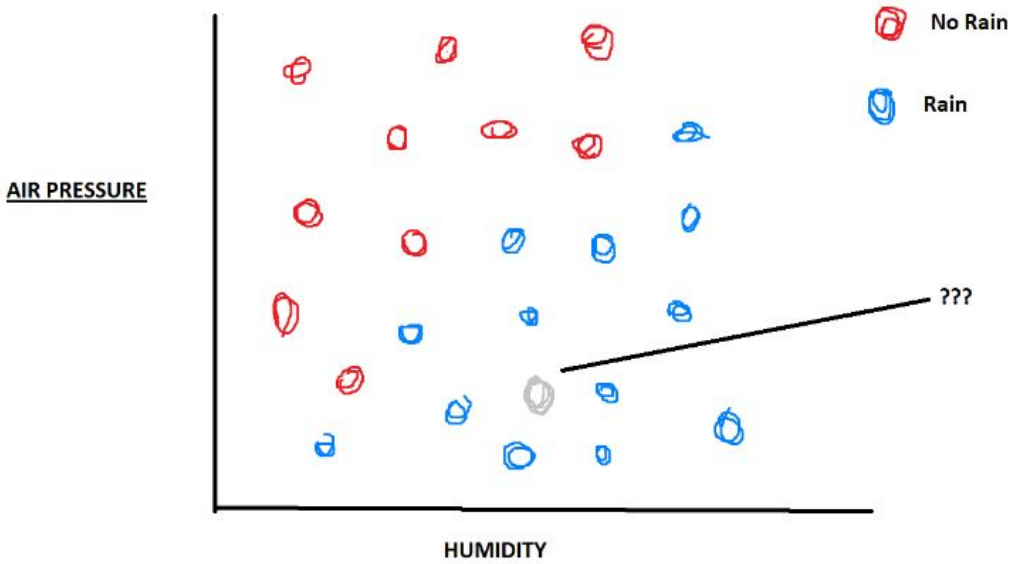

DEBT

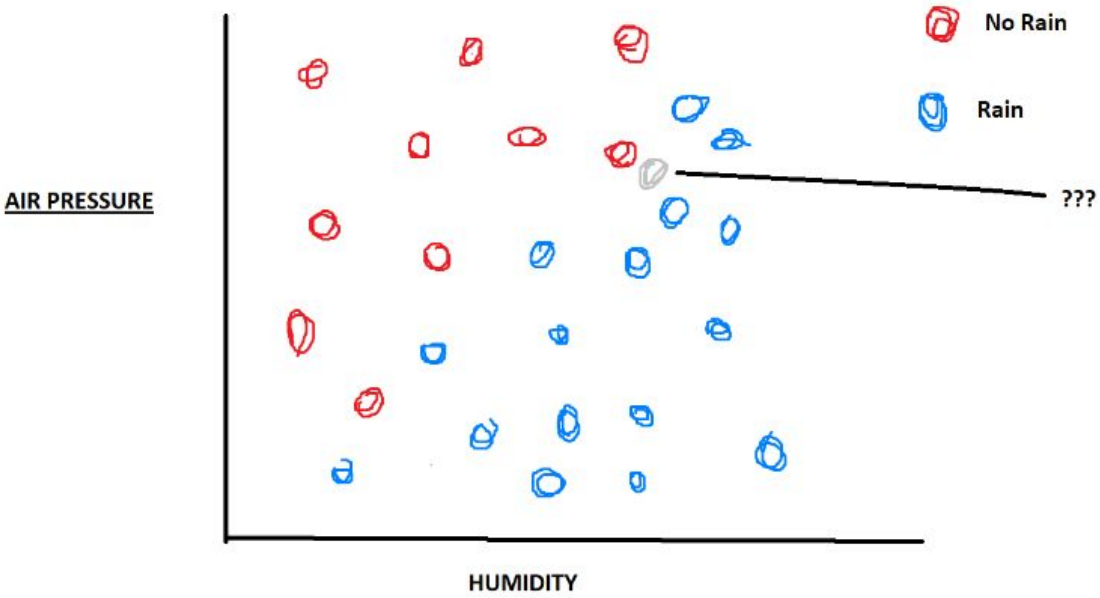

365
SPAM
HOSTPAPA

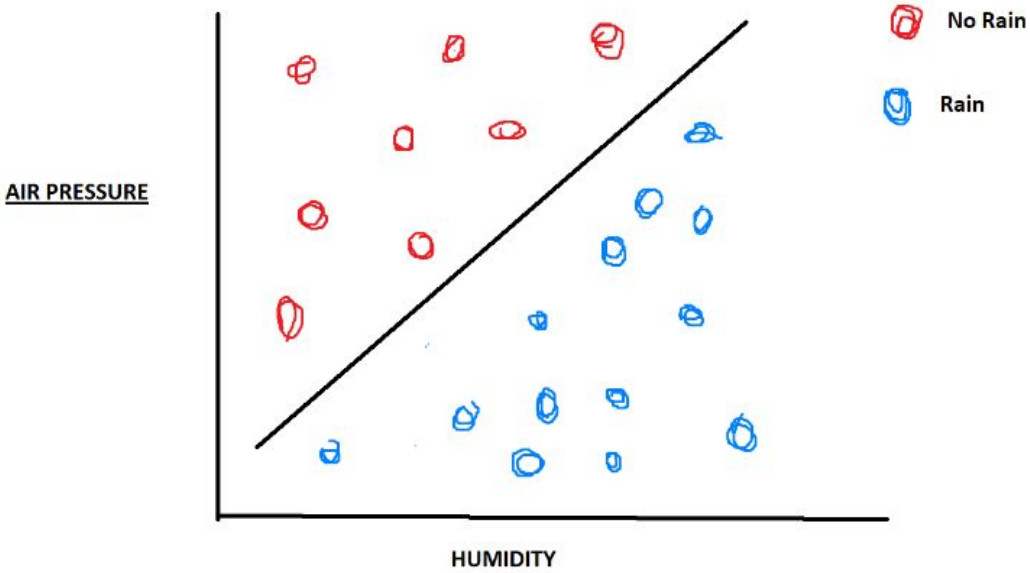

501
Junk
Not Junk
Block Sender

Humidity	Air pressure	Rain
18	25	Rain
19	3	No Rain
25	5	No Rain
20	7	No Rain
8	25	Rain
10	40	Rain
6	25	-


No Rain
Rain
AIR PRESSURE
HUMIDITY


No Rain
Rain
AIR PRESSURE
???
HUMIDITY


No Rain
Rain
???
AIR PRESSURE
HUMIDITY


No Rain
Rain
AIR PRESSURE
HUMIDITY

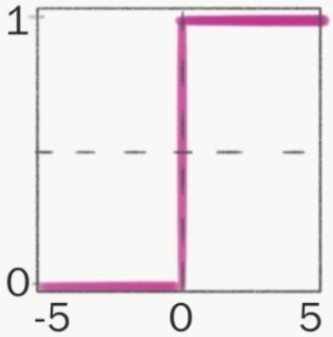
Hypothesis = Intercept + (W1 * humidity) + (W2 * Air pressure)

