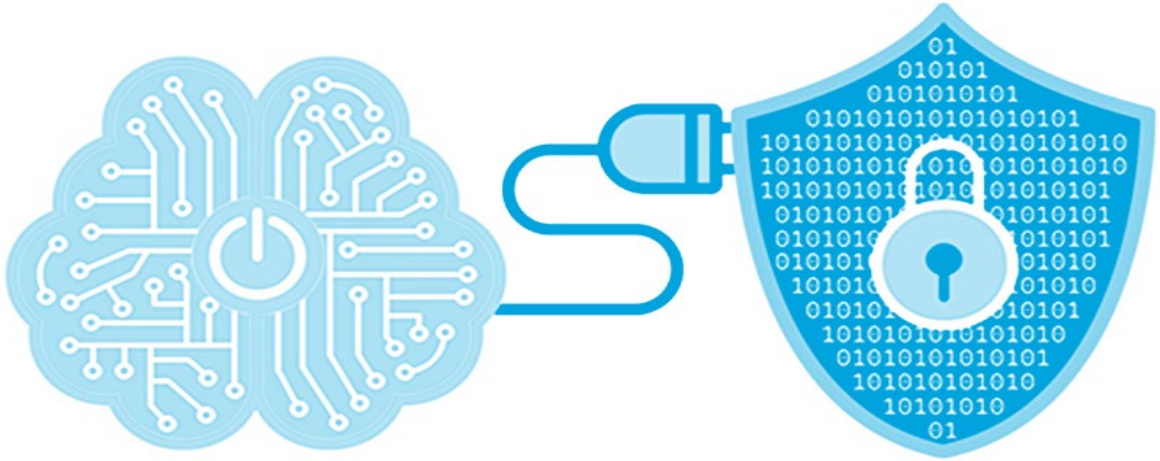
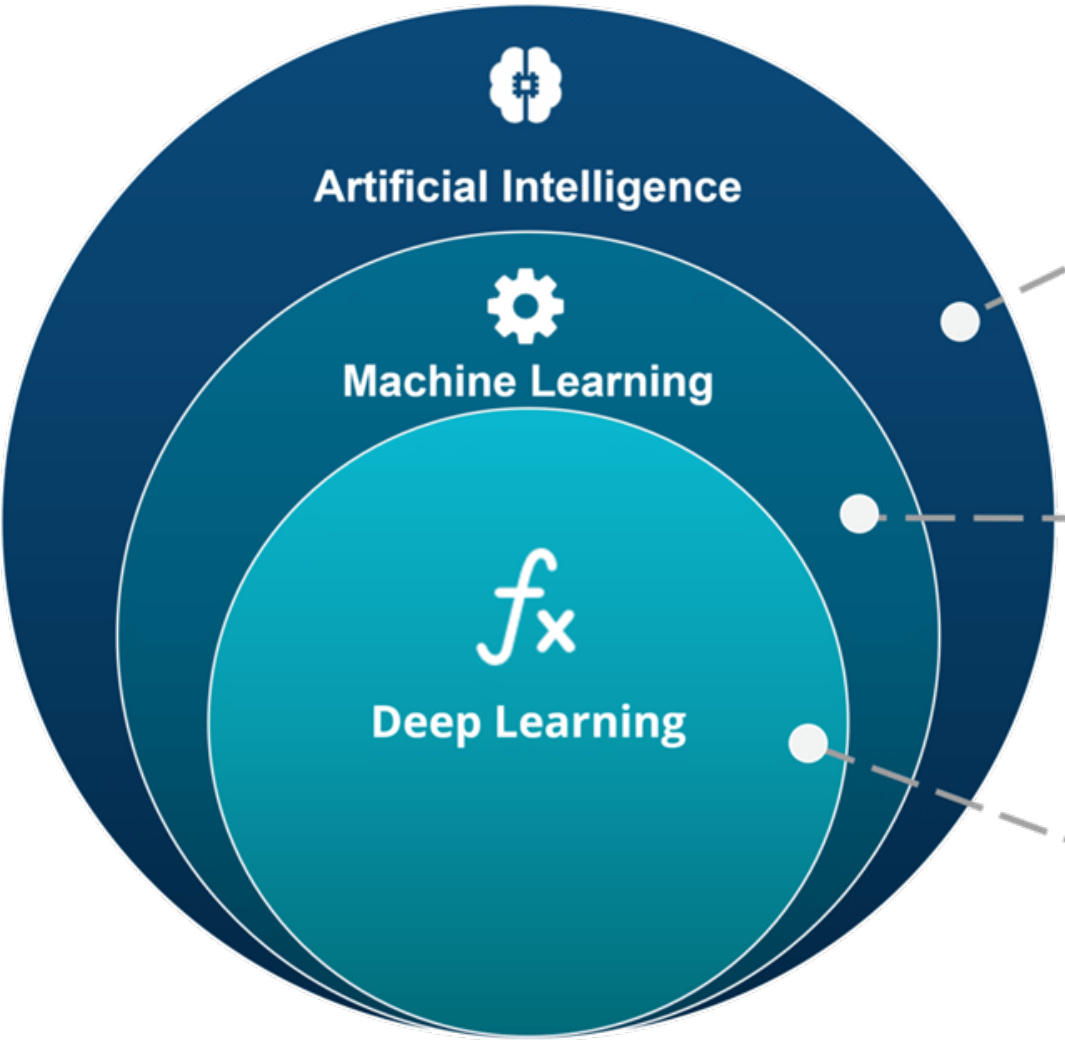
ITU WTDC BAKU 2025
17–28 November 2025
WORLD TELECOMMUNICATION DEVELOPMENT CONFERENCE



# Cyber-Resilience in the Age of AI – Opportunities and Risks


**Marwan Ben Rached**
Senior Cybersecurity Coordinator
International Telecommunication Union




## ARTIFICIAL INTELLIGENCE

A technique which enables machines to mimic human behaviour

## MACHINE LEARNING

Subset of AI technique which use statistical methods to enable machines to improve with experience

