# *Ai* **Artificial Intelligence**

*AI refers to the ability of machines and computers to perform tasks that would normally require human intelligence. These tasks include things like recognizing patterns and making predictions.*
*Carnegie Mellon University*

*Alan Turing, one of the founders of AI, suggested in 1950 that if a machine can have a conversation with a human and the human can't distinguish whether they are conversing with another human or with a machine, the machine has demonstrated human intelligence.*
*Carnegie Mellon University*

# *Ai* **Artificial Intelligence**

*Invented by Allen Newell, Herbert Simon, and J.C. Shaw in 1956*

*Ai consists of Machine learning, Neural Networks, and Deep Learning with many subsets of those categories.*

*Ai is the pursuit to make machines think like humans*

# *ML* *Machine Learning*

*Is a field of study in artificial intelligence concerned with the development and study of statistical algorithms that can learn from data and generalize to unseen data, and thus perform tasks without explicit instructions. Wikipedia*

Invented by Arthur Samuel, at IBM in 1959
DL is a subset of ML
Makes predictions and decisions based on data
Both Supervised (using labels and data)ML
and Unsupervised Learning (no human interaction required)DL

# NN *Neural Network*

*A Neural Network is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain. It is a type of machine learning process, called deep learning, that uses interconnected nodes or neurons in a layered structure that resembles the human brain. Amazon*