Rain(humidity, Air pressure) = Intercept + (W1 * humidity) + (W2 * Air pressure)

Function;
If below threshold = Value is 0 = No Rain
If above threshold = Value is 1 = Rain

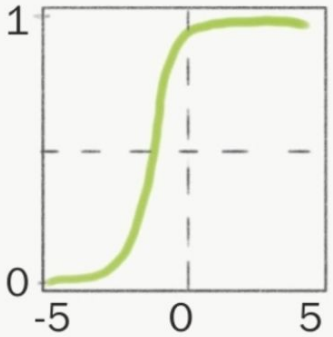
Activation Functions

Threshold

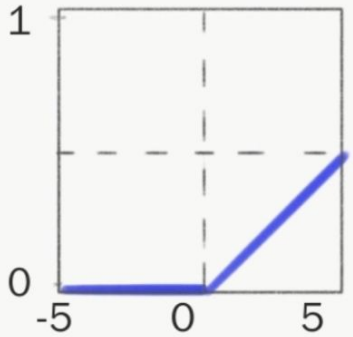


No defined gradient

Sigmoid

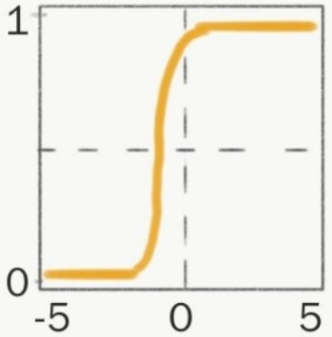


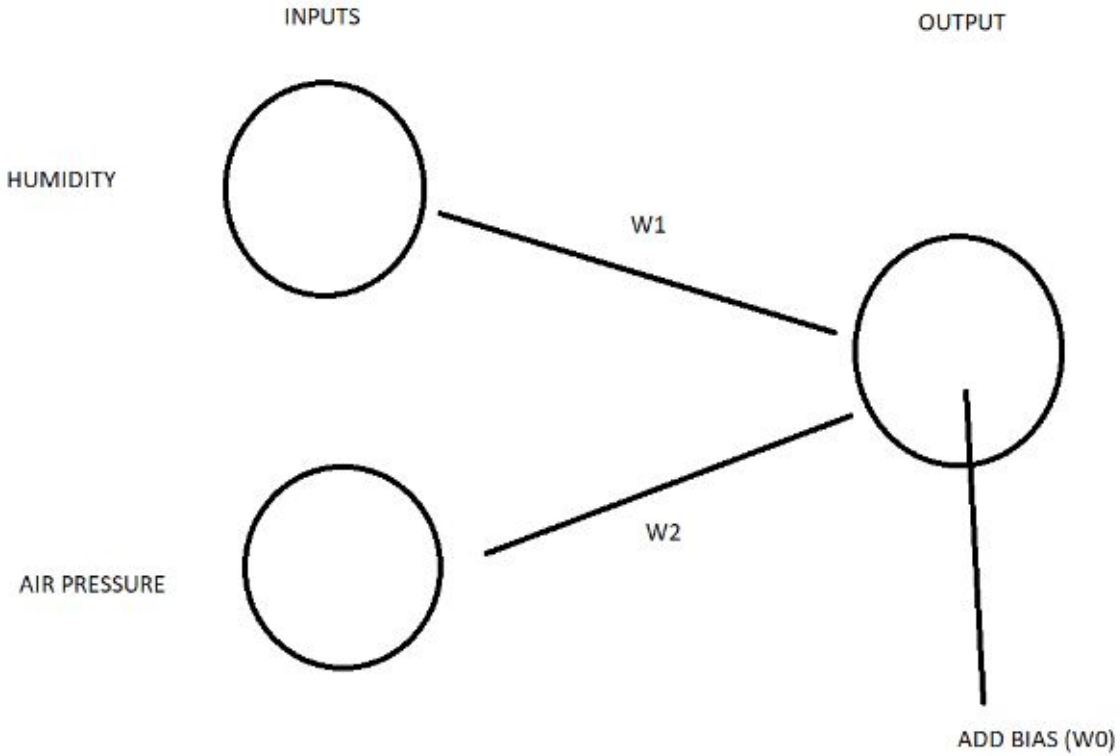
Relu*

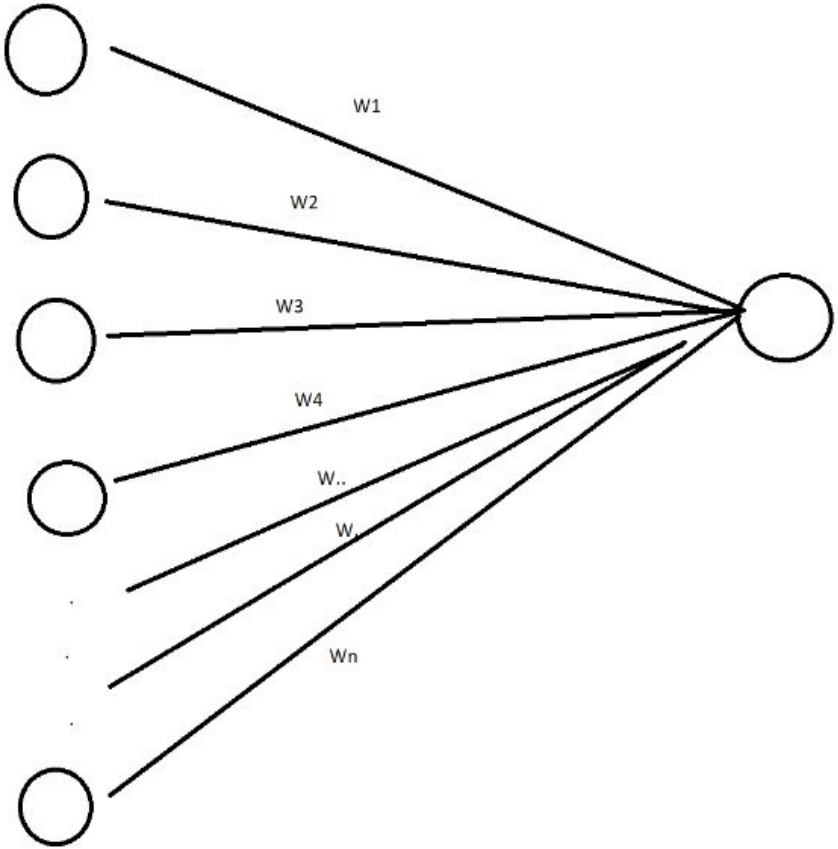


Default

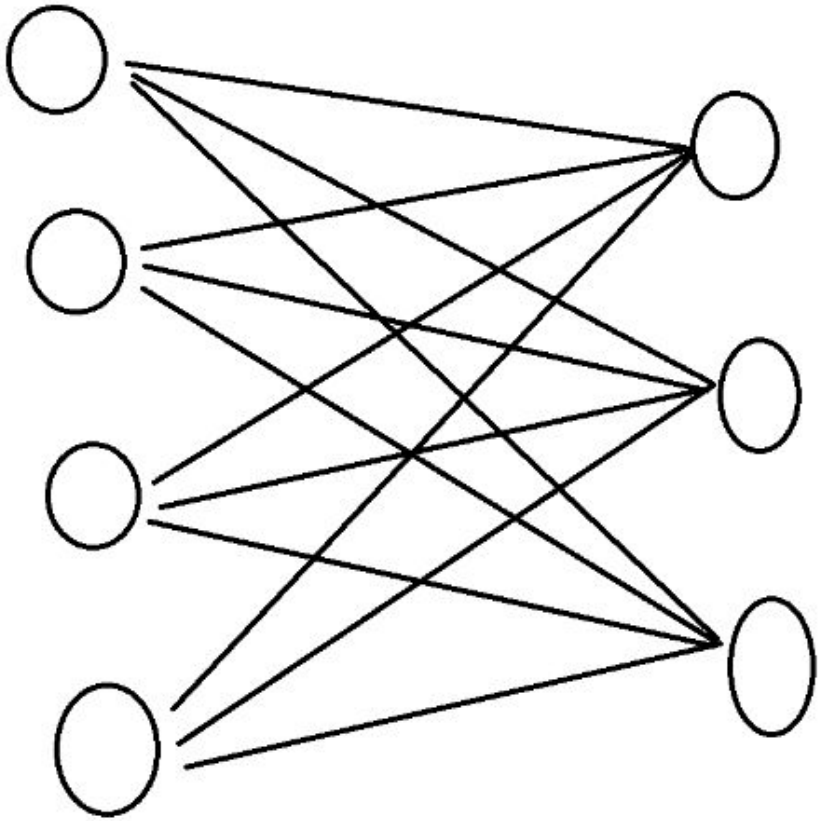
Tan H

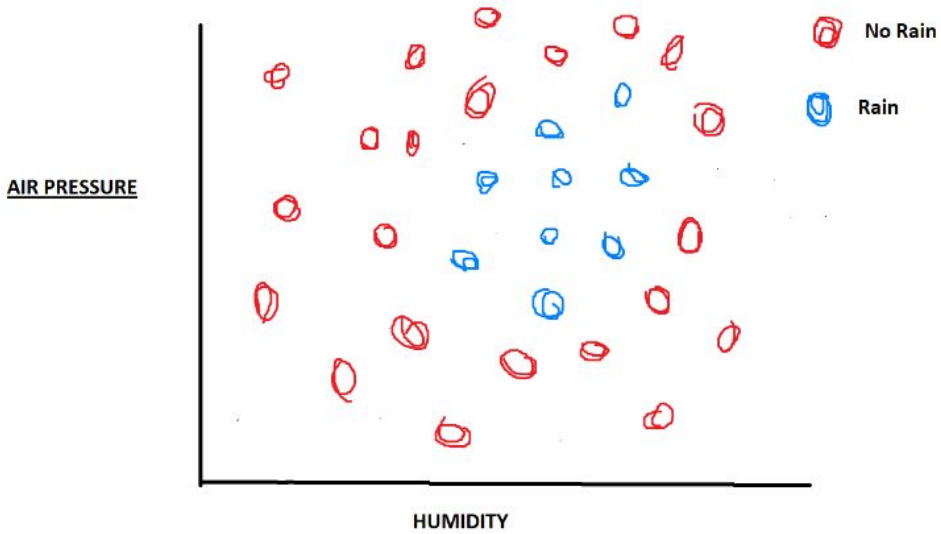



INPUTS
OUTPUT
HUMIDITY
W1
AIR PRESSURE
W2
ADD BIAS (W0)