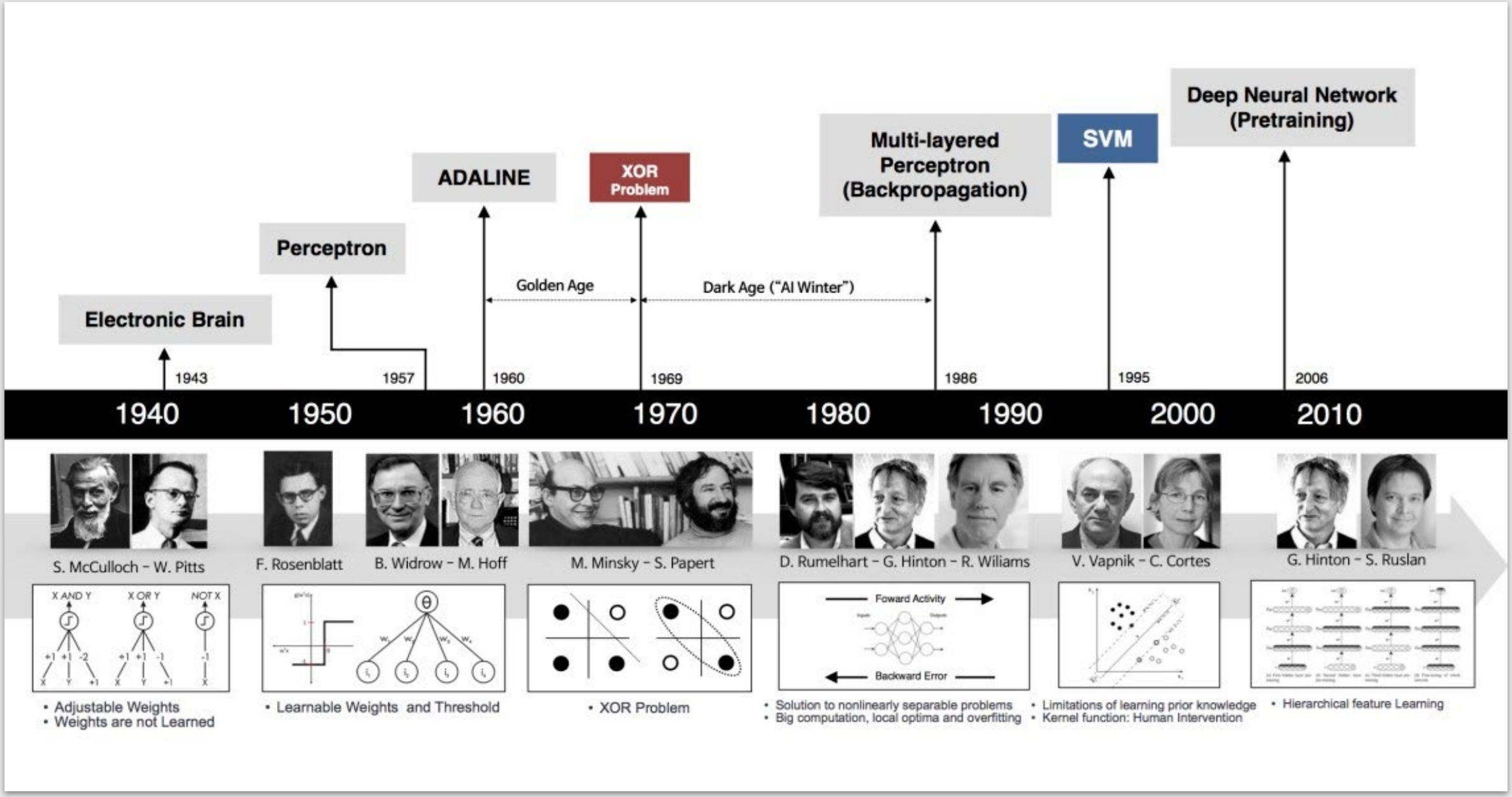
## DEEP LEARNING

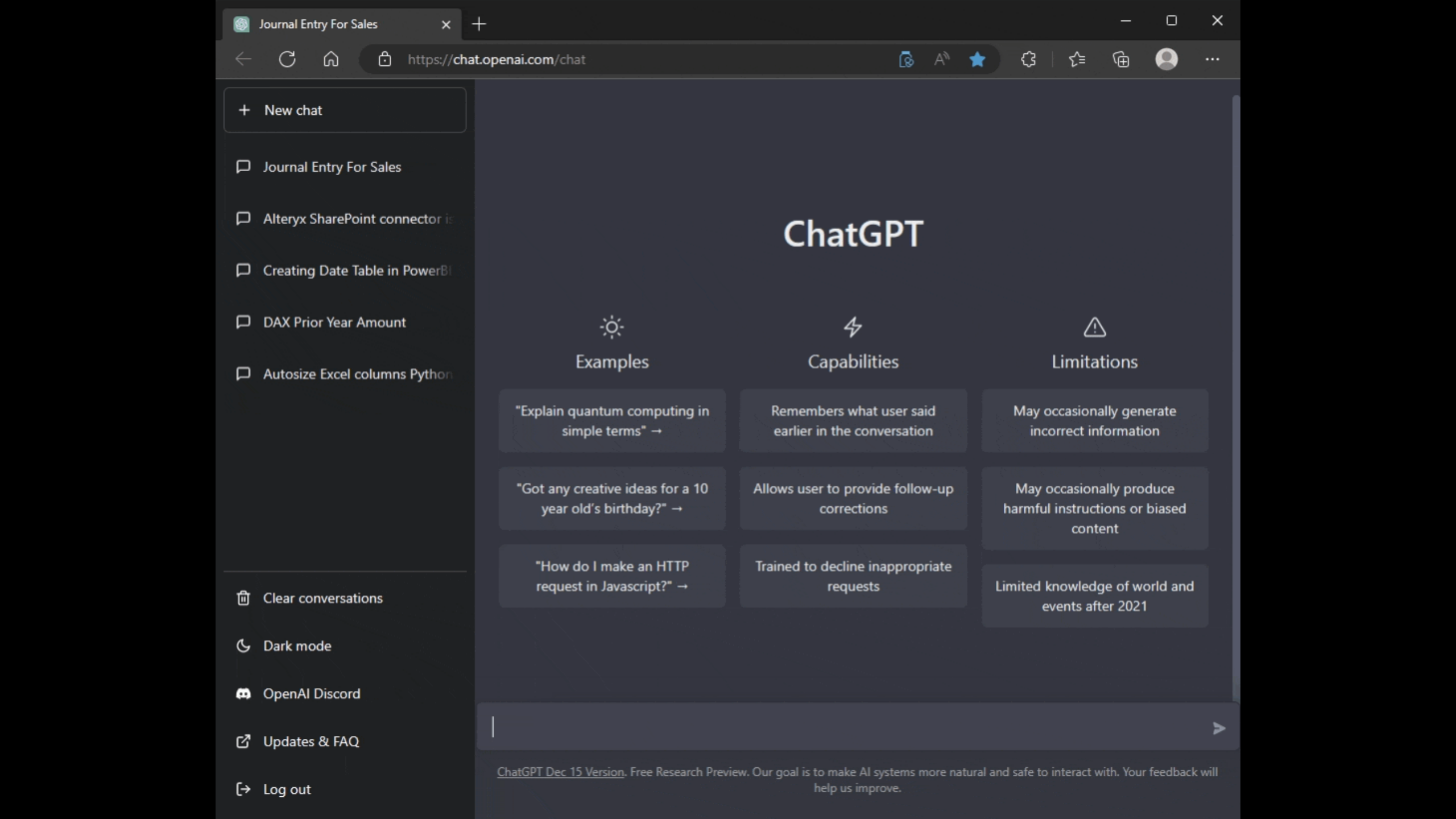
Subset of ML which make the computation of multi-layer neural network feasible

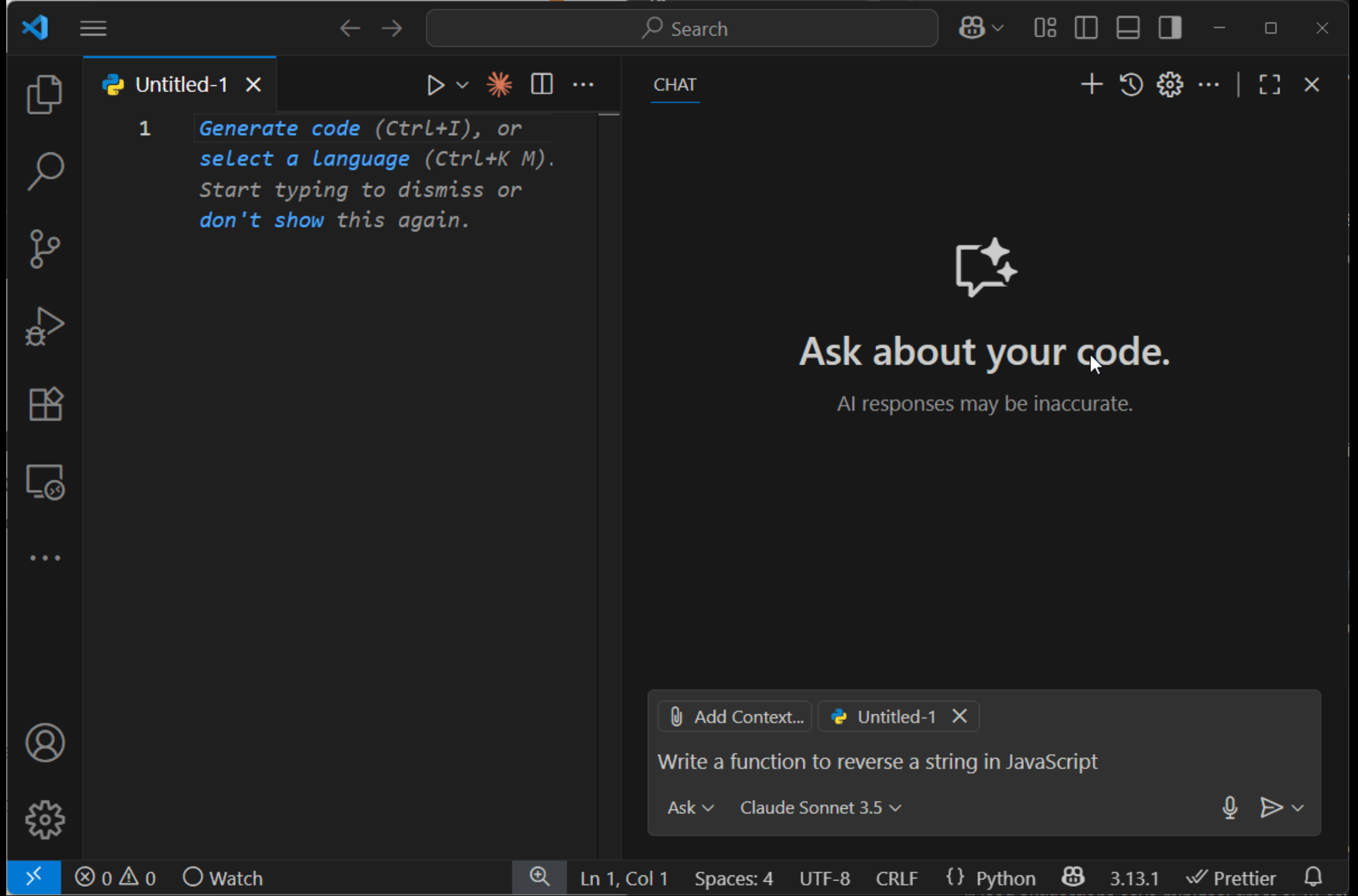
The Digital Universe is Huge —And Growing Exponentially
4.4 ZB
44 ZB
2013
2020
If the Digital Universe were represented by the memory in a stack of tablets, in 2013 it would have stretched two-thirds the way to the Moon*
2020, 6.6 stacks from the Earth to the Moon*
Source: IDC, 2014
* iPad Air – 0.29" thick, 128 GB

- **In 2013 :  44 Zettabytes (ZB)**

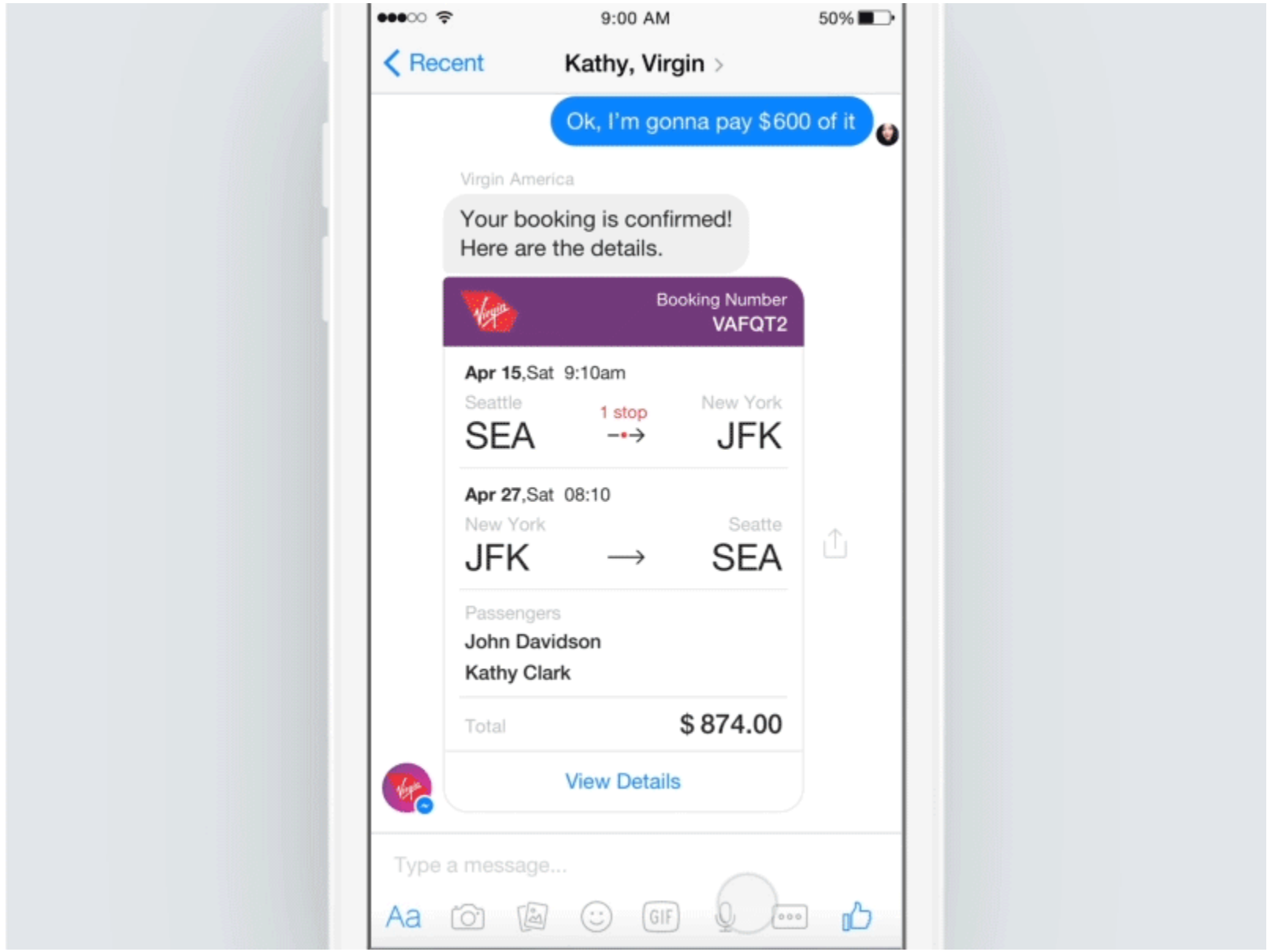
- **In 2025 : 175 Zettabytes (175 trillion GB)**
- Represents a **4x increase** since 2013
- stack to the **moon 23 times**


Deep Neural Network
(Pretraining)
SVM
Multi-layered
Perceptron
(Backpropagation)
ADALINE
XOR
Problem
Perceptron
Electronic Brain
Golden Age
Dark Age ("AI Winter")
1943
1957
1960
1969
1986
1995
2006
1940
1950
1960
1970
1980
1990
2000
2010
S. McCulloch - W. Pitts
F. Rosenblatt
B. Widrow - M. Hoff
M. Minsky - S. Papert
D. Rumelhart - G. Hinton - R. Wiliams
V. Vapnik - C. Cortes
G. Hinton - S. Ruslan
X AND Y
X OR Y
NOT X
Foward Activity
Backward Error
• Adjustable Weights
• Weights are not Learned
• Learnable Weights and Threshold
• XOR Problem
• Solution to nonlinearly separable problems
• Big computation, local optima and overfitting
• Limitations of learning prior knowledge
• Kernel function: Human Intervention
• Hierarchical feature Learning


Journal Entry For Sales
https://chat.openai.com/chat
New chat
Journal Entry For Sales
Alteryx SharePoint connector is
Creating Date Table in PowerBI
DAX Prior Year Amount
Autosize Excel columns Python
Clear conversations
Dark mode
OpenAI Discord
Updates & FAQ
Log out
ChatGPT
Examples
"Explain quantum computing in simple terms" →
"Got any creative ideas for a 10 year old's birthday?" →
"How do I make an HTTP request in Javascript?" →
Capabilities
Remembers what user said earlier in the conversation
Allows user to provide follow-up corrections
Trained to decline inappropriate requests
Limitations
May occasionally generate incorrect information
May occasionally produce harmful instructions or biased content
Limited knowledge of world and events after 2021
ChatGPT Dec 15 Version. Free Research Preview. Our goal is to make AI systems more natural and safe to interact with. Your feedback will help us improve.