*Invented by Frank Rosenblatt in 1957 - the Perceptron*
*Neural Networks are composed of Node Layers*
*Input Node Layer _ Hidden Node Layer _ Output Node Layer*
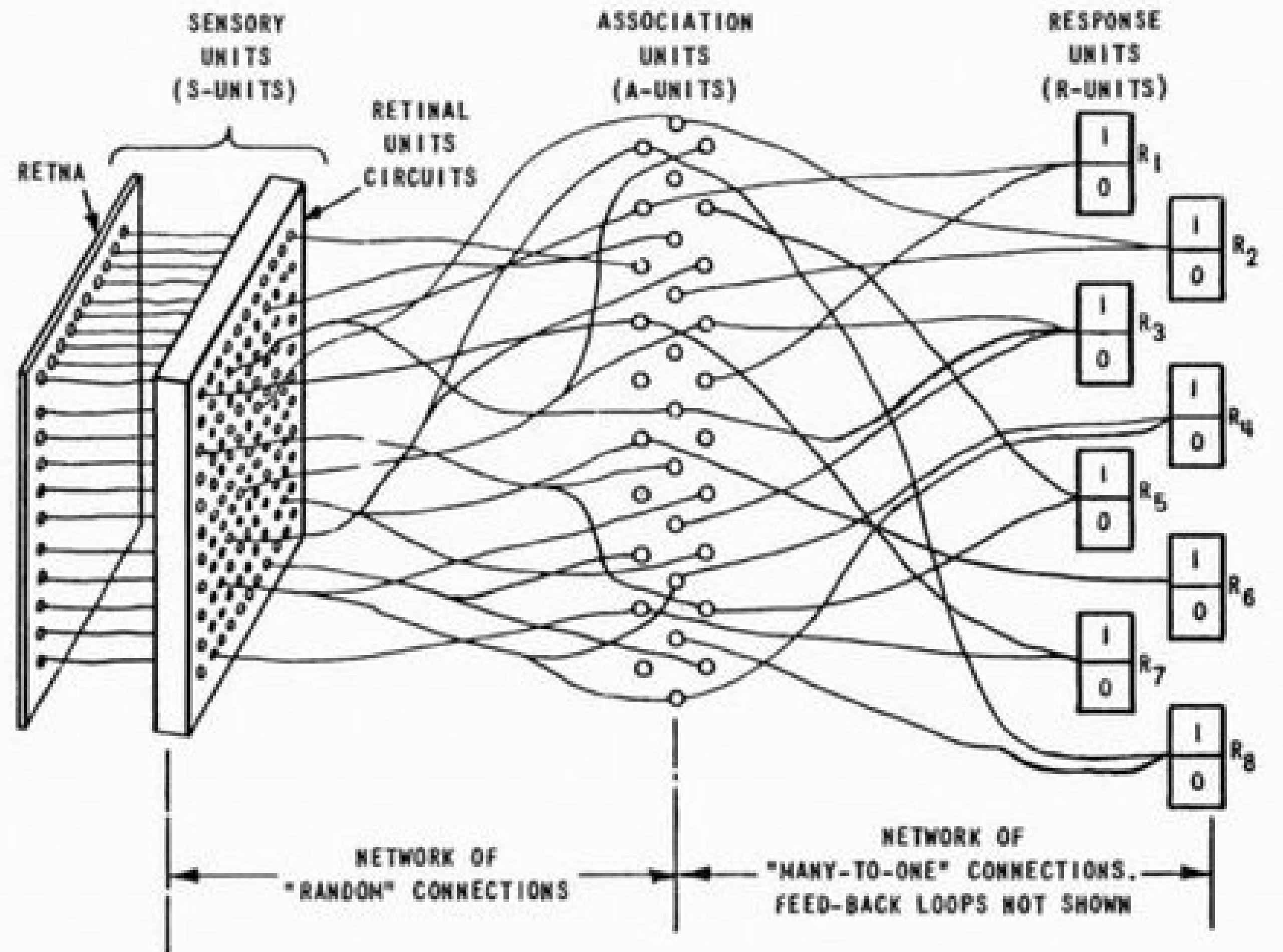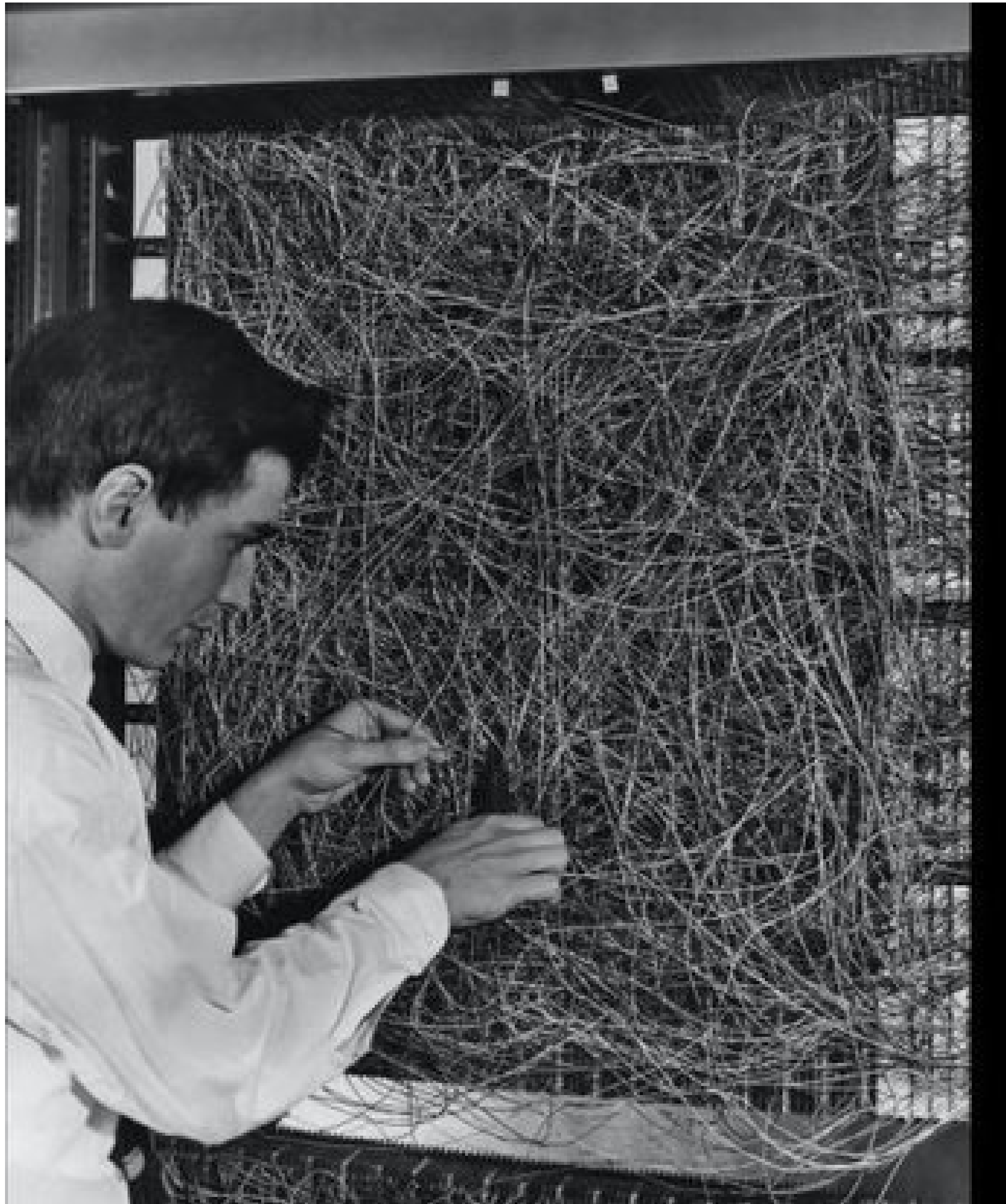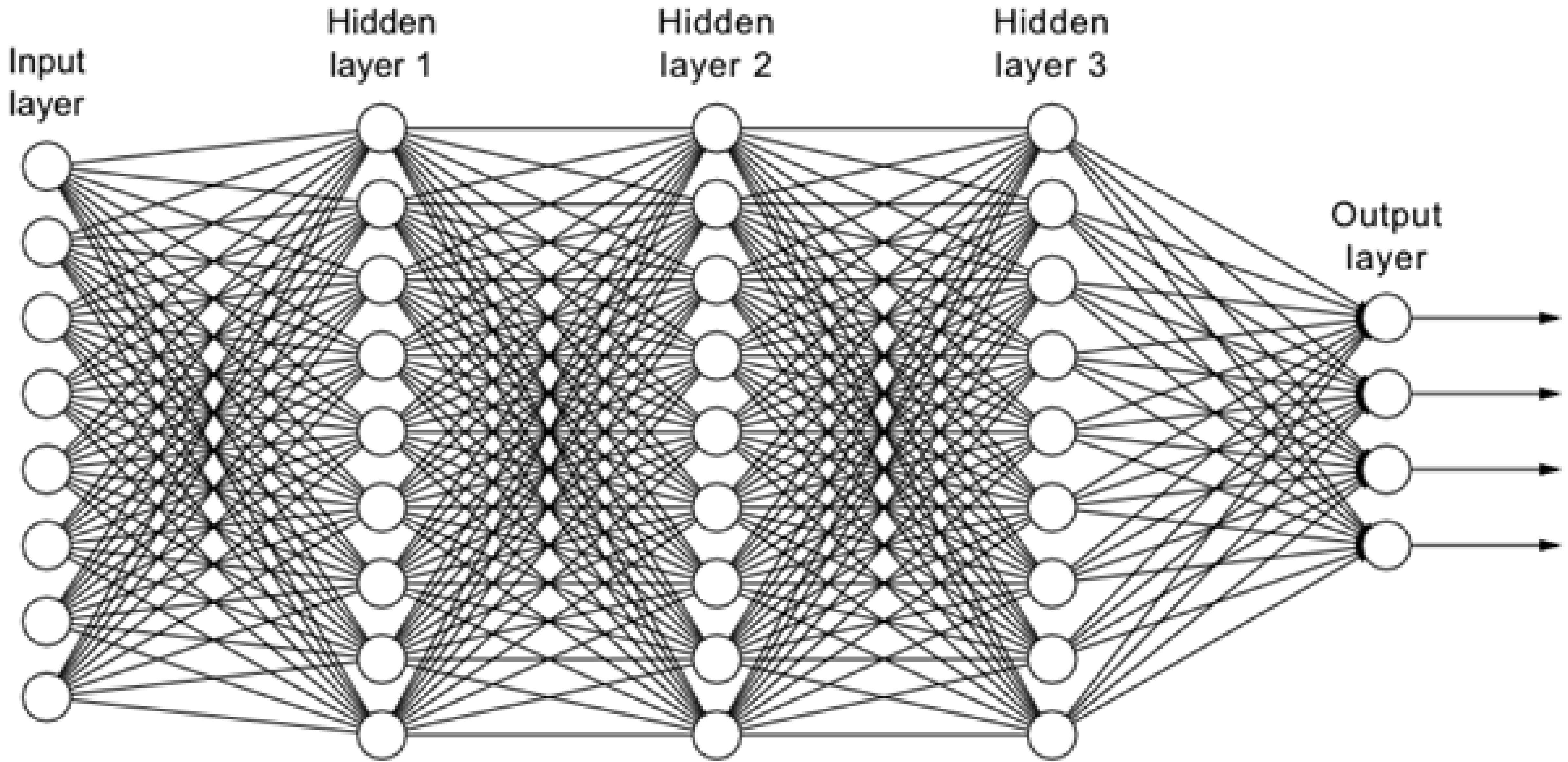*Nodes = Neurons and are connected to one another by Synapses*
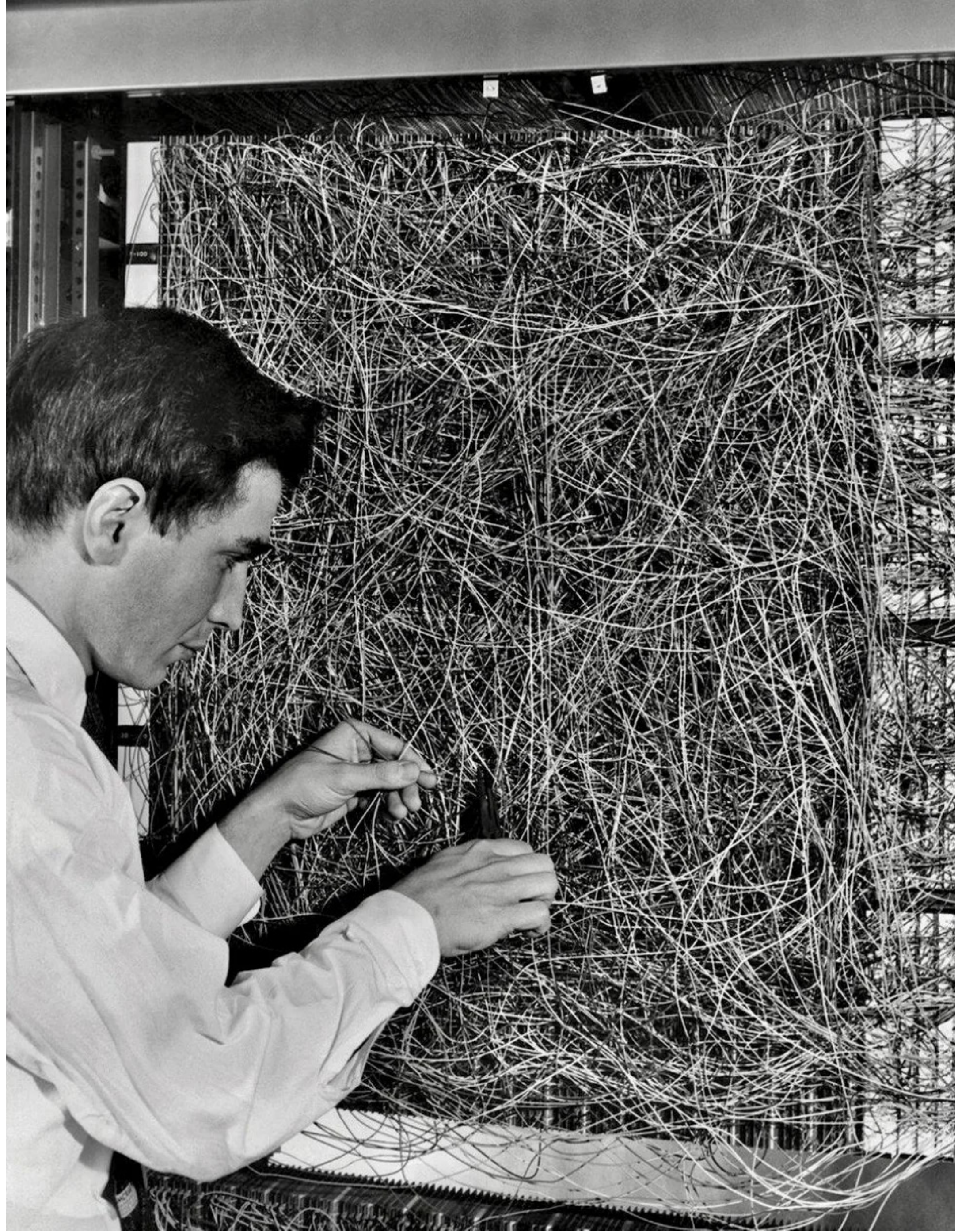
Figure 1   ORGANIZATION OF THE MARK I PERCEPTRON