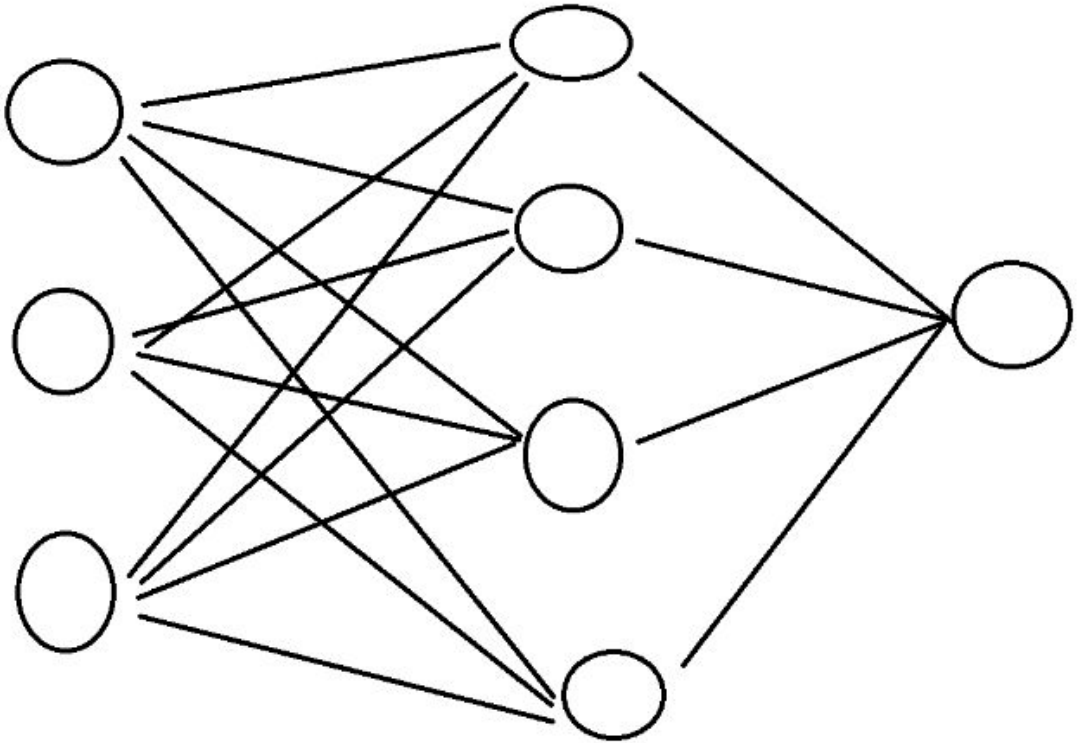

W1
W2
W3
W4
W..
W.
Wn

Gradient Descent;
Algorithm for minimizing loss when training a neural network



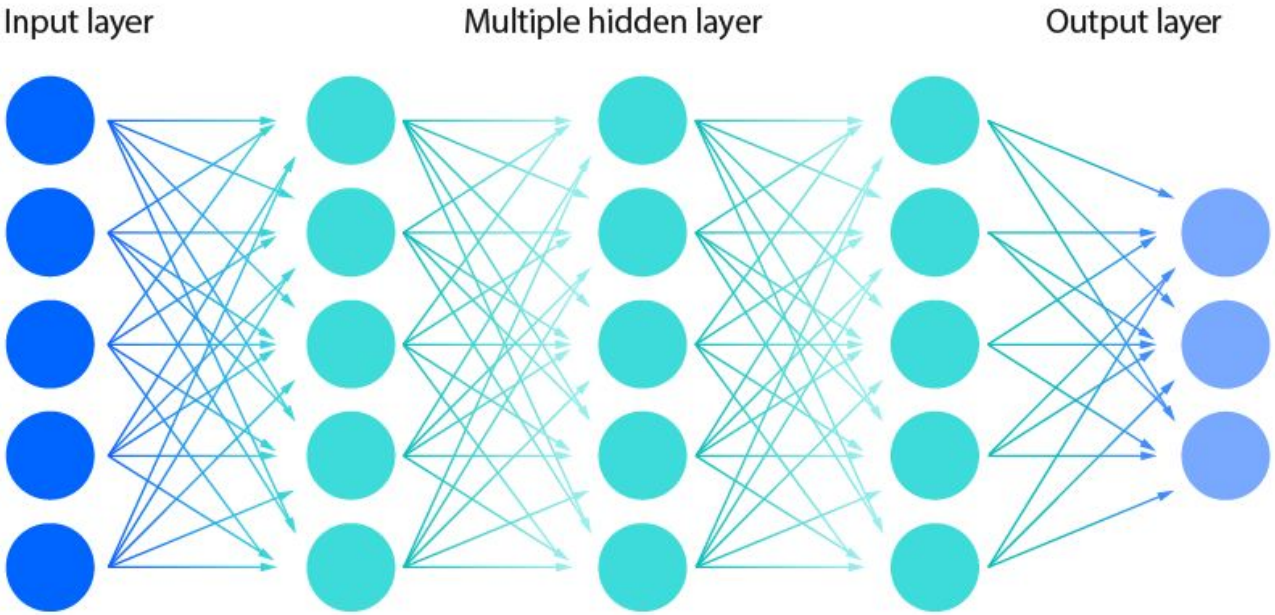

No Rain
Rain
AIR PRESSURE
HUMIDITY

Multilayer Neural Network;
An artificial neural network with an input layer, output layer and at least one hidden layer.



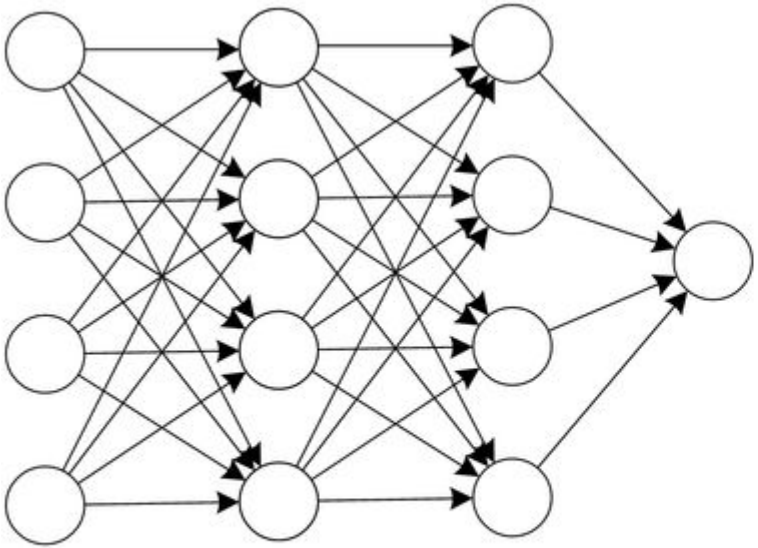
Back propagation;
An algorithm for training a neural network with a hidden layer

Deep neural network

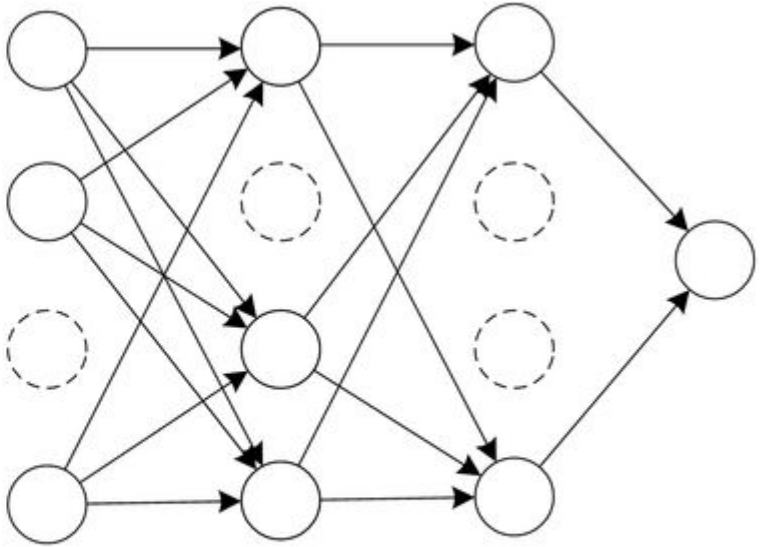


Overfitting;
A model that fits too closely to a particular dataset and may therefore fail to generalise on future datasets

Drop out:
Temporarily removing units - randomly - from the neural network to prevent over reliance on certain units.