Search
Untitled-1
1 Generate code (Ctrl+I), or select a language (Ctrl+K M). Start typing to dismiss or don't show this again.
CHAT
Ask about your code.
AI responses may be inaccurate.
Add Context...
Untitled-1
Write a function to reverse a string in JavaScript
Ask
Claude Sonnet 3.5
0 0
Watch
Ln 1, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.1
Prettier

LEFT REARWARD VEHICLE CAMERA
MEDIUM RANGE VEHICLE CAMERA
RIGHT REARWARD VEHICLE CAMERA
MOTION FLOW
LANE LINES
LANE LINES
ROAD FLOW
IN-PATH OBJECTS
ROAD LIGHTS
OBJECTS
ROAD SIGNS


9:00 AM
50%
Recent
Kathy, Virgin
Ok, I'm gonna pay $600 of it
Virgin America
Your booking is confirmed!
Here are the details.
Booking Number
VAFQT2
Apr 15,Sat 9:10am
Seattle
SEA
1 stop
New York
JFK
Apr 27,Sat 08:10
New York
JFK
Seatte
SEA
Passengers
John Davidson
Kathy Clark
Total
$ 874.00
View Details
Type a message...
Aa
GIF

Exam: OB
Clipboard: 7/127.85 MB

Voluson™ E10

g, *

E69766-18-09-07-1 GA=20w5d

TIs 0.2
TIb 0.2
MI 0.9

09/07/2018
12:54:14 PM
RM6C

73Hz/ 9.8cm
42°/0.9.
Routine 2 Trim./OB
HI M 7.70 - 4.30-
Gn 0
C7/M7-
P4/E2
SRI II 3-

Voluson
E 10

A B C

V = 0.684 lit
Vol.Angle

Calculating...

SonoCNS

Make sure the Transthalamic plane (TT) is visible in the A-plane area, adjust if needed.

Then press **Start Alignment**

Scan the QR code below with your mobile device to access the ISUOG Guidelines.

