

# Deep Learning and Neural Network

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Deep learning is a class of machine learning that:

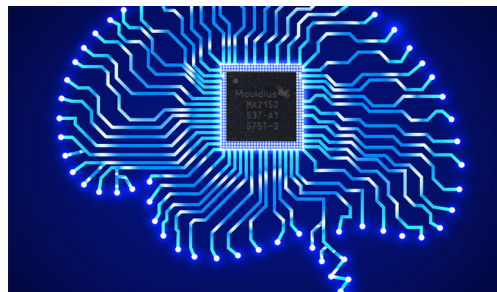
- use a cascade of multiple layers for extracting and transforming the features.
- learn in supervised or unsupervised mode
- learn with different levels of presentation



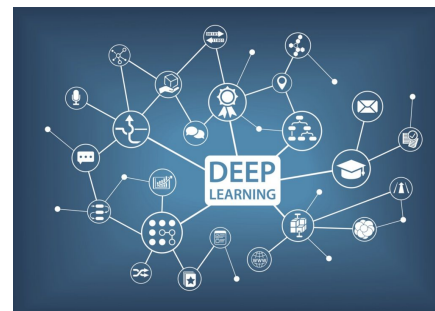
[ZDNet, 2018]



[Sicle Digital, 2016]



[Silicon ANGLE, 2016]