(a) Standard Neural Network

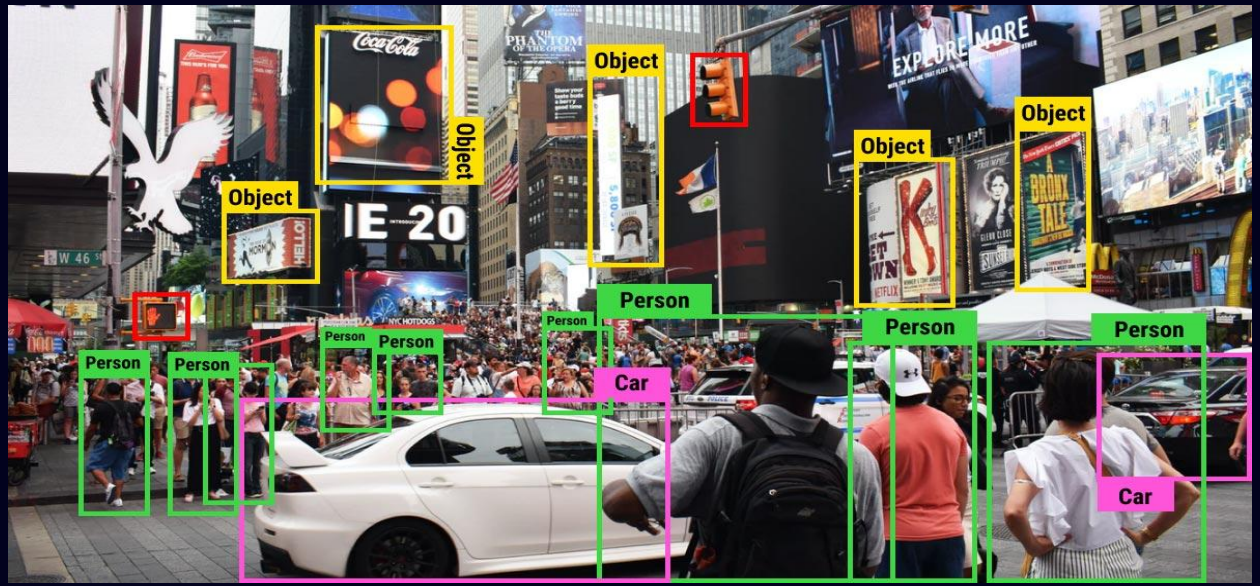


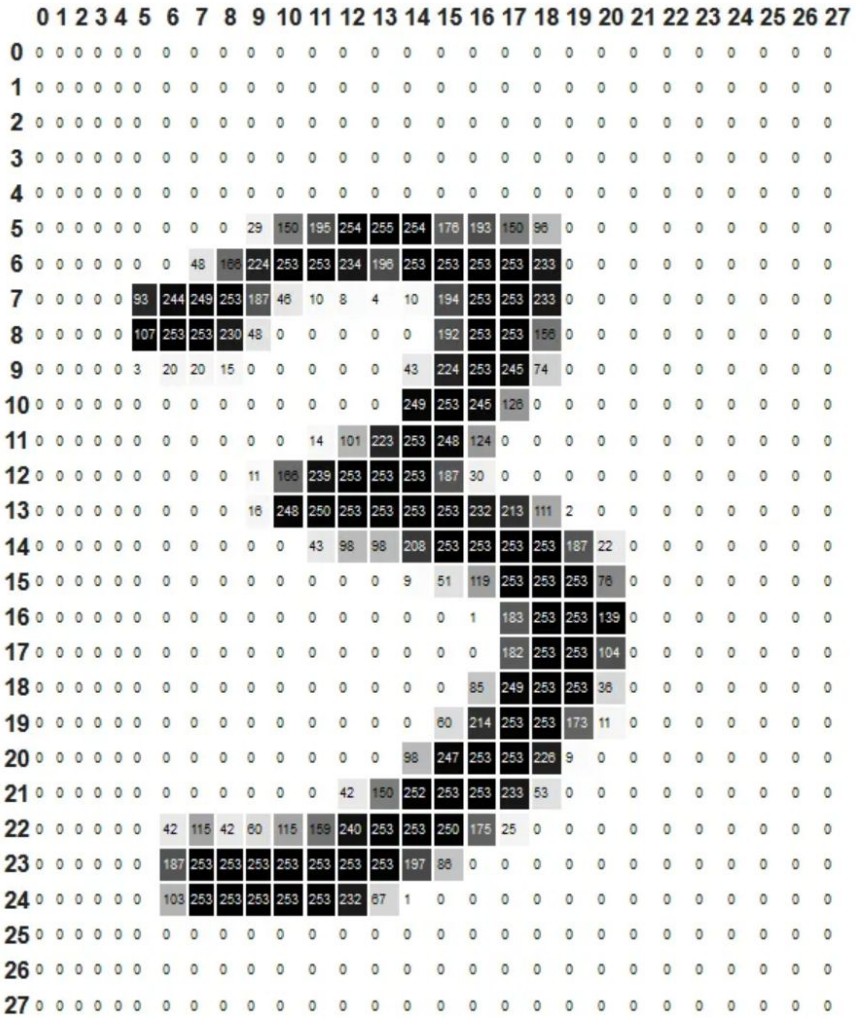
(b) Network after Dropout

playground.tensorflow.org

Computer Vision

Computer vision; Computational methods for analyzing and understanding digital images




0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
5 0 0 0 0 0 0 0 0 0 29 150 195 254 255 254 176 193 150 96 0 0 0 0 0 0 0 0 0
6 0 0 0 0 0 0 0 48 166 224 253 253 234 196 253 253 253 253 233 0 0 0 0 0 0 0 0 0
7 0 0 0 0 0 93 244 249 253 187 46 10 8 4 10 194 253 253 233 0 0 0 0 0 0 0 0 0
8 0 0 0 0 0 107 253 253 230 48 0 0 0 0 0 192 253 253 156 0 0 0 0 0 0 0 0 0
9 0 0 0 0 0 3 20 20 15 0 0 0 0 0 43 224 253 245 74 0 0 0 0 0 0 0 0 0
10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 249 253 245 126 0 0 0 0 0 0 0 0 0 0
11 0 0 0 0 0 0 0 0 0 0 0 14 101 223 253 248 124 0 0 0 0 0 0 0 0 0 0
12 0 0 0 0 0 0 0 0 0 11 166 239 253 253 253 187 30 0 0 0 0 0 0 0 0 0 0
13 0 0 0 0 0 0 0 0 0 16 248 250 253 253 253 253 232 213 111 2 0 0 0 0 0 0 0 0
14 0 0 0 0 0 0 0 0 0 0 0 43 98 98 208 253 253 253 253 187 22 0 0 0 0 0 0 0
15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 9 51 119 253 253 253 76 0 0 0 0 0 0 0
16 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 183 253 253 139 0 0 0 0 0 0 0
17 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 182 253 253 104 0 0 0 0 0 0 0
18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 85 249 253 253 36 0 0 0 0 0 0 0
19 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 60 214 253 253 173 11 0 0 0 0 0 0 0
20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 98 247 253 253 226 9 0 0 0 0 0 0 0
21 0 0 0 0 0 0 0 0 0 0 0 0 42 150 252 253 253 233 53 0 0 0 0 0 0 0 0 0
22 0 0 0 0 0 0 42 115 42 60 115 159 240 253 253 250 175 25 0 0 0 0 0 0 0 0 0 0
23 0 0 0 0 0 0 187 253 253 253 253 253 253 253 197 86 0 0 0 0 0 0 0 0 0 0 0 0
24 0 0 0 0 0 0 103 253 253 253 253 253 232 67 1 0 0 0 0 0 0 0 0 0 0 0 0 0
25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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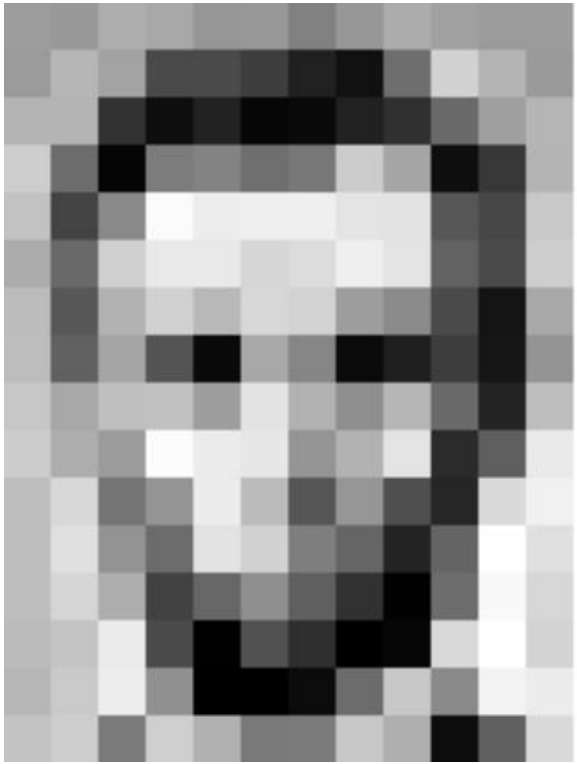

