

# ML Week

0x07a Perceptron

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# Introducing Perceptron

- Supervised learning
- Binary classifier
- Linear classifier
- Permits online learning

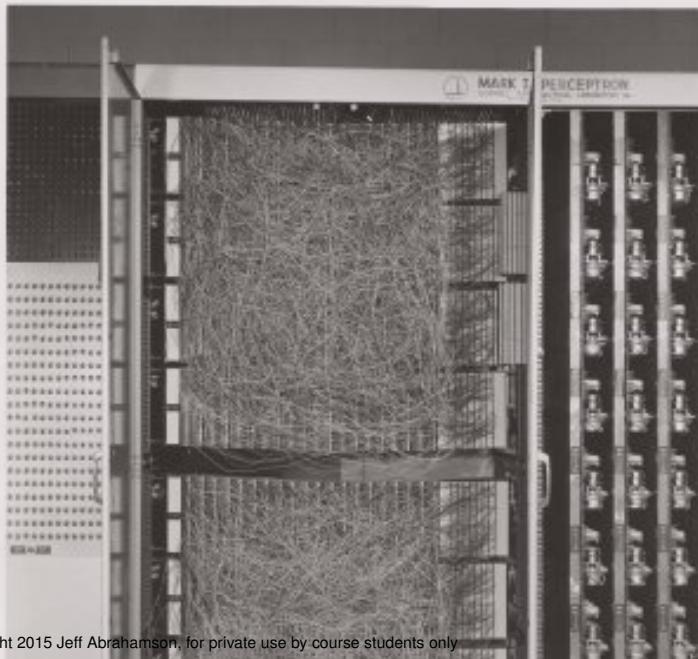
# History

- Invented in 1957 by Frank Rosenblatt
- Cornell University Aeronautical Laboratory
- Paid for by ONR
- First implementation in software (IBM 704)
- Intended to be a machine
- Designed for image recognition

# Hardware

- Inputs = 400 CdS photocells
- Weights = potentiometers
- Tuning = electric motors

# Patch panel and potentiometers



# Controversy

- 1958, press conference, NYT
- Rosenblatt too optimistic
- 1969, Minsky and Papert

We want to learn a linear separator

$$f(x) = \begin{cases} 1 & \text{if } w \cdot x + b > 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $w \in \mathbb{R}^{n+1}$ .

# Algorithm

- 1 Initialise weights
- 2 From input, compute output
- 3 If correct, add  $(\alpha \cdot \text{input})$  to weight



# Convergence

- If linearly separable, yes
- If not linearly separable, learning fails

## **feedforward neural network**

# Questions?

`purple.com/talk-feedback`