Input layer

Hidden layer 1

Hidden layer 2

Hidden layer 3

Output layer

# *DL* *Deep Learning*

*Deep learning uses NN's that have more than 3 layers.*

*Deep learning models can recognize complex patterns in pictures, text, sounds, and other data to produce accurate insights and predictions. Amazon*

*Invented by Alexey Ivakhnenko in 1966*
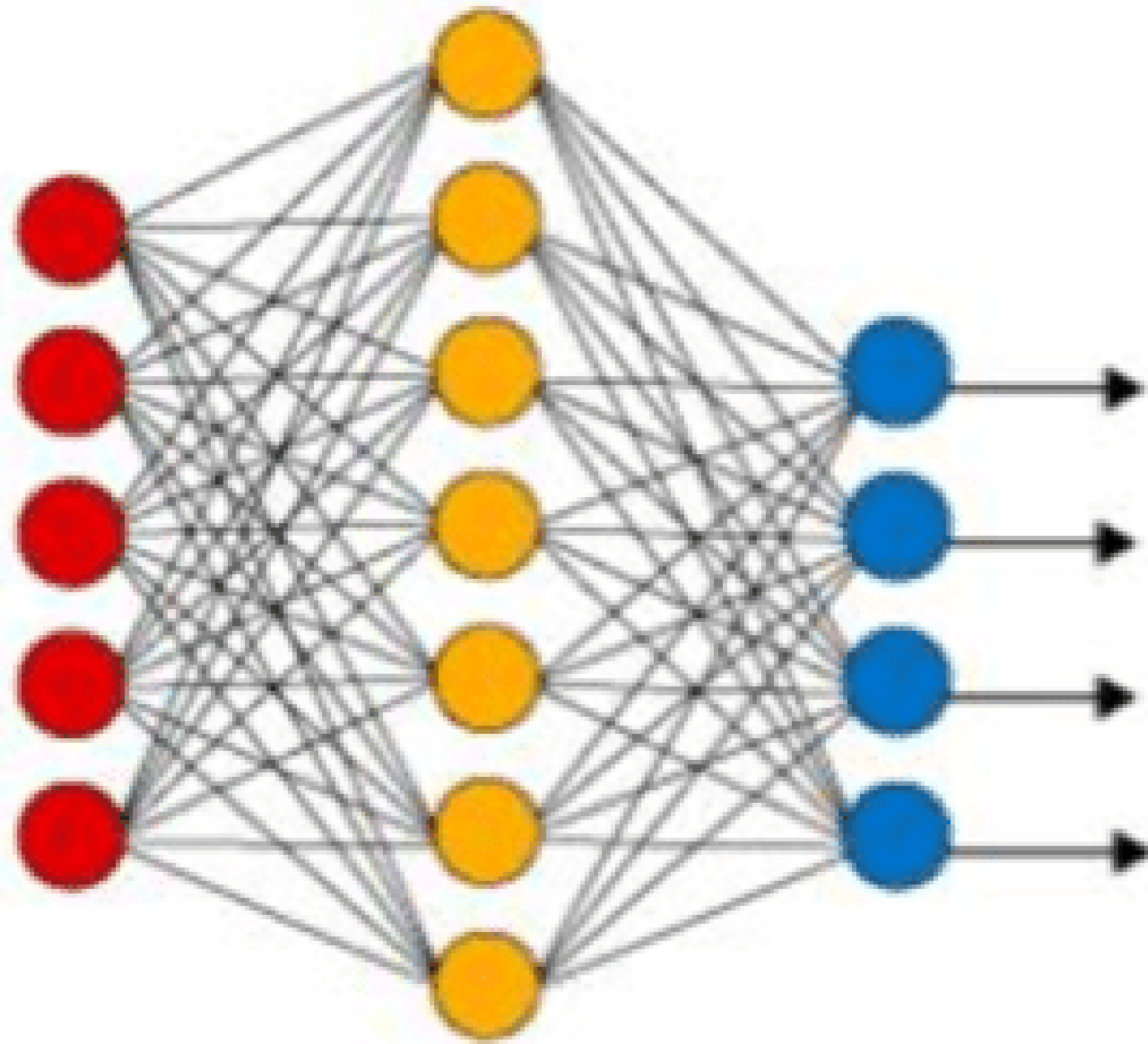*The term deep learning was proposed in 1986 by Rina Dechter*
*It's a subset of a NN*
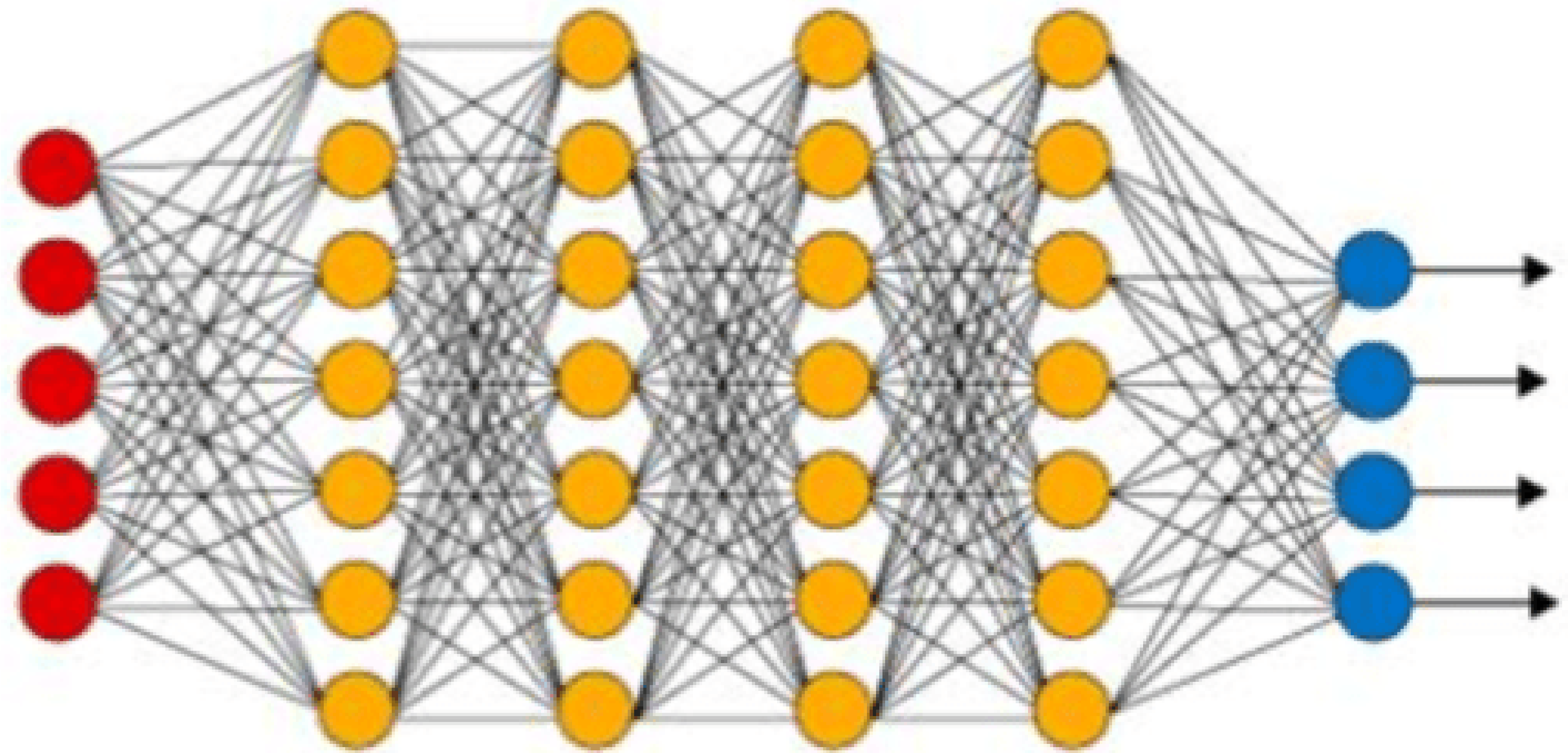*Consists of more than 3 layers*
*Unsupervised Learning (no human interaction required)*
*Doesn't require labeled data sets. It can decipher the data.*

**Artificial Neural Network**

**Deep Neural Network**

# *LLM* *Large Language Model*

*Large language models (LLM) are very large deep learning models that are pre-trained on vast amounts of data. The underlying transformer is a set of neural networks that consist of an encoder and a decoder with self-attention capabilities. Amazon*

*Invented by Joseph Weizenbaum at MIT in 1966. ELIZA*
*Rogerian Psychotherapist*
*The client, not the therapist, decides what is discussed.*
*LLM's consist of Data, Transformer (NN), and Training*
*Used in Chatbots, Content Creation,and Software Development*

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Welcome to
                EEEEEE  LL       IIII    ZZZZZZ   AAAAA
                EE      LL        II         ZZ   AA   AA
                EEEEE   LL        II        ZZZ   AAAAAAA
                EE      LL        II       ZZ     AA   AA
                EEEEEE  LLLLLL  IIII ZZZZZZ       AA   AA


   Eliza is a mock Rogerian psychotherapist.
   The original program was described by Joseph Weizenbaum in 1966.
   This implementation by Norbert Landsteiner 2005.