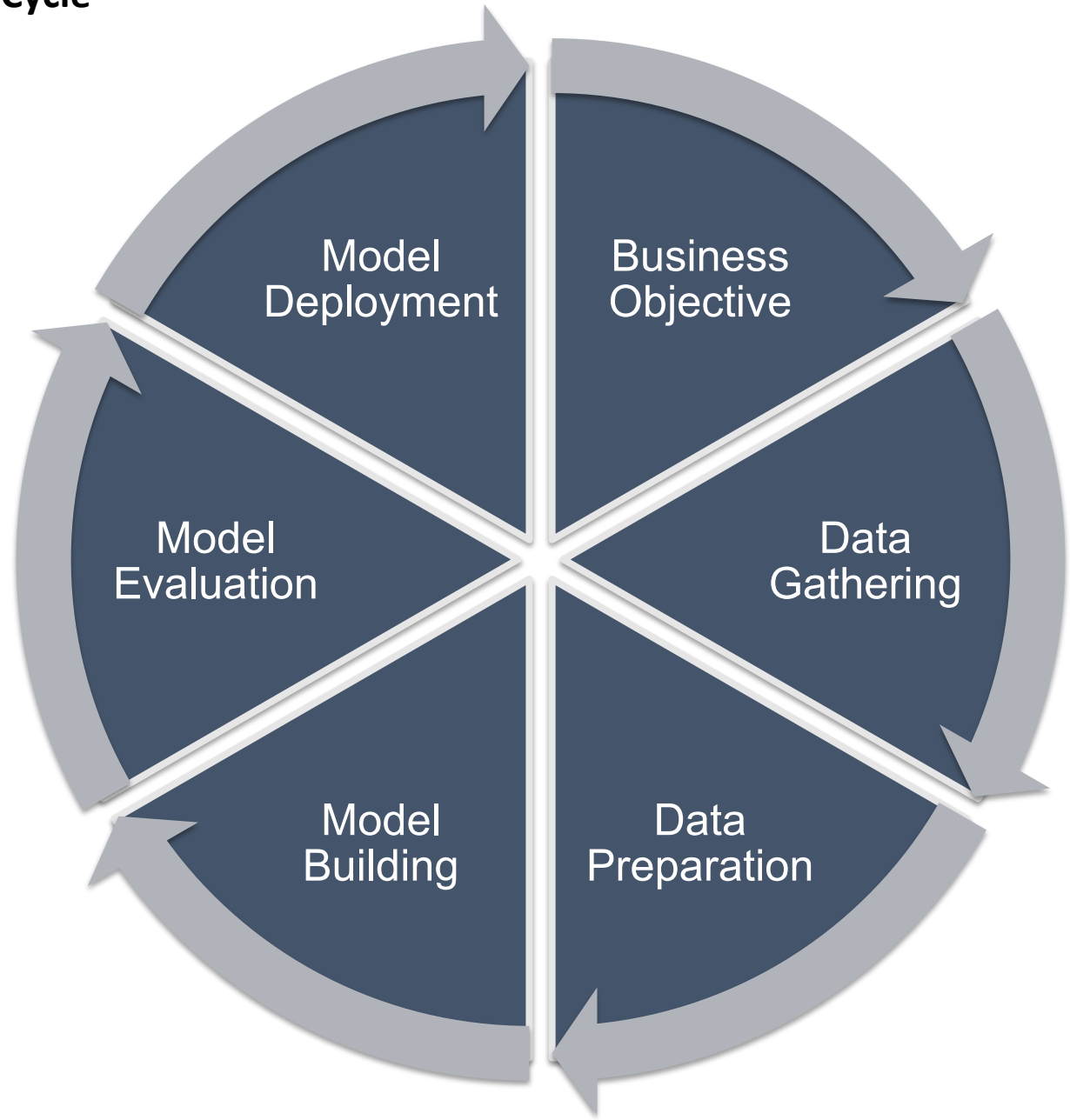
No Exam History available

P5 P3 P1 P6 P4 P2 Img 3D

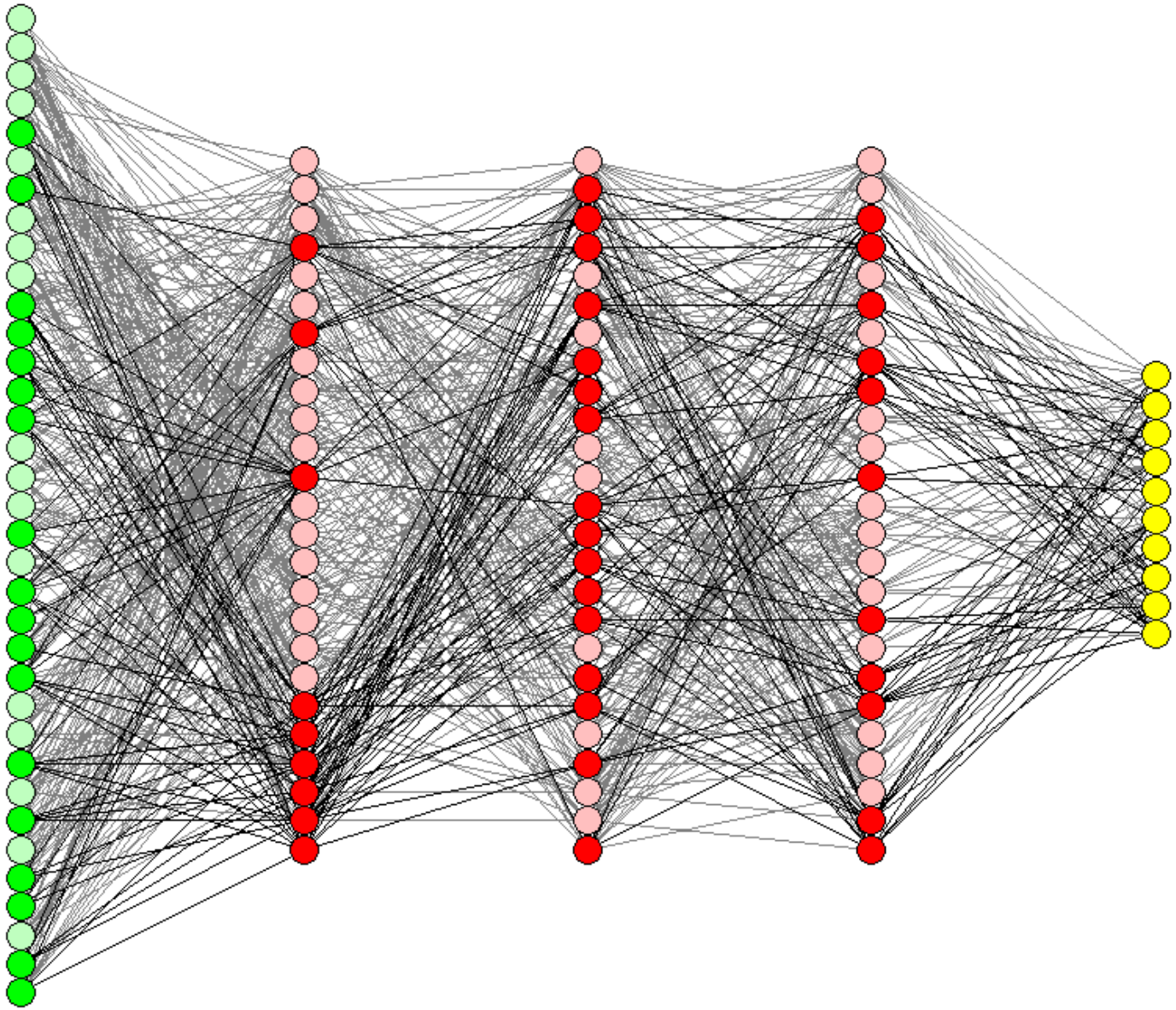
Page 1/1

Profile Analysis
Sex: M
Race: Hispanic
Age: 34
Weight: 206 lbs

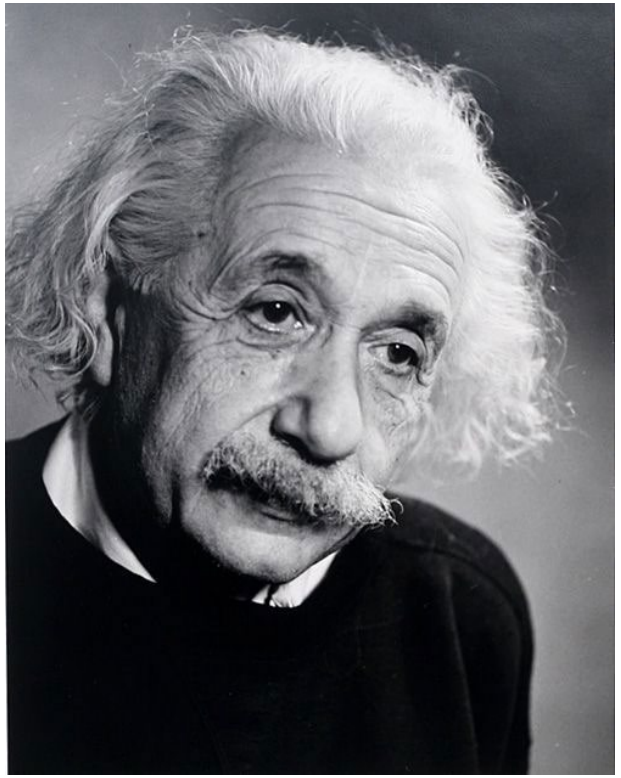
**Machine Learning Project Life Cycle**



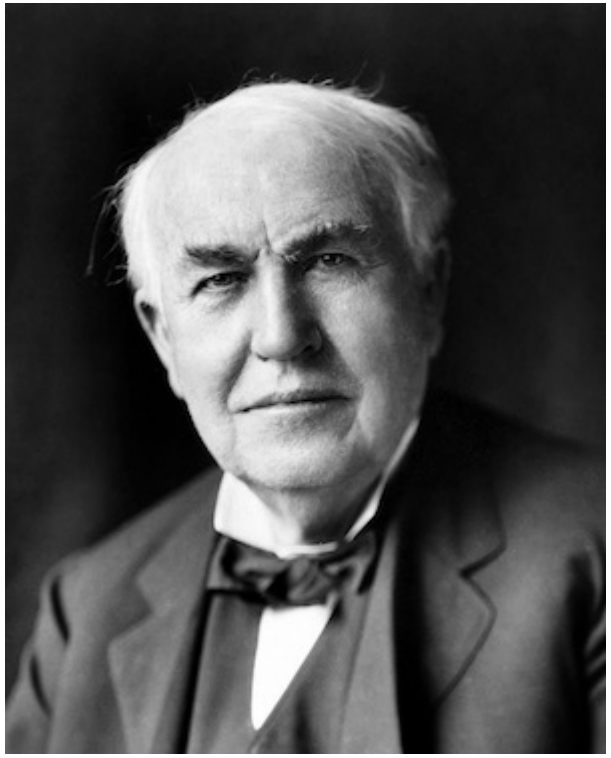
# Simple Neural Network



**Creating a Basic Neural Network Model to Distinguish Between Albert Einstein and Thomas Edison**

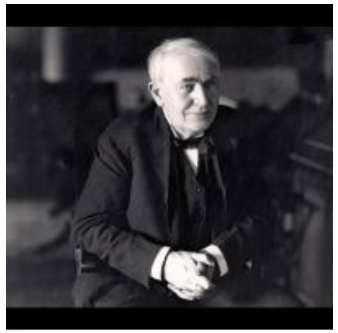
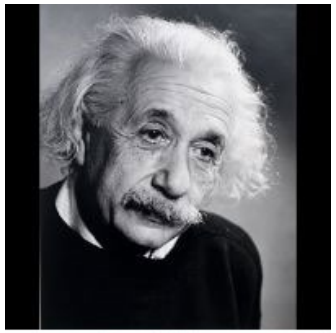


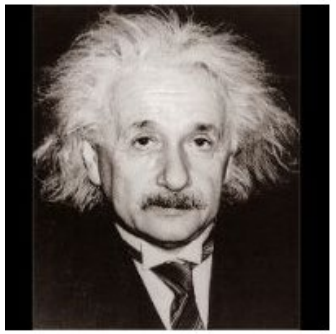
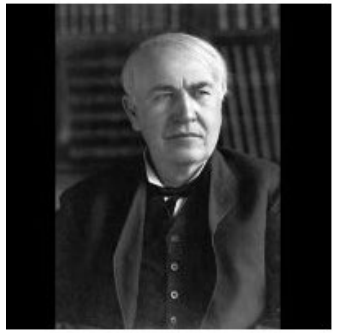
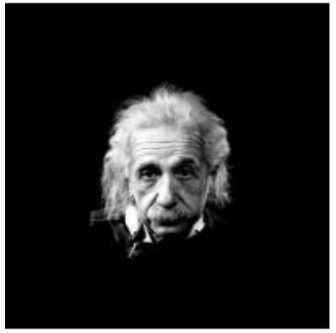
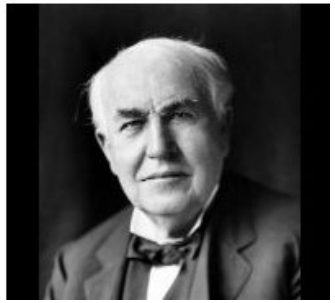
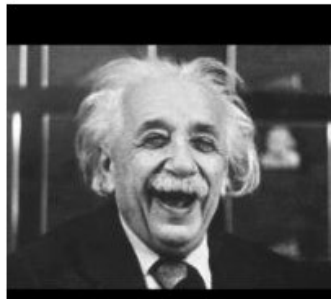
Albert Einstein



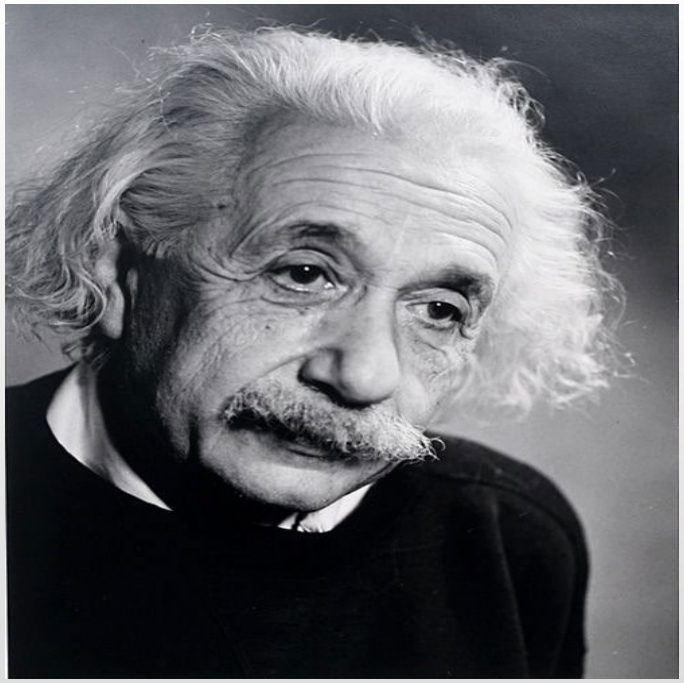
Thomas Edison

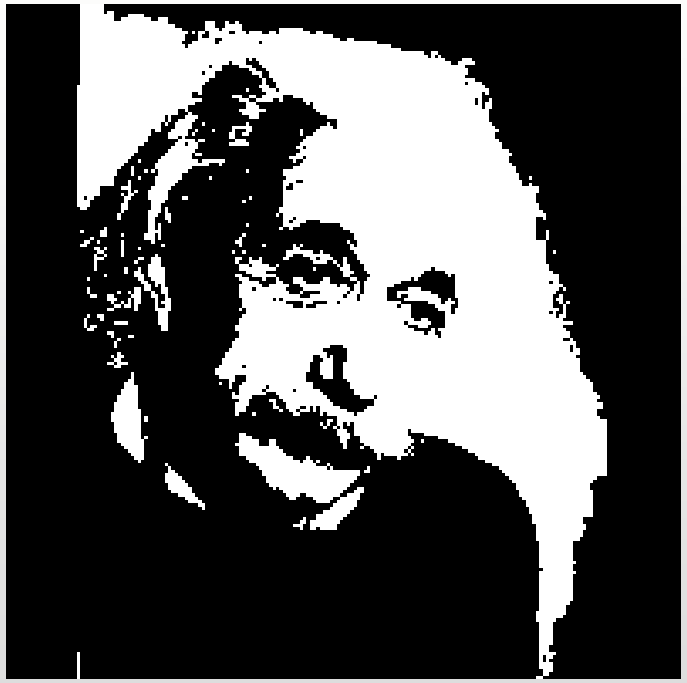
**Data Gathering**
**Learning Database**

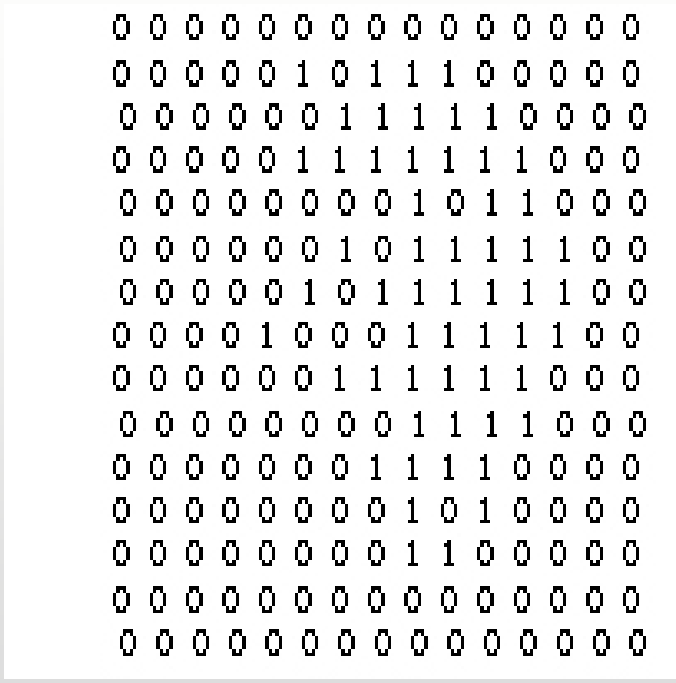



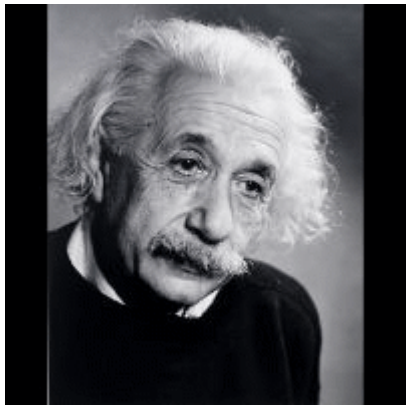
## Data Preparation
## Data Preprocessing