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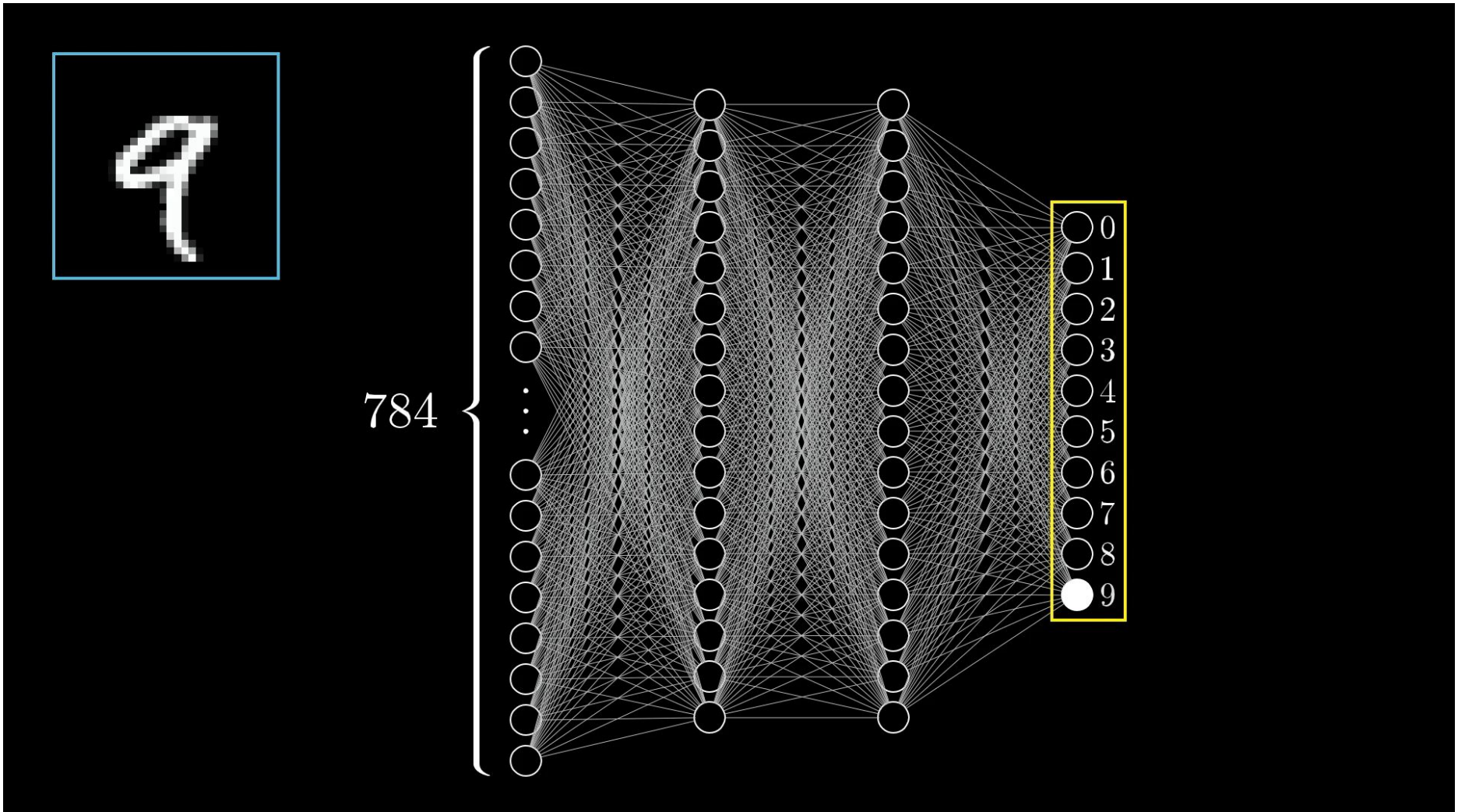
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218


784
0
1
2
3
4
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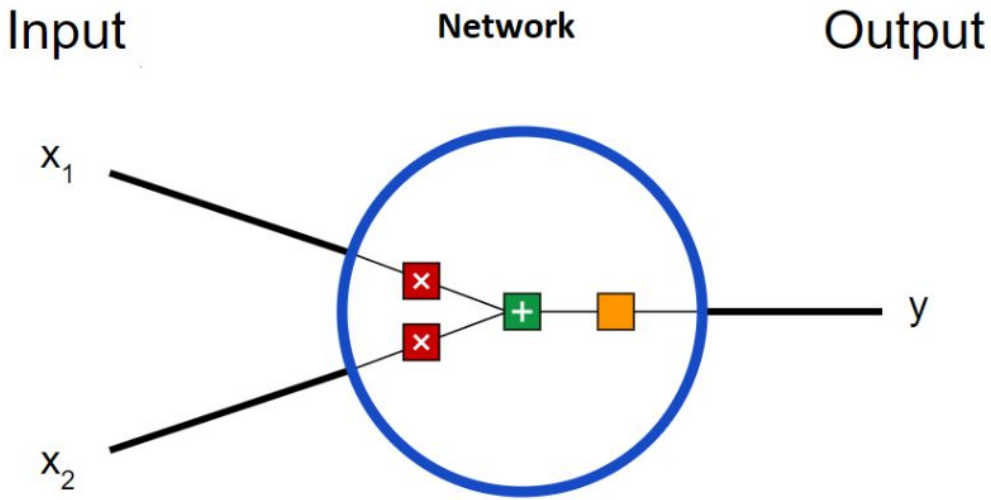
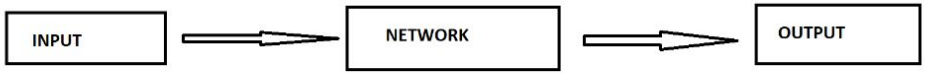
8
9


Input
Network
Output
x_1
x_2
y


INPUT
NETWORK
OUTPUT

Feed forward Neural Network

Microsoft

English (US)

CaptionBot

I can understand the content of any photograph and I'll try to describe it as well as any human. I'll analyze your photo, but I won't store or share it. Learn More.