ELIZA: Is something troubling you ?
YOU:   Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU:   They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU:   Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU:   He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU:   It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:
```

# GAN *Generative Adverserial Network*

*Given a training set, this technique learns to generate new data with the same statistics as the training set. For example, a GAN trained on photographs can generate new photographs that look at least superficially authentic to human observers, having many realistic characteristics. Wikipedia*

*Invented by Ian Goodfellow in 2014 (b.1987)*
*A fight between two neural networks*
*The generator and The discriminator*
*the generator works to fool the discriminator by trying to pass off fake images as real ones*

# DM *Diffusion Model*

*Diffusion models are advanced machine learning algorithms that uniquely generate high-quality data by progressively adding noise to a dataset and then learning to reverse this process. This innovative approach enables them to create remarkably accurate and detailed outputs, from lifelike images to coherent text sequences. SuperAnnotate*

*Invented by Ian Jascha Sohl-Dickstein in 2015(Stanford)*
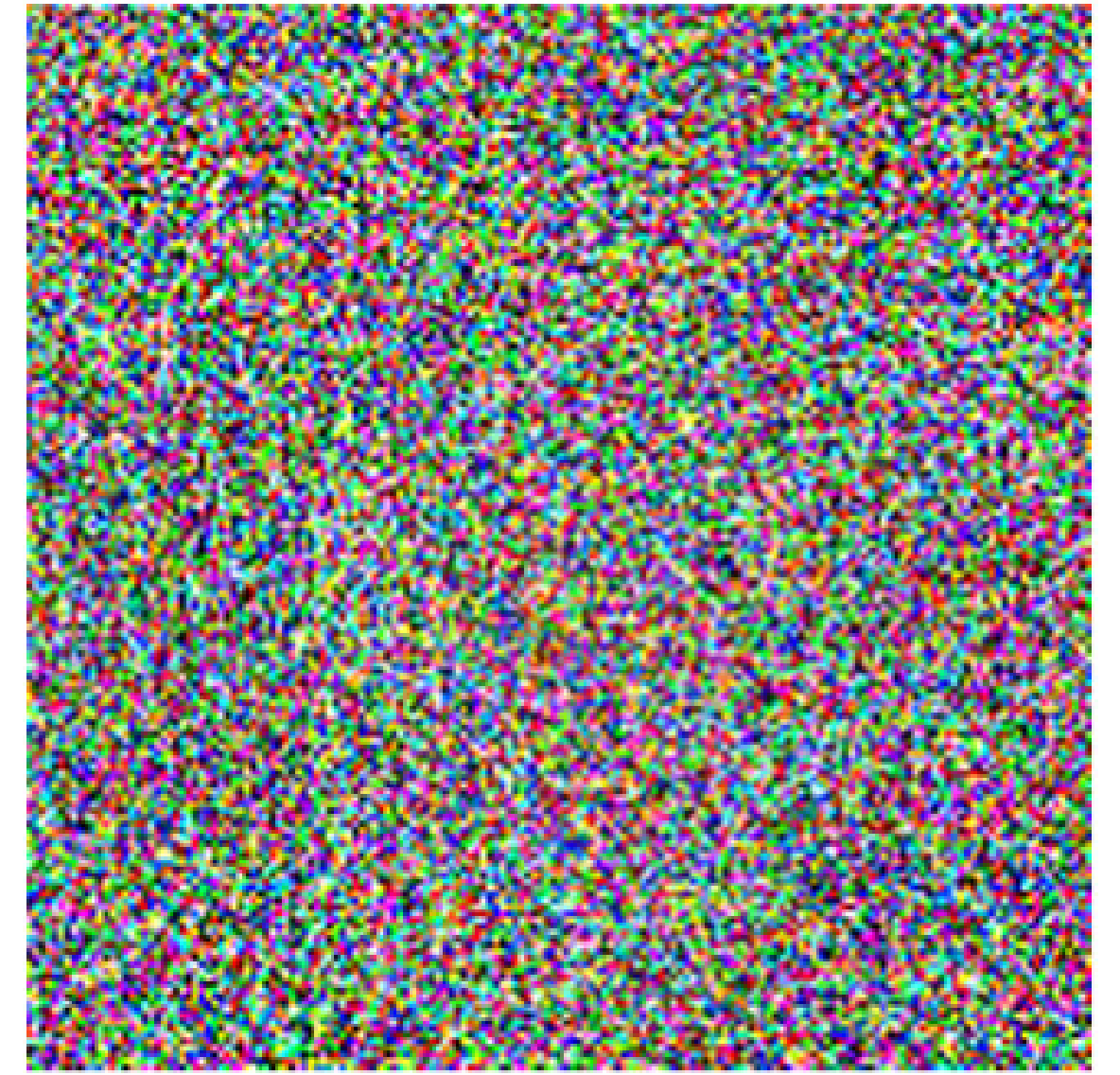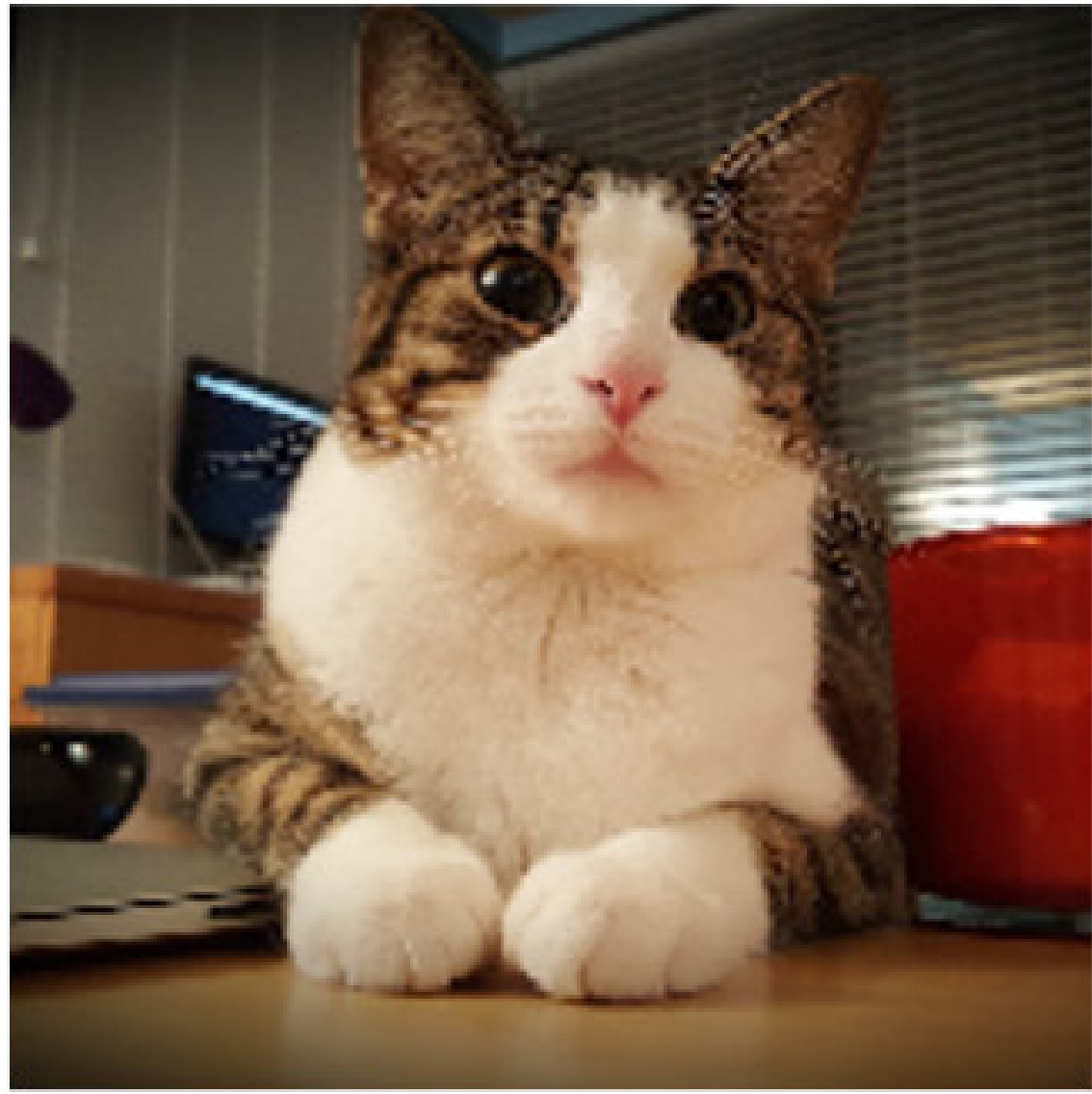*They are Generative Networks*
*They're are trained on a Data Set of possibly billions of images*
*They take an image from their dataset and add gaussian noise and then de noise it into a completely different image*

# Diffusion Model    Data Set

# Diffusion Model

# *MH* *Machine Hallucinations*

*AI hallucination is a phenomenon wherein a large language model (LLM)—often a generative AI chatbot or computer vision tool—perceives patterns or objects that are nonexistent or imperceptible to human observers, creating outputs that are nonsensical or altogether inaccurate. -IBM*


*When machines dream*
*In LLM's you may get an answer that just doesn't make sense*
*"LLM's are prone to just make stuff up, Plausible sounding nonsense"*
*Contradictions, Data scraping, perhaps Reddit,*
*Avoid Hallucinations by writing clear, precise, and accurate prompts*

# CV *Computer Vision*

*Computer vision is the field of computer science that focuses on replicating parts of the complexity of the human vision system and enabling computers to identify and process objects in images and videos in the same way that humans do. Until recently, computer vision only worked in limited capacity. -Medium*