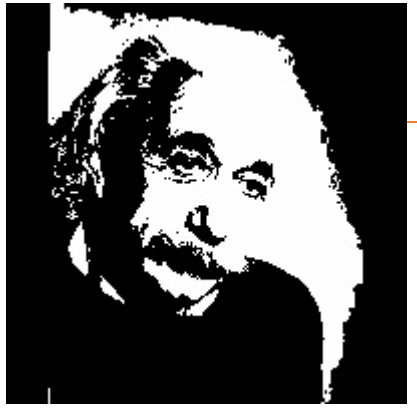




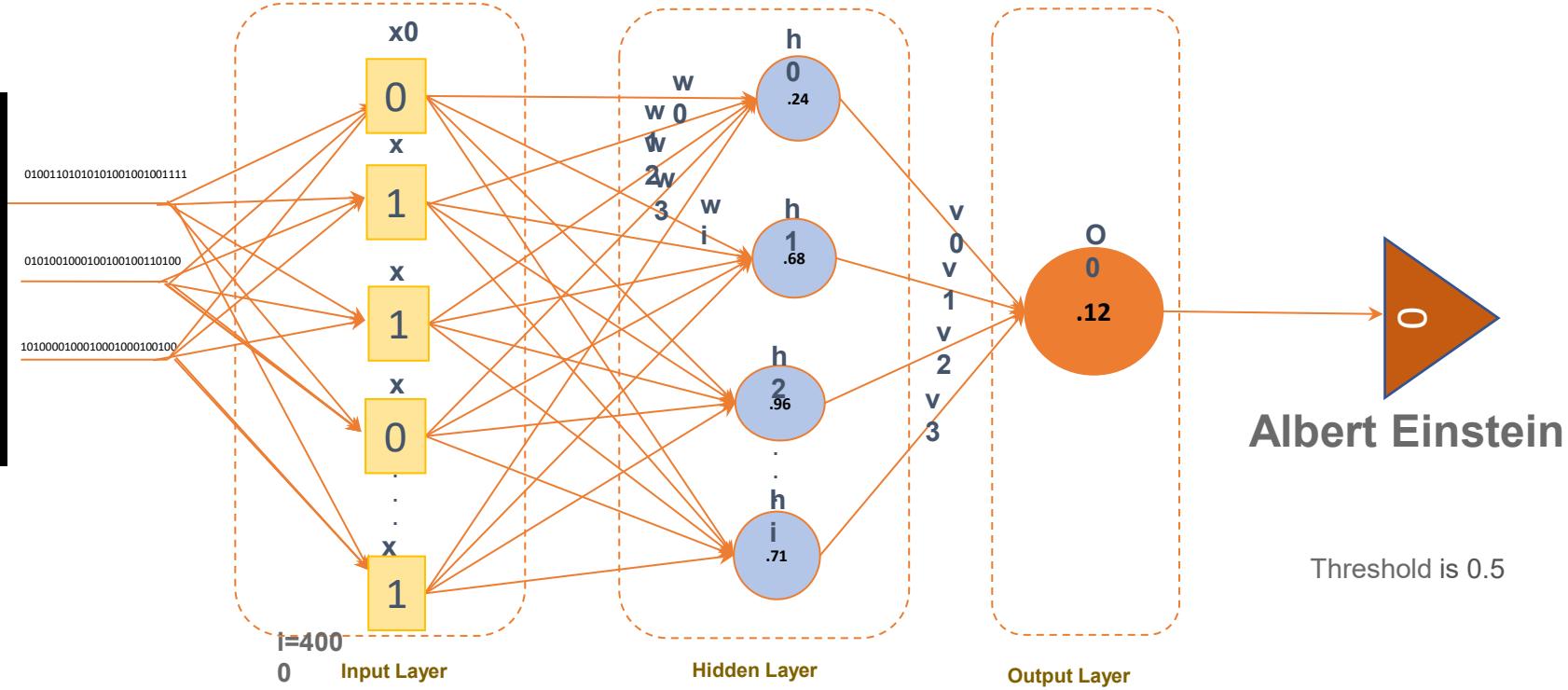
# Model Building : Training phase



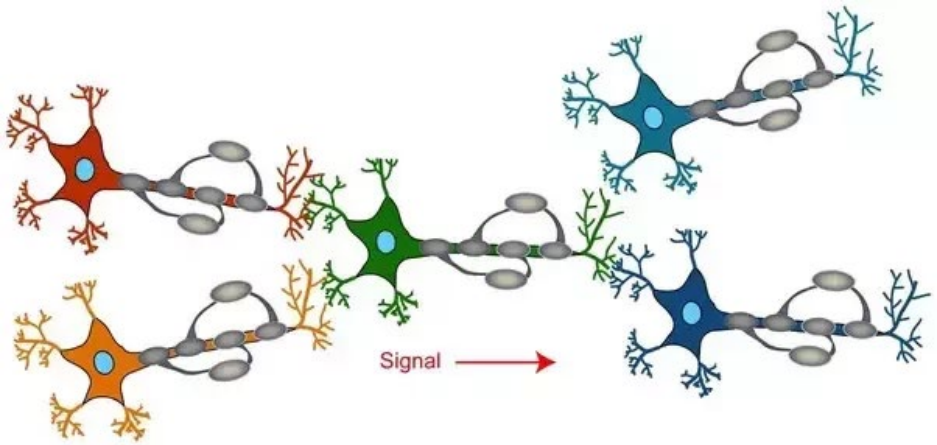
200 x 200

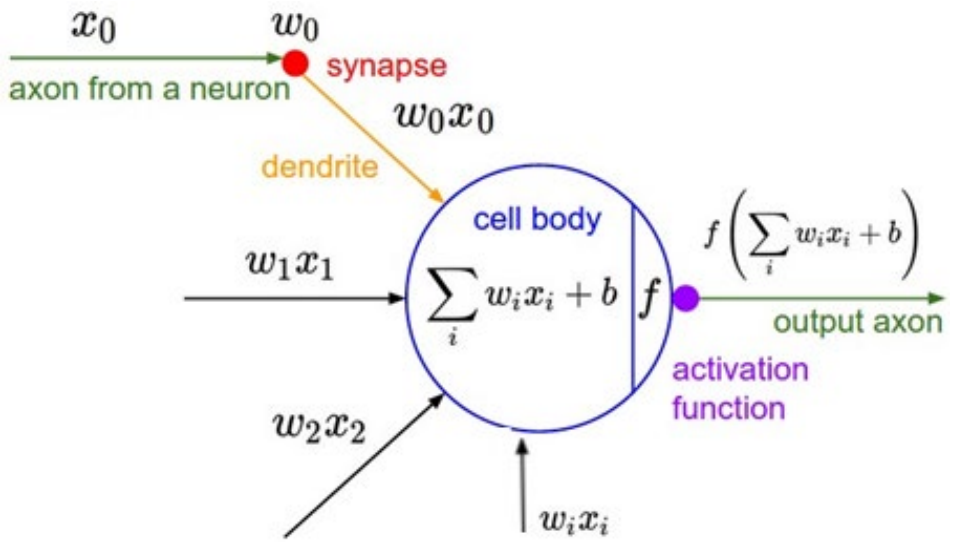


200 x 200



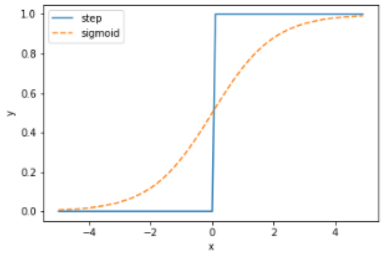

Threshold is 0.5



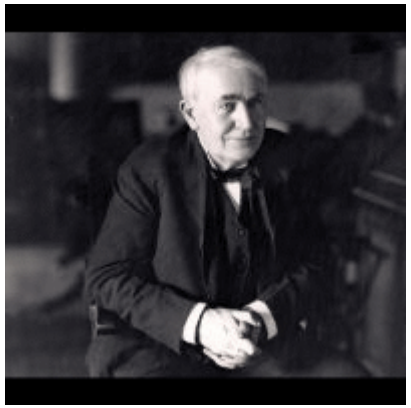

$$z = \sum w_i x_i$$

$$\sigma(z) = \frac{1}{1 + e^{-z}}$$



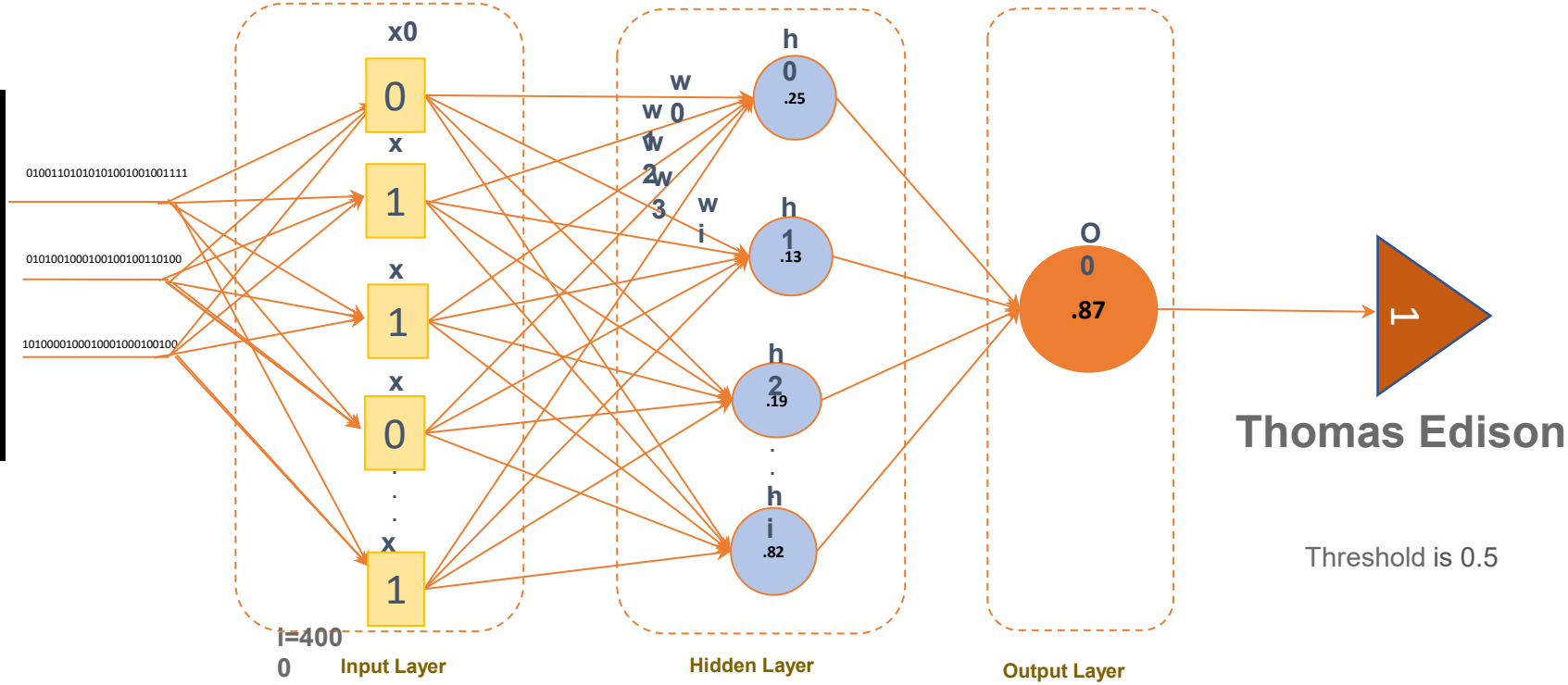

$$E_i = z_i(1 - v_i)(0_0 - v_i)$$