Upload a photo

captionbotui.azurewebsites.net

Microsoft's new image-captioning AI will help accessibility in Word, Outlook, and beyond

The image captioning algorithm will be used to improve apps like Seeing AI, here being used by developer Florian Beijers. Image: Microsoft / Maurice Jager

/ The algorithm even beats humans in some limited tasks

By James Vincent, a senior reporter who has covered AI, robotics, and more for eight years at The Verge.

Oct 14, 2020, 6:00 PM GMT+3 | 0 Comments / 0 New

Microsoft has developed a new image-captioning algorithm that exceeds human accuracy in certain limited tests. The AI system has been used to update the company's assistant app for the visually

TECH / ARTIFICIAL INTELLIGENCE

ThisPersonDoesNotExist.com uses AI to generate endless fake faces

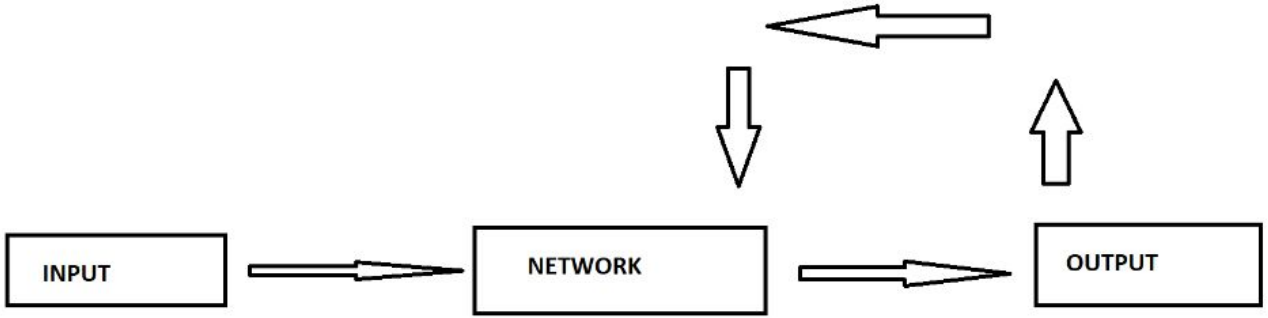
A few sample faces — all completely fake — created by ThisPersonDoesNotExist.com

/ Hit refresh to lock eyes with another imaginary stranger

By James Vincent, a senior reporter who has covered AI, robotics, and more for eight years at The Verge.

Feb 15, 2019, 3:38 PM GMT+3 | 0 Comments / 0 New

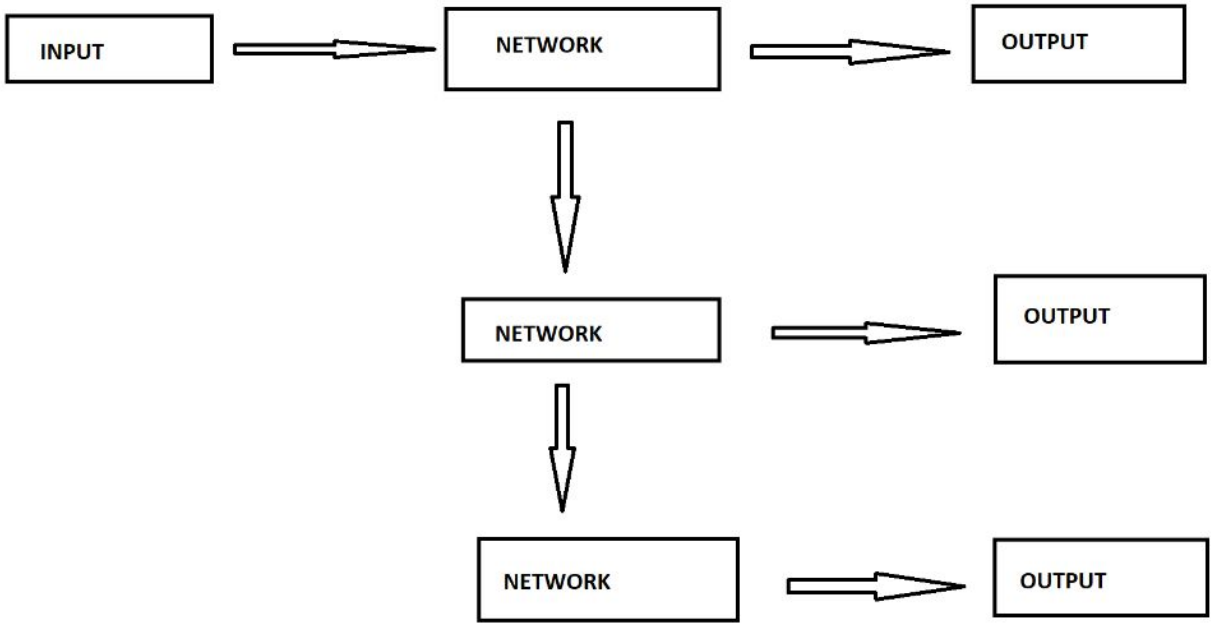
The ability of AI to generate fake visuals is not yet mainstream knowledge, but a new website — ThisPersonDoesNotExist.com — offers a quick and persuasive education.