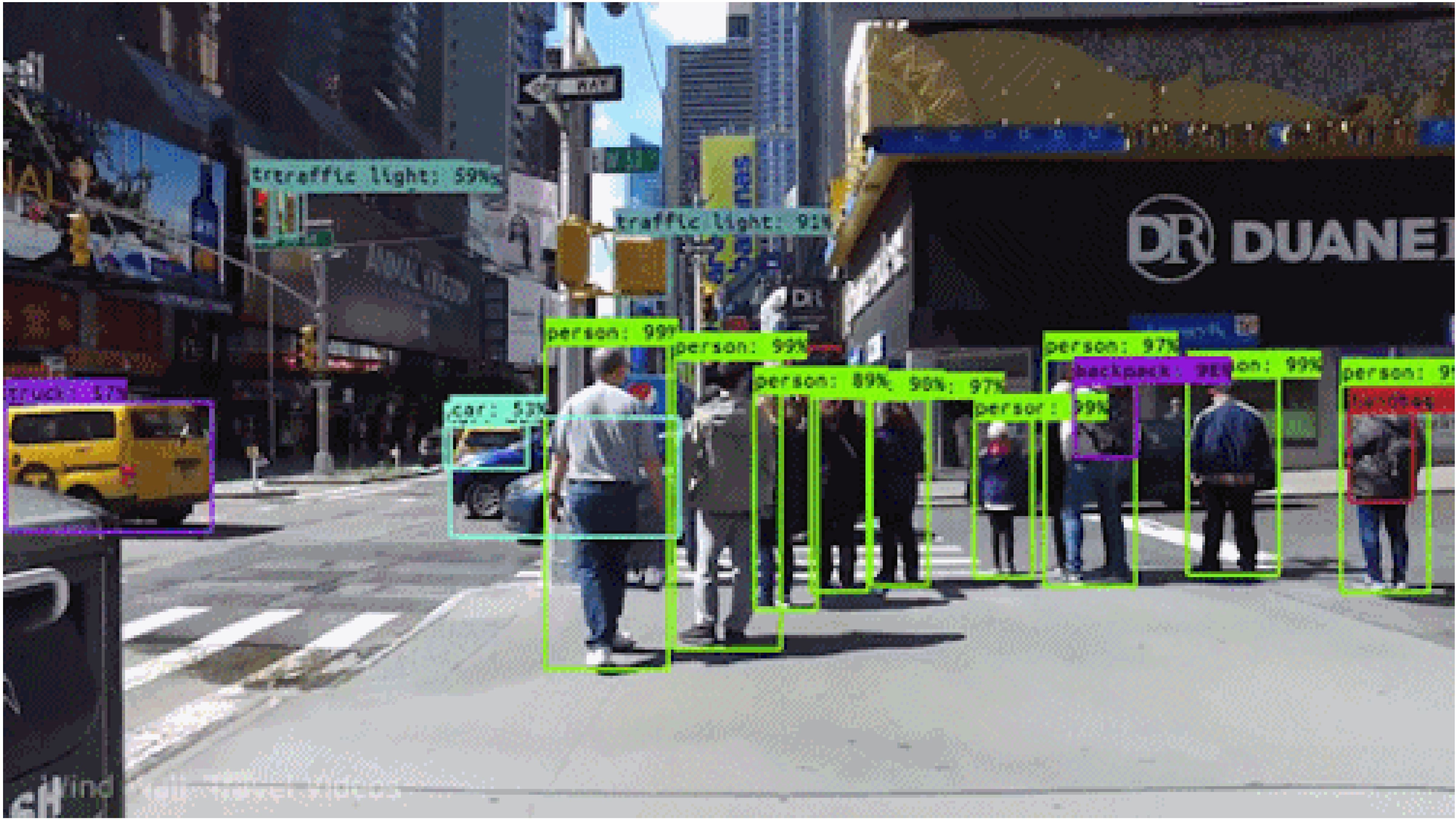
Computer Vision = Pattern Recognition
Deep Learning DL made it possible to solve previous issues with CV
Self Driving Cars - CV
Facial Recognition - CV
Augmented Reality -CV

# *LoRA* **Low Rank Adaptation**

*LoRa is a popular and lightweight training technique that significantly reduces the number of trainable parameters. It works by inserting a smaller number of new weights into the model and only these are trained. This makes training with LoRA much faster, memory-efficient, and produces smaller model weights -Hugging Face*

*Invented in 2021 by researchers from Microsoft*
*Used to Fine Tune an existing model*
*Can be trained on a small tagged data set (supervised learning)*

# VAE *VAE - Variational AutoEncoder*

*A variational autoencoder (VAE) is a technique used to improve the quality of AI generated images you create with the text-to-image model Stable Diffusion. VAE encodes the image into a latent space and then that latent space is decoded into a new, higher quality image.*
*-Built In*


*Invented in 2013 by Diederik P. Kingma and Max Welling*
*Some Model Checkpoints have VAE's baked into them*
*VAE's will make your images sharper and less blurry*