# Model Building : Training phase



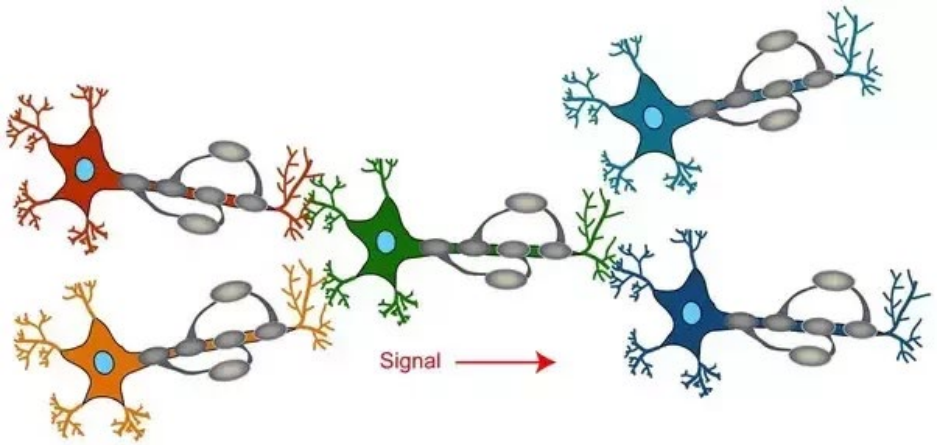
200 x 200

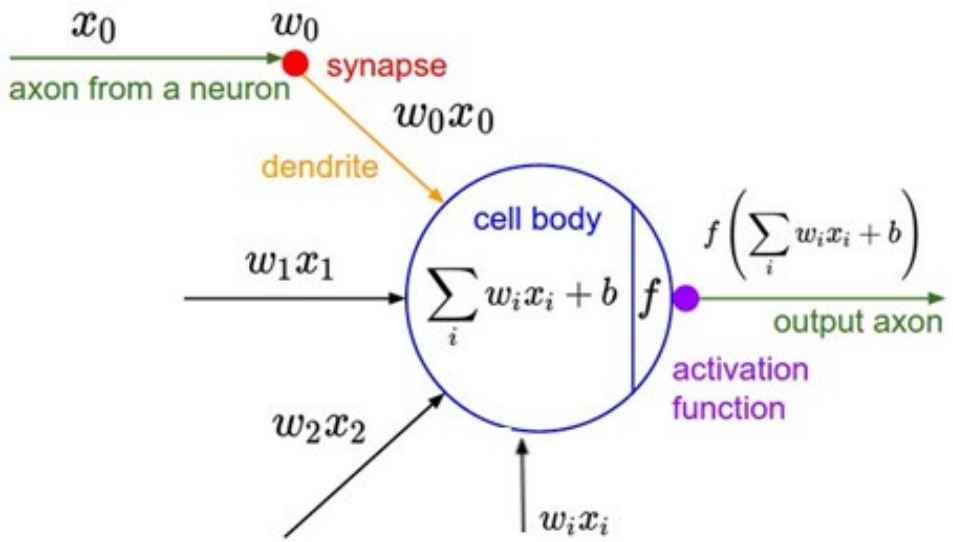
200 x 200




Thomas Edison

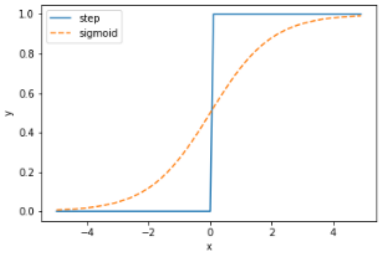
Threshold is 0.5

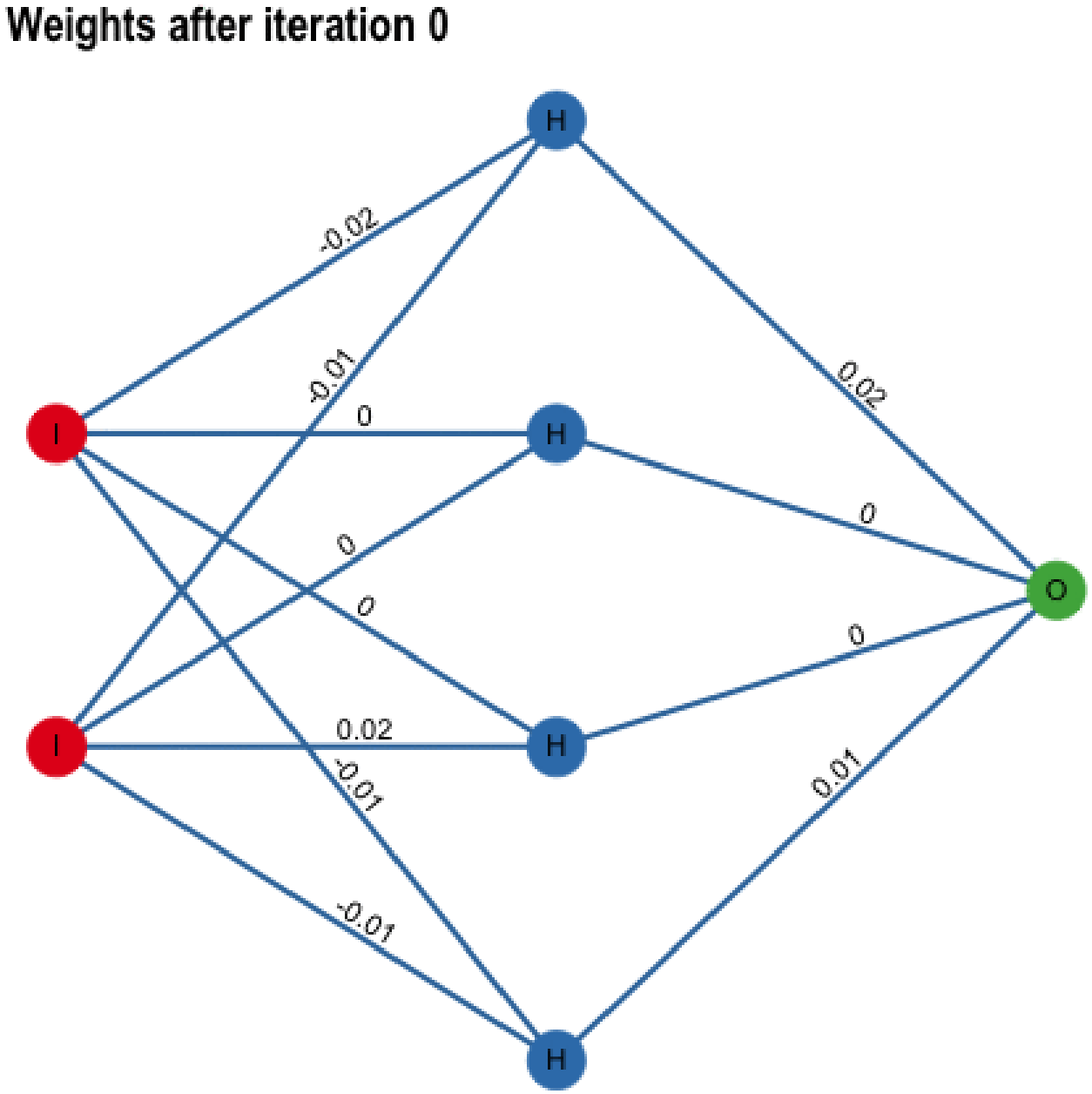


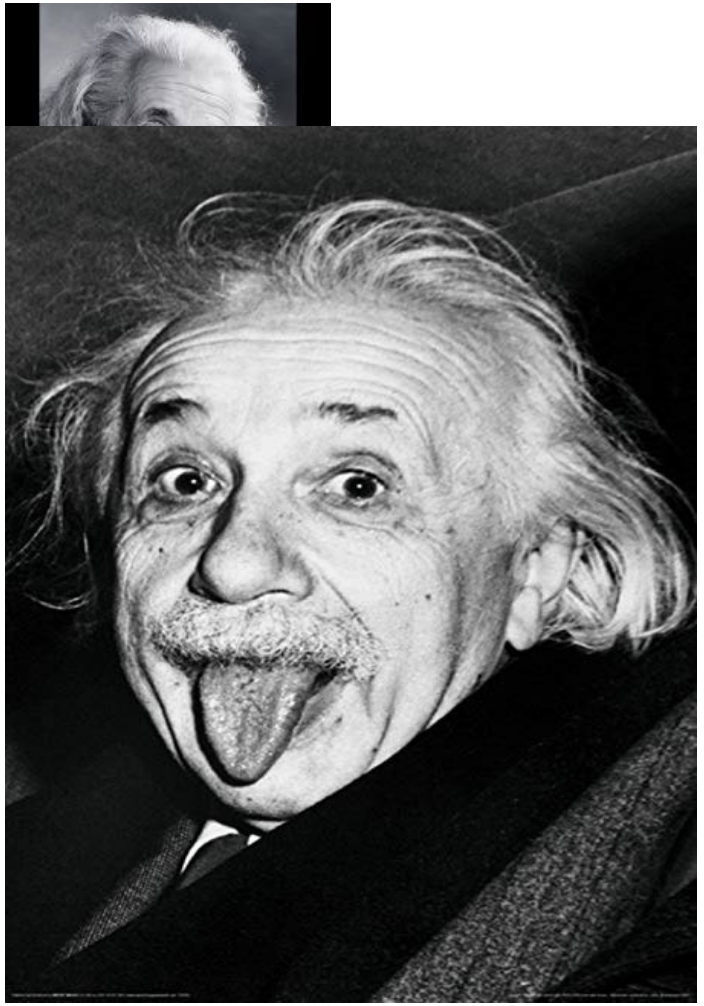

$$z = \sum w_i x_i$$

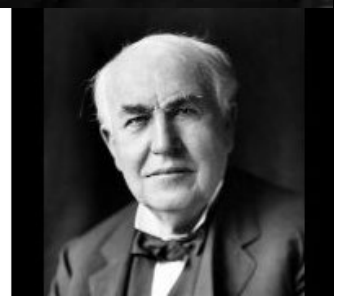
$$\sigma(z) = \frac{1}{1 + e^{-z}}$$

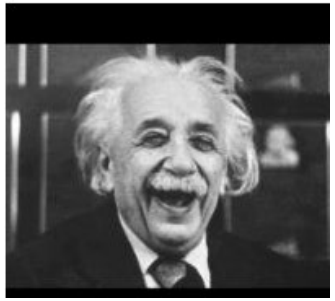



Weights after iteration 0
H
-0.02
-0.01
0.02
I
0
H
0
0
0
O
0
I
0.02
H
-0.01
0.01
-0.01
H