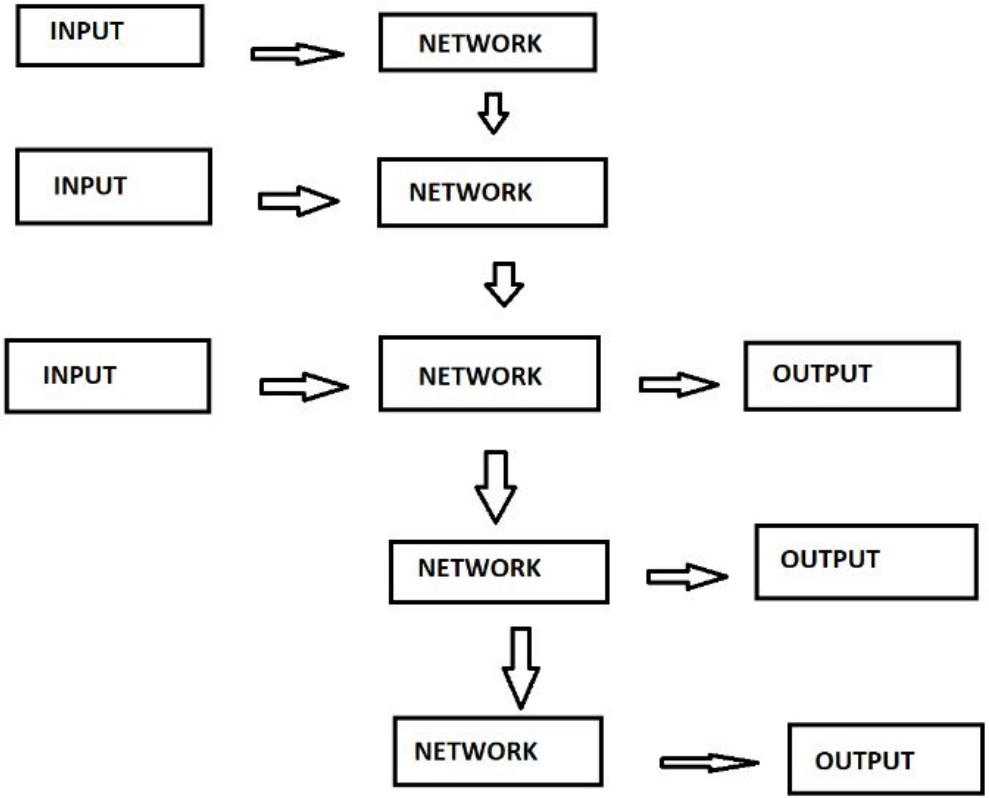

INPUT
NETWORK
OUTPUT

Recurrent Neural Network

RNNs:

These networks are designed for sequential data and have connections that loop back on themselves. They are effective for tasks like natural language processing and time series analysis.


INPUT
NETWORK
OUTPUT
NETWORK
OUTPUT
NETWORK
OUTPUT


INPUT
NETWORK
INPUT
NETWORK
INPUT
NETWORK
OUTPUT
NETWORK
OUTPUT
NETWORK
OUTPUT

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Google Translate

Text | Images | Documents | Websites

Detect language | English | Spanish | French

English | Spanish | Arabic

0 / 5,000

Translation

Send feedback

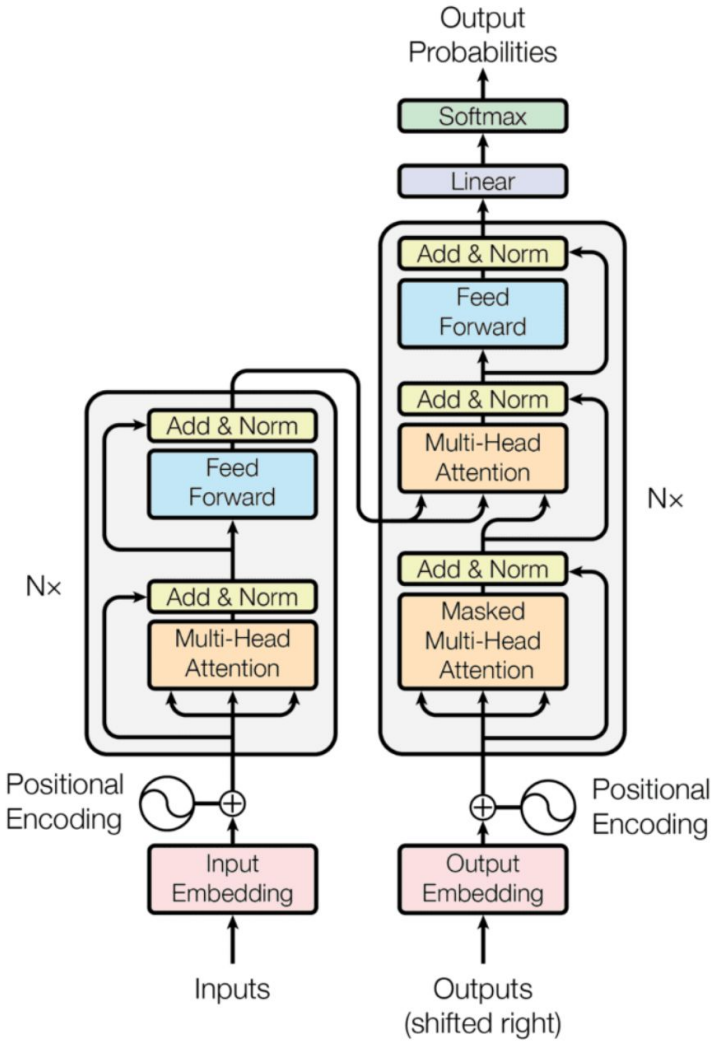
History | Saved | Contribute

Long Short-Term Memory (LSTM) Networks:

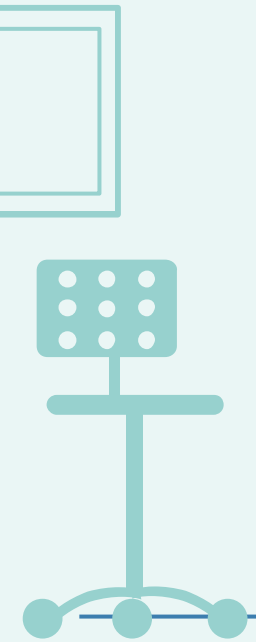
A type of RNN, LSTMs address the vanishing gradient problem, making them better at handling long-range dependencies in sequences.

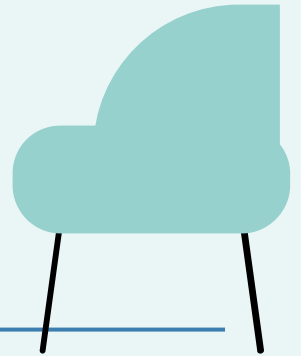
Transformers:

Introduced for natural language processing, Transformers have a self-attention mechanism that enables parallel processing of input sequences. They are the basis for many state-of-the-art models like BERT, GPT-3, and more.


Output Probabilities
Softmax
Linear
Add & Norm
Feed Forward
Add & Norm
Multi-Head Attention
Add & Norm
Masked Multi-Head Attention
Nx
Add & Norm
Feed Forward
Add & Norm
Multi-Head Attention
Nx
Positional Encoding
Positional Encoding
Input Embedding
Output Embedding
Inputs
Outputs (shifted right)

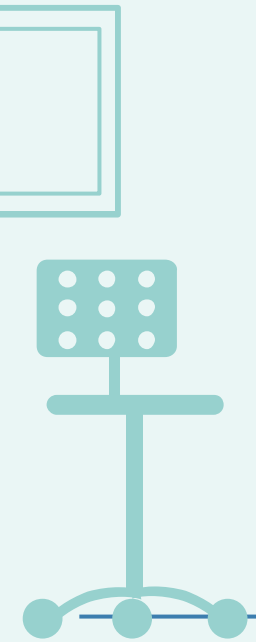
Any Questions...

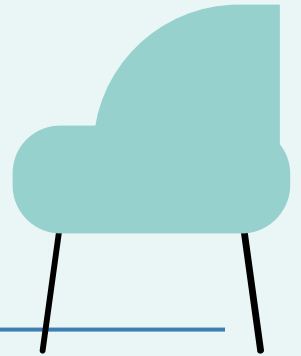




Demo Time!!

Survey time...





Sources;

- UVA Deep Learning Course
- Harvard's CS50
- University of Toronto (https://www.cs.toronto.edu/~hinton/coursera_slides.html)