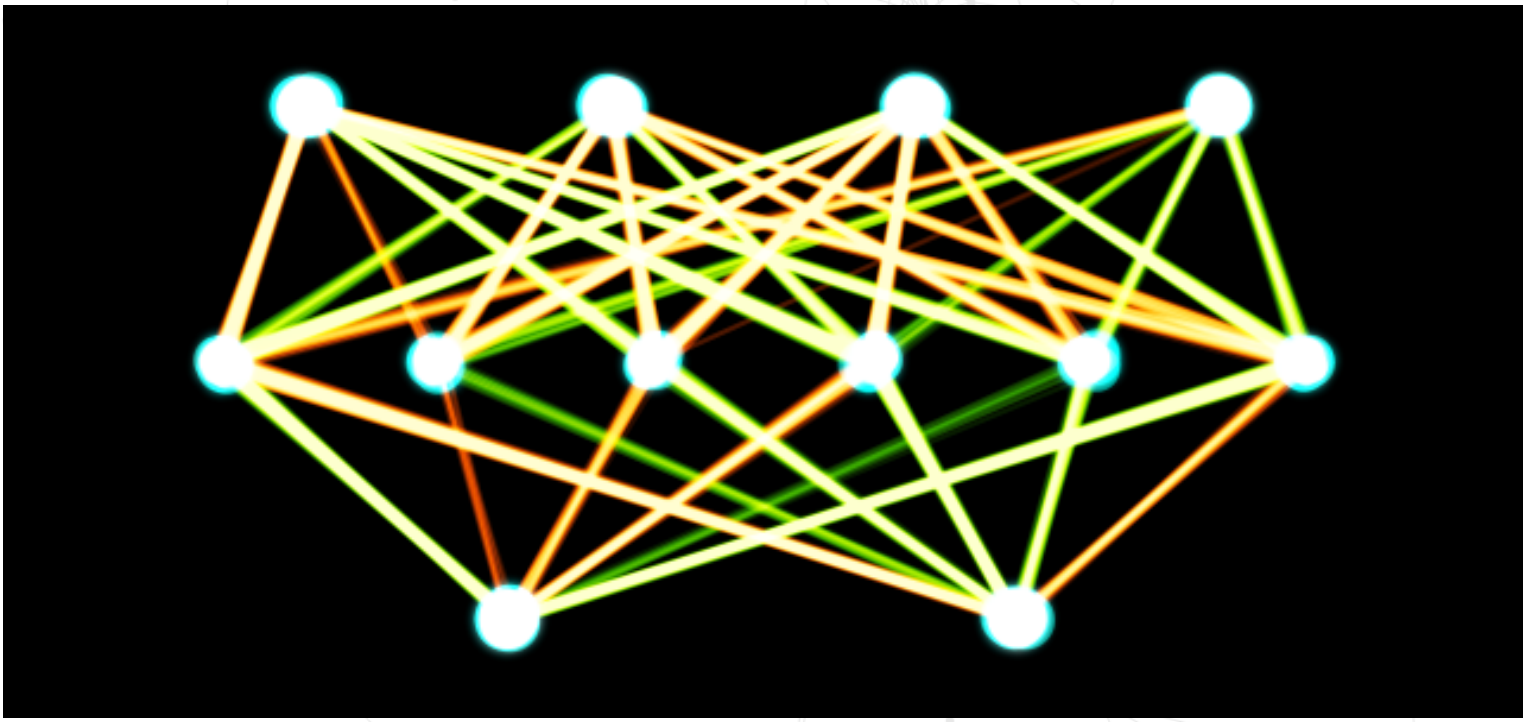
The History of Neural Networks and AI: Part I - Open Data Science

(https://opendatascience.com/)



The History of Neural Networks and AI: Part I (https://opendatascience.com/the-history-of-neural-networks-and-ai-part-i/)

DEEP LEARNING (HTTPS://OPENDATASCIENCE.COM/CATEGORY/MODELING/DEEP-LEARNING/) MODELING (HTTPS://OPENDATASCIENCE.COM/CATEGORY/MODELING/) posted by Caspar Wylie, ODSC (https://opendatascience.com/user/casparwylie/) April 24, 2018

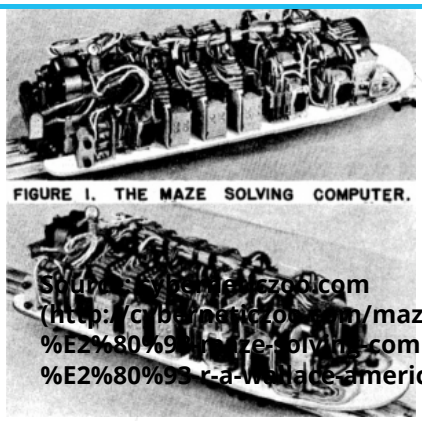
Although machine learning has only become mainstream in the last decade, there are many essential contributors to the field dating back as far as the 1940s. In order to understand the infinite possibilities presented today in the fields of AI, deep learning and more, it is important to understand the original intentions of the scientists responsible for blazing the trail to where we presently. The history of neural networks and AI is a fascinating look at how machine learning models started as theory based mechanical contrivances made of anything from matchboxes to aeroplane scraps, before being implemented in complex, fast, modern day software.