## Model Evaluation

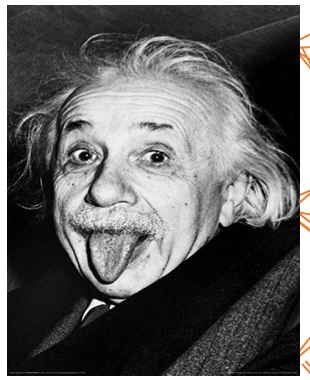






**we should use pictures that have not been used during the learning phase.**

# Model Evaluation



1

0

x2

1

x3

0

xi

0

i=4000

w0

w1

w2

w3

wi

.85

h1

.68

h2

.25

hi

.47

O0

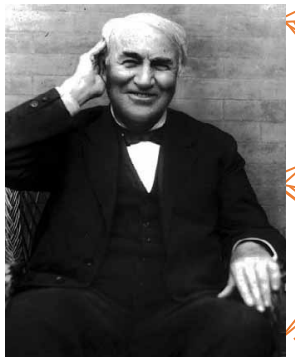
.34

0

Albert Einstein

Threshold is 0.5

# Model Evaluation



1

0

x2

1

x3

0

xi

0

i=4000

w0

w1

w2

w3

wi

.85

h1

.68

h2

.25

hi

.47

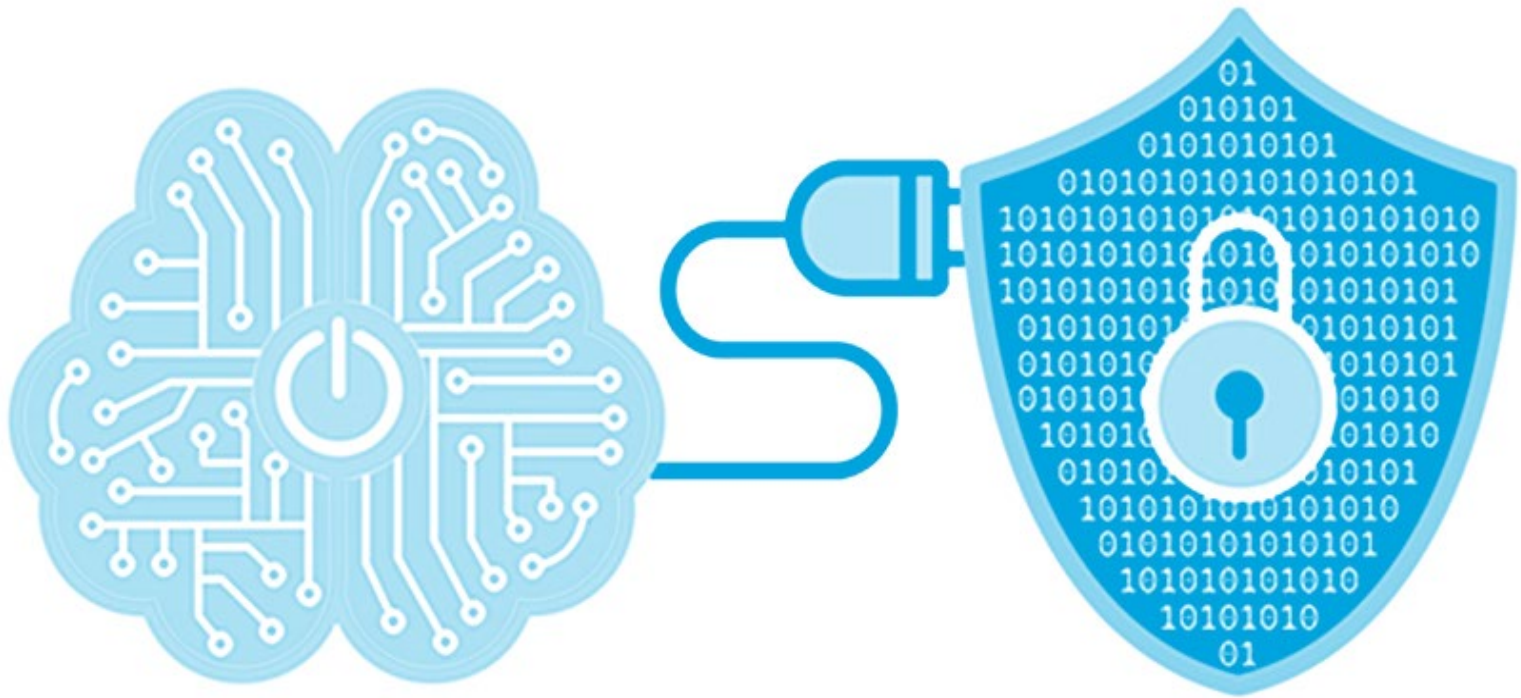
O0

.86

1

Thomas Edison

Threshold is 0.5

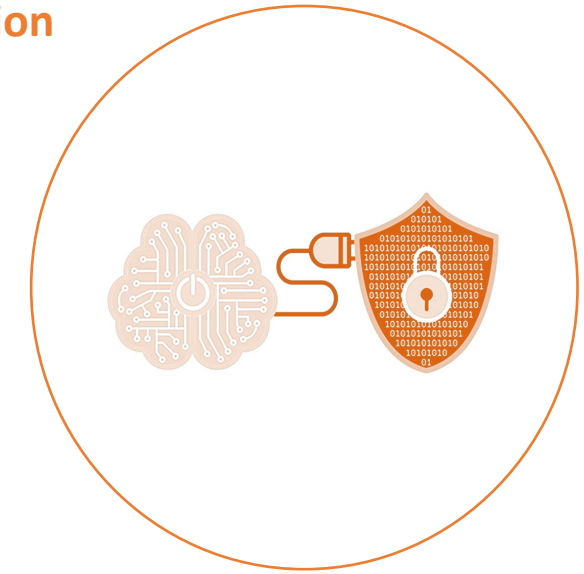


Intelligent Intrusion Detection Systems

Phishing Websites Detection

SPAM Detection

User Behavior Analytics (UBA)



Automated Software Vulnerability Detection

Security Orchestration and Automation

Next-Generation Antivirus (NGAV)