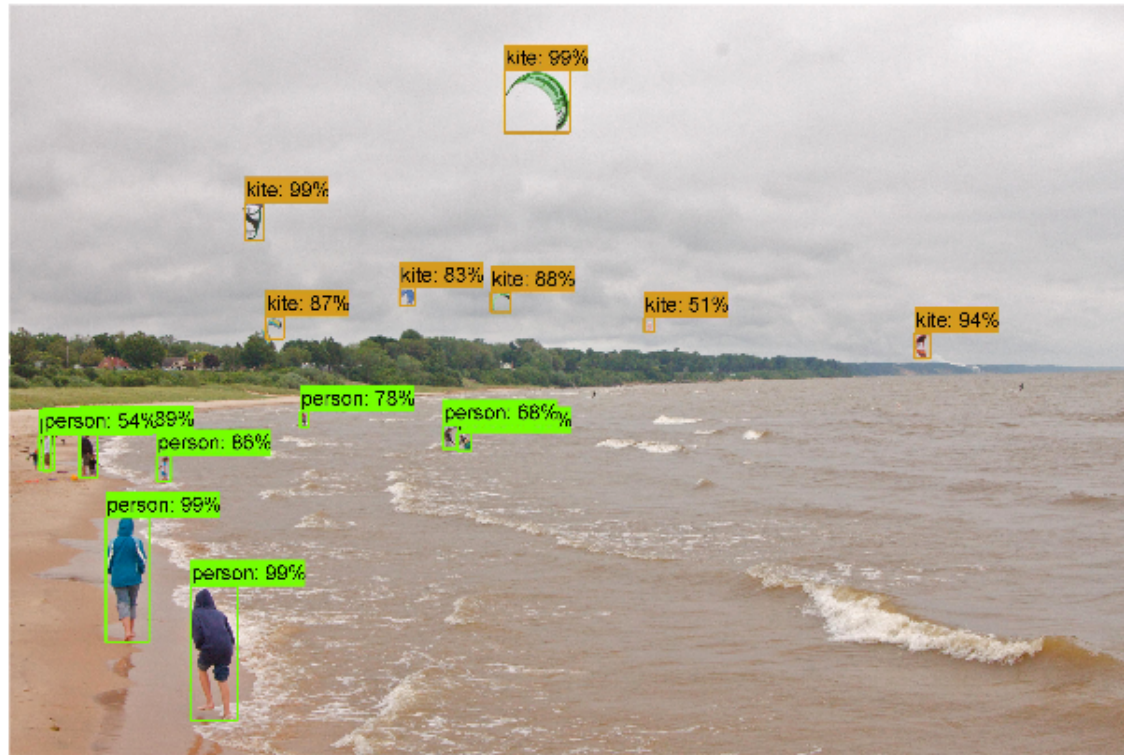
ROSS Intelligence, 2018

## Images classification



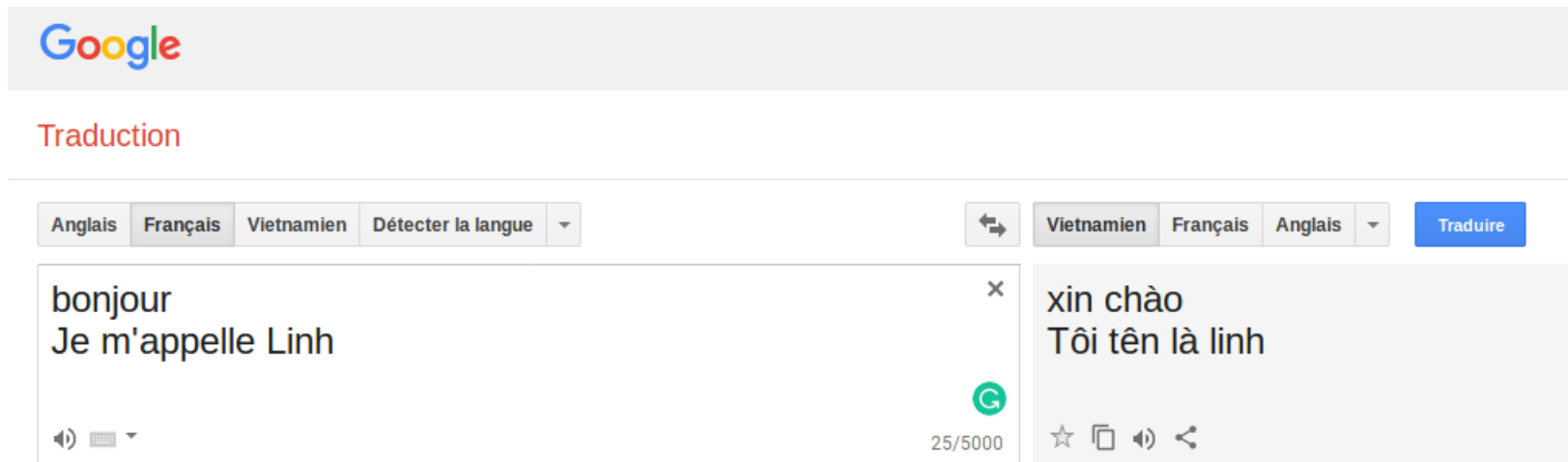
[Machine Learning Mastery, 2016]

## Object detection



[Medium, 2018]

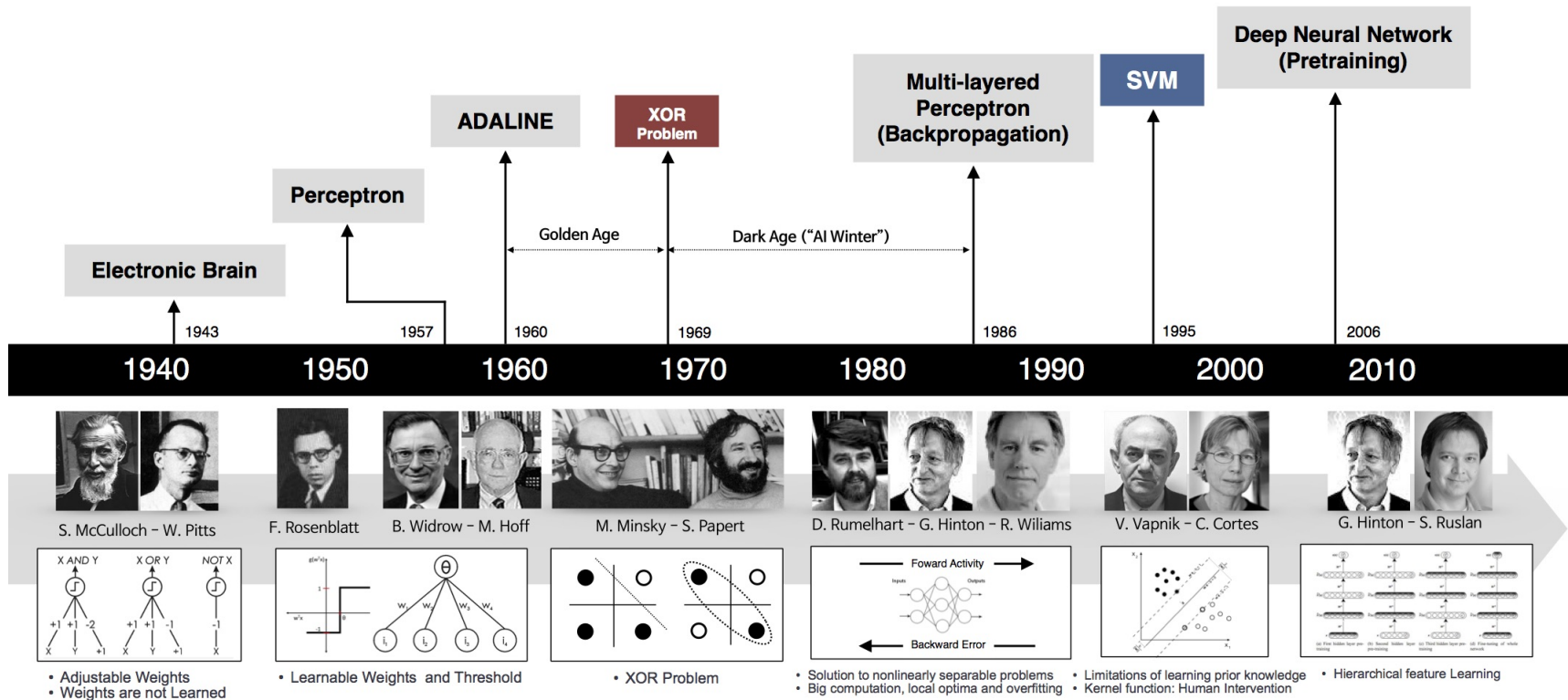
## Machine translation



The screenshot shows the Google Translate web interface. At the top left is the Google logo. Below it, the word "Traduction" is written in red. The interface features two language selection menus: the left one is set to "Français" and "Vietnamien", and the right one is set to "Vietnamien" and "Français". A blue "Traduire" button is positioned to the right of the second menu. The main content area is split into two panels. The left panel, representing the source text, contains "bonjour" and "Je m'appelle Linh". Below this text are icons for a speaker, a keyboard, and a