Understanding the History of Neural Networks and AI

The story starts in 1943 when Warren Sturgis McCulloch, **(https://en.wikipedia.org/wiki/Warren_Sturgis_McCulloch)** an American neurophysiologist and cybernetician published "A Logical Calculus of the Ideas Immanent in Nervous Activity" with Walter Pitts. The paper laid the foundations for artificial neural networks, and attempted to demonstrate that a Turing machine program could be implemented in a finite network of formal neurons.

The idea that a simple program or set of rules could be represented in a less explicit format – a web of neurons – is the fundamental principle of artificial intelligence today. These theories were not implemented until 1951, when the first neural network machine was designed by Marvin Minsky **(https://en.wikipedia.org/wiki/Marvin_Minsky)**and one of Minsky's graduate students, Dean Edmonds. This first neural network machine was known as the SNARC **(https://en.wikipedia.org/wiki/Stochastic_neural_analog_reinforcement_calculator)** (Stochastic Neural Analog Reinforcement Calculator) which was a neuro-computer containing 40 neurons which imitated a rat finding its way around a maze.

Minsky was actually inspired by McCulloch's 1943 paper to build out SNARC which was considered one of the first electronic learning machines. Using components from a B-24 bomber and a few thousand dollars from the Office of Naval Research, Minsky took one of the first initial steps towards building out machine learning capabilities.



Source: Cybernetic Zoo.com (http://cyberneticzoo.com/mazesolvers/1952-%E2%80%99-maze-solving-computer-%E2%80%99-r-a-wallace-american/)

Minsky's machine relied on being informed of basic success, while containing a basic memory to comprehend past errors. With this structure, the machine could adjust itself with a few motors and vacuum tubes. It was also wired randomly, like the weights on a modern day neural network model. This meant it could break in certain places, but still work because of its fail-safe nature. Again, like a neural network today, if you remove one neuron, the model would still effectively work.

Only six years later, Frank Rosenblatt **(https://en.wikipedia.org/wiki/Frank_Rosenblatt)** invented the Perceptron, which was an actual electronic device that followed neurological principals. Today, neural networks are made up of perceptrons, which are entirely based on Rosenblatt's device. The perceptrons were first tested out on an IBM 704 computer at Cornell Aeronautical Laboratory. Testing revealed that the 704 computer was able to recognise the basic imaging of a triangle. This was one of the most important creations in AI history, because it hinted at how helpful AI had the potential to be. It received huge international recognition, including an article in The New York Times titled "New Navy Device Learns By Doing."

NEW NAVY DEVICE LEARNS BY DOING

Psychologist Shows Embryo of Computer Designed to Read and Grow Wiser

WASHINGTON, July 7 (UPI) —The Navy revealed the embryo of an electronic computer today that it expects will be able to walk, talk, see, write, reproduce itself and be conscious of its existence.

...ings, Perceptron will make mistakes at first, but will grow wiser as it gains experience, he said.

Dr. Rosenblatt, a research psychologist at the Cornell Aeronautical Laboratory, Buffalo, said Perceptrons might be fired to the planets as mechanical space explorers.

Without Human Controls

The Navy said the perceptron would be the first non-living mechanism "capable of receiving, recognizing and identifying its surroundings without any human training or control."

1958 New York Times...

In today's demonstration, the "704" was fed two cards, one with squares marked on the left side and the other with squares on the right side.

Learns by Doing

In the first fifty trials, the machine made no distinction between them. It then started registering a "Q" for the left squares and "O" for the right

Dr. Rosenblatt said he could explain why the machine

...ly technical

...computer had undergone a "self-induced change in the wiring diagram."

The first Perceptron will have about 1,000 electronic "association cells" receiving electrical impulses from an eye-like scanning device with 400 ... human brain ... responsive cells, including 200,000,000 connections with the eyes.