Malware Detection and Classification

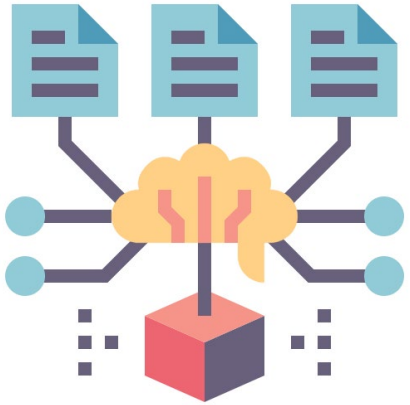
# Malware Detection and Classification

## Training phase

Malicious Executables

Benign Executables

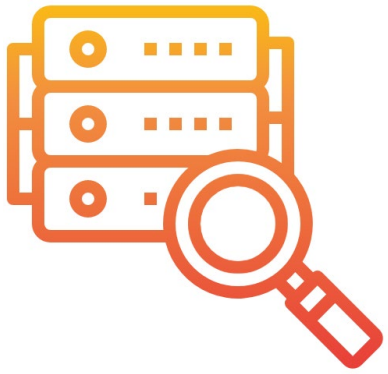
Training



Predictive model

## Protection phase

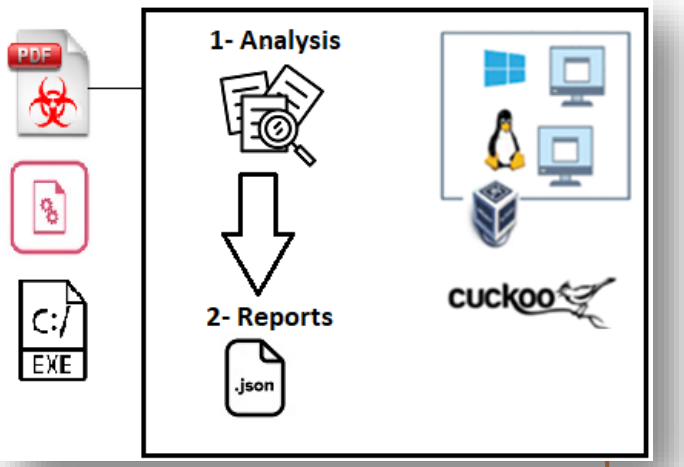
Unknown Executable



Benign / Malicious

Model decision

# Malware Detection and Classification




Automated Static File Analysis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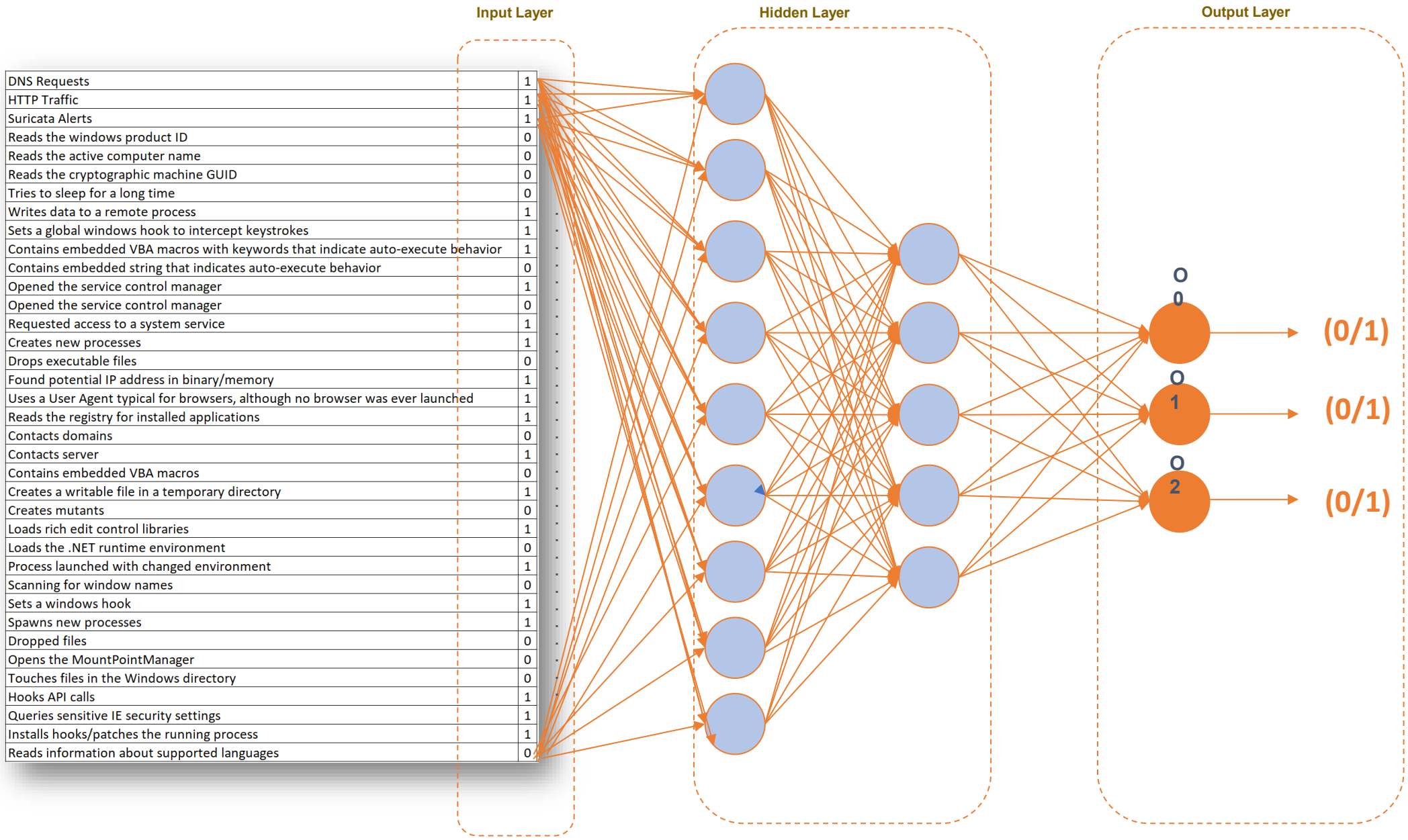
...
"hosts": ["0.0.0.0", "255.255.255.255",
"10.0.2.2", "10.0.2.15", "239.255.255.250",
"224.0.0.22", "10.0.2.255"], "dns": [],
"tcp": []}, "behavior": {"processes":
[{"parent_id": "428", "process_name":
"0a1cc307ed378bc79bc524497282c4d9c535cc3014d
8e2a9e72c0baad681b3e9", "process_id": "700",
"first_seen": "20140831184558.308", "calls":
[{"category": "filesystem", "status":
"SUCCESS", "return": "0x00000024",
"timestamp": "20140831184558.308",
"repeated": 0, "api": "CreateFileW",
"arguments": [{"name": "lpFileName",
"value": "C:\\WINDOWS\\system32
\\duser.dll"}, {"name": "dwDesiredAccess",
"value": "GENERIC_READ"}]}, {"category":
"filesystem", "status": "SUCCESS", "return":
"", "timestamp": "20140831184558.308",
...
```


Analysis Report

| | |
|---|---|
| DNS Requests | 1 |
| HTTP Traffic | 1 |
| Suricata Alerts | 1 |
| Reads the windows product ID | 0 |
| Reads the active computer name | 0 |
| Reads the cryptographic machine GUID | 0 |
| Tries to sleep for a long time | 0 |
| Writes data to a remote process | 1 |
| Sets a global windows hook to intercept keystrokes | 1 |
| Contains embedded VBA macros with keywords that indicate auto-execute behavior | 1 |
| Contains embedded string that indicates auto-execute behavior | 0 |
| Opened the service control manager | 1 |
| Opened the service control manager | 0 |
| Requested access to a system service | 1 |
| Creates new processes | 1 |
| Drops executable files | 0 |
| Found potential IP address in binary/memory | 1 |
| Uses a User Agent typical for browsers, although no browser was ever launched | 1 |
| Reads the registry for installed applications | 1 |
| Contacts domains | 0 |
| Contacts server | 1 |
| Contains embedded VBA macros | 0 |
| Creates a writable file in a temporary directory | 1 |
| Creates mutants | 0 |
| Loads rich edit control libraries | 1 |
| Loads the .NET runtime environment | 0 |
| Process launched with changed environment | 1 |
| Scanning for window names | 0 |
| Sets a windows hook | 1 |
| Spawns new processes | 1 |
| Dropped files | 0 |
| Opens the MountPointManager | 0 |
| Touches files in the Windows directory | 0 |
| Hooks API calls | 1 |
| Queries sensitive IE security settings | 1 |
| Installs hooks/patches the running process | 1 |
| Reads information about supported languages | 0 |

Behavioral Patterns

# Malware Detection and Classification




| | |
|---|---|
| DNS Requests | 1 |
| HTTP Traffic | 1 |
| Suricata Alerts | 1 |
| Reads the windows product ID | 0 |
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| Reads the cryptographic machine GUID | 0 |
| Tries to sleep for a long time | 0 |
| Writes data to a remote process | 1 |
| Sets a global windows hook to intercept keystrokes | 1 |
| Contains embedded VBA macros with keywords that indicate auto-execute behavior | 1 |
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| Opened the service control manager | 1 |
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| Requested access to a system service | 1 |
| Creates new processes | 1 |
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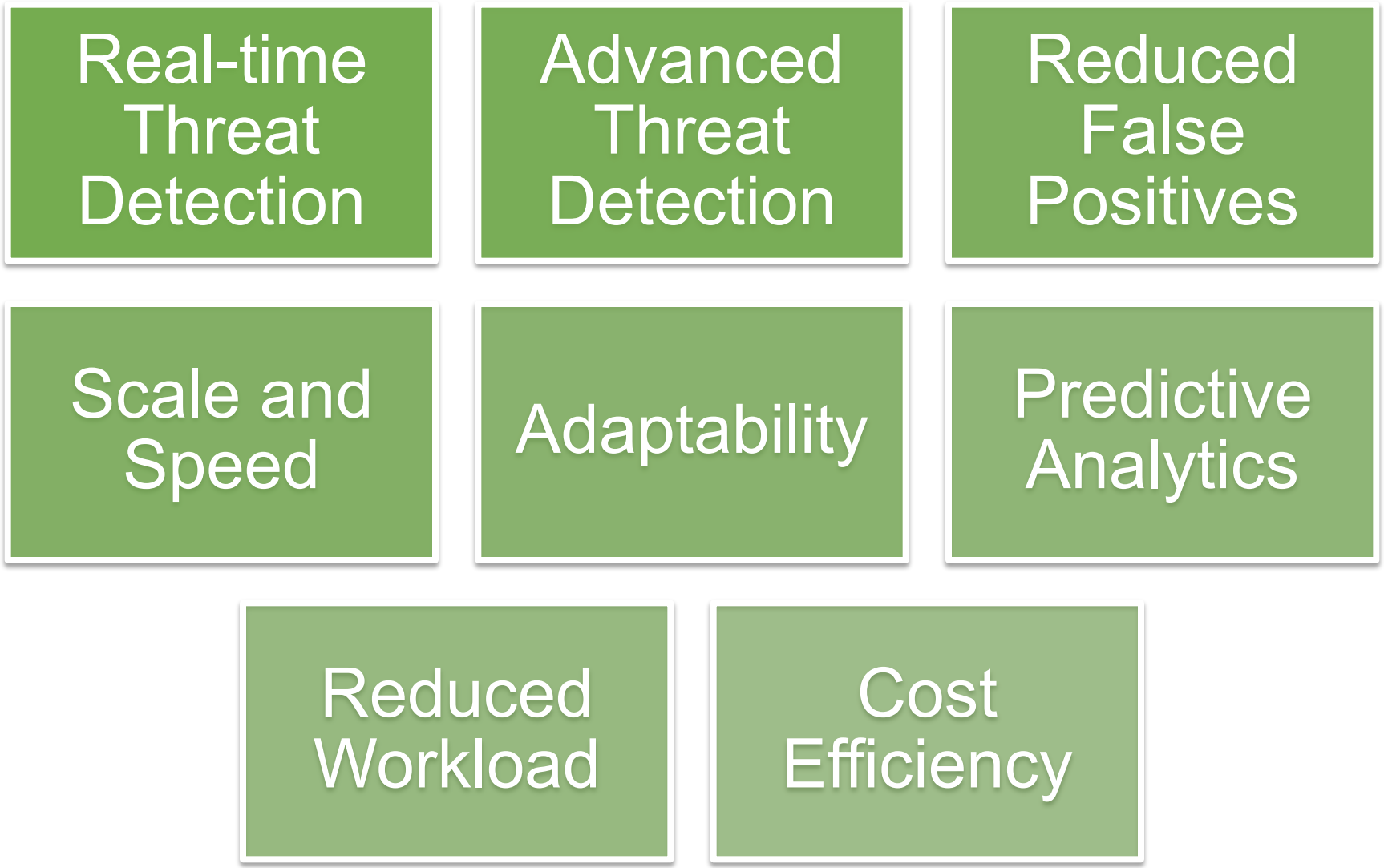
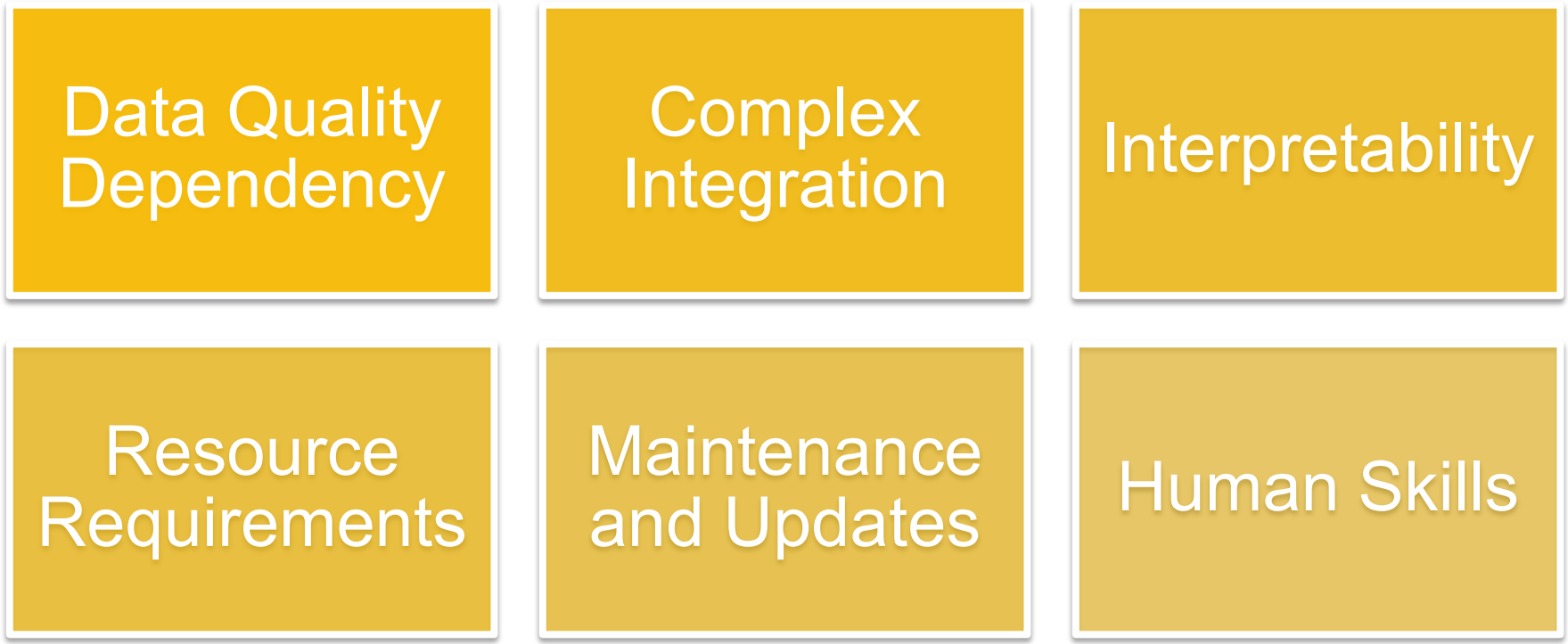
| Reads the registry for installed applications | 1 |
| Contacts domains | 0 |
| Contacts server | 1 |
| Contains embedded VBA macros | 0 |
| Creates a writable file in a temporary directory | 1 |
| Creates mutants | 0 |
| Loads rich edit control libraries | 1 |
| Loads the .NET runtime environment | 0 |
| Process launched with changed environment | 1 |
| Scanning for window names | 0 |
| Sets a windows hook | 1 |
| Spawns new processes | 1 |
| Dropped files | 0 |
| Opens the MountPointManager | 0 |
| Touches files in the Windows directory | 0 |
| Hooks API calls | 1 |
| Queries sensitive IE security settings | 1 |
| Installs hooks/patches the running process | 1 |
| Reads information about supported languages | 0 |

| O0 | O1 | O2 | |
|---|---|---|---|
| 0 | 0 | 0 | Adware |
| 0 | 0 | 1 | Spyware |
| 0 | 1 | 0 | Worm |
| 0 | 1 | 1 | Trojan |
| 1 | 0 | 0 | Rootkit |
| 1 | 0 | 1 | Backdoors |
| 1 | 1 | 0 | Keyloggers |
| 1 | 1 | 1 | Ransomware |

**Benefits of AI in cybersecurity**



**limitations of AI in cybersecurity**



# THANK YOU