1958 New York Times article on Perceptron's capabilities Source: parvez-ahammad.org (http://www.parvez-ahammad.org/blog/category/ai)

The excitement among the community was huge, and there was perhaps too much, too quickly. In 1969, Minsky wrote a book titled *Perceptrons*, which highlighted the many limitations the Perceptron really had. For example, a single perceptron was unable to learn the XOR function, which was easily solved by creating a network of them.

The intentions to truly "discover" and build out artificial intelligence have long been in researchers and scientists' minds but it was the essential development of early neural network models that formulated the true opportunity for AI's creation. Ventures ranging from McCulloch's foundational paper to Rosenblatt's Perceptron in the 40s, 50s and 60s marked the fundamental years in which AI transformed from a mere idea to a reality.

Feature Image by ***Akritasa (https://az.m.wikipedia.org/wiki/%C5%9E%C9%99kil:Two-layer_feedforward_artificial_neural_network.png)***

ABOUT AUTHOR

Caspar Wylie, ODSC (https://opendatascience.com/user/casparwylie/)

My name is Caspar Wylie, and I have been passionately computer programming for as long as I can remember. I am currently a teenager, 17, and have taught myself to write code with initial help from an employee at Google in Mountain View California, who truly motivated me. I program everyday and am always putting new ideas into perspective. I try to keep a good balance between jobs and personal

projects in order to advance my research and understanding. My interest in computers started with very basic electronic engineering when I was only 6, before I then moved on to software development at the age of about 8. Since, I have experimented with many different areas of computing, from web security to computer vision.

1

LATEST POSTS

View all

(https://opendatascience.com/data-sciences-great-compression-and-its-next-frontier/)

Data Science's Great Compression and its Next Frontier (https://opendatascience.com/data-sciences-great-compression-and-its-next-frontier/)

posted by ELIZABETH WALLACE, ODSC (HTTPS://OPENDATASCIENCE.COM/USER/ELIZABETH-WALLACE/)

Jul 23, 2021

In US history, the period after the great depression became known as the Great Compression. It...

(https://opendatascience.com/announcing-the-odsc-apac-2021-keynotes/)

Announcing the ODSC APAC 2021 Keynotes (https://opendatascience.com/announcing-the-odsc-apac-2021-keynotes/)

posted by ODSC TEAM (HTTPS://OPENDATASCIENCE.COM/USER/ADMIN_ODSC/)

Jul 22, 2021

Over the past several years, AI has increasingly permeated our lives, transforming how we interact with...

(https://opendatascience.com/standout-artificial-intelligence-labs-in-india/)

Standout Artificial Intelligence Labs in India (https://opendatascience.com/standout-artificial-intelligence-labs-in-india/)

posted by ODSC TEAM (HTTPS://OPENDATASCIENCE.COM/USER/ADMIN_ODSC/)

Jul 22, 2021

As dynamic fields, what we can do with and how we apply data science and artificial...

POPULAR POSTS

(https://opendatascience.com/the-rapid-evolution-of-the-canonical-stack-for-machine-learning/) **The Rapid Evolution of the Canonical Stack for Machine Learning (https://opendatascience.com/the-rapid-evolution-of-the-canonical-stack-for-machine-learning/)**

(https://opendatascience.com/highlighting-artificial-intelligence-research-universities-and-labs-in-the-apac-region/) **Highlighting Artificial Intelligence Research Universities and Labs in the APAC Region (https://opendatascience.com/highlighting-artificial-intelligence-research-universities-and-labs-in-the-apac-region/)**

(https://opendatascience.com/best-machine-learning-research-of-2021-so-far/) **Best Machine Learning Research of 2021 So Far (https://opendatascience.com/best-machine-learning-research-of-2021-so-far/)**

TAGS

Machine Learning 112 (https://opendatascience.com/tag/machine-learning/)
ODSC East 2015|Speaker Slides 64 (https://opendatascience.com/tag/odsc-east-2015speaker-slides/) East 2020 48 (https://opendatascience.com/tag/east-2020/)
Deep Learning 48 (https://opendatascience.com/tag/deep-learning/) Accelerate AI 43 (https://opendatascience.com/tag/accelerate-ai/)
East 2021 42 (https://opendatascience.com/tag/east-2021/) Conferences 41 (https://opendatascience.com/tag/conferences/)
Europe 2020 39 (https://opendatascience.com/tag/europe-2020/) Europe 2021 37 (https://opendatascience.com/tag/europe-2021/)
West 2018 34 (https://opendatascience.com/tag/west-2018/) R 33 (https://opendatascience.com/tag/r/) West 2019 33 (https://opendatascience.com/tag/west-2019/)
NLP 31 (https://opendatascience.com/tag/nlp/) AI 25 (https://opendatascience.com/tag/ai/) West 2020 25 (https://opendatascience.com/tag/west-2020/)
Business 24 (https://opendatascience.com/tag/business/) Python 23 (https://opendatascience.com/tag/python/)
Data Visualization 23 (https://opendatascience.com/tag/data-visualization/) TensorFlow 22 (https://opendatascience.com/tag/tensorflow/)
Reinforcement Learning 20 (https://opendatascience.com/tag/reinforcement-learning/)

RELATED POSTS

The Rapid Evolution of the Canonical Stack for...

(https://opendatascience.com/the-rapid-evolution-of-the-canonical-stack-for-machine-learning/)

Best Machine Learning Research of 2021 So Far

(https://opendatascience.com/best-machine-learning-research-of-2021-so-far/)

Top 5 Applications of Machine Learning in Healthcare

(https://opendatascience.com/top-5-applications-of-machine-learning-in-healthcare/)

ABOUT US

Proactively envisioned multimedia based expertise and cross-media growth strategies. Seamlessly visualize quality intellectual capital without superior collaboration and idea-sharing. Holistically pontificate installed base portals after maintainable products.

CONTENT MAP

Modeling (https://opendatascience.com/category/modeling/)	941	Conferences (https://opendatascience.com/category/conferences/)	451
Business + Management (https://opendatascience.com/category/accelerate-ai/)	384	Featured Post (https://opendatascience.com/category/featured-post/)	341
Tools & Languages (https://opendatascience.com/category/tools-languages/)	334	Machine Learning (https://opendatascience.com/category/modeling/machine-learning/)	205
Blog (https://opendatascience.com/category/blog/)	201	Deep Learning (https://opendatascience.com/category/modeling/deep-learning/)	193
ODSC Speaker (https://opendatascience.com/category/conferences/odsc-speaker/)	133	NLP/Text Analytics (https://opendatascience.com/category/modeling/nlp-text-analytics/)	131
Career Insights (https://opendatascience.com/category/careers/)	129	Statistics (https://opendatascience.com/category/modeling/statistics/)	124
R (https://opendatascience.com/category/tools-languages/r/)	119	Predictive Analytics (https://opendatascience.com/category/modeling/predictive-analytics/)	99
Data Visualization (https://opendatascience.com/category/modeling/data-visualization/)	99	Python (https://opendatascience.com/category/tools-languages/python/)	98
Technology (https://opendatascience.com/category/accelerate-ai/technology/)	77	Tools (https://opendatascience.com/category/tools-languages/tools/)	72
Research (https://opendatascience.com/category/modeling/research-modeling/)	62	Guest contributor (https://opendatascience.com/category/guest-contributor/)	53

TAGS

Machine Learning 112 (https://opendatascience.com/tag/machine-learning/)
ODSC East 2015 | Speaker Slides 64 (https://opendatascience.com/tag/odsc-east-2015speaker-slides/)
East 2020 48 (https://opendatascience.com/tag/east-2020/)

Deep Learning 48 (https://opendatascience.com/tag/deep-learning/) Accelerate AI 43 (https://opendatascience.com/tag/accelerate-ai/)
East 2021 42 (https://opendatascience.com/tag/east-2021/) Conferences 41 (https://opendatascience.com/tag/conferences/)
Europe 2020 39 (https://opendatascience.com/tag/europe-2020/) Europe 2021 37 (https://opendatascience.com/tag/europe-2021/)
West 2018 34 (https://opendatascience.com/tag/west-2018/) R 33 (https://opendatascience.com/tag/r/) West 2019 33 (https://opendatascience.com/tag/west-2019/)
NLP 31 (https://opendatascience.com/tag/nlp/) AI 25 (https://opendatascience.com/tag/ai/) West 2020 25 (https://opendatascience.com/tag/west-2020/)
Business 24 (https://opendatascience.com/tag/business/) Python 23 (https://opendatascience.com/tag/python/)
Data Visualization 23 (https://opendatascience.com/tag/data-visualization/) TensorFlow 22 (https://opendatascience.com/tag/tensorflow/)
Reinforcement Learning 20 (https://opendatascience.com/tag/reinforcement-learning/)

ODSC PRIVACY POLICY

View ODSC Privacy Policy (https://opendatascience.com/odsc-privacy-policy/)

(https://www.facebook.com/OPENDATASCI/) (https://twitter.com/odsc) (https://www.youtube.com/channel/UCDS20hpBFiv_Kdp5Ibh0vew) (https://plus.google.com/u/0/+OpenDataScienceCon) (https://www.linkedin.com/groups/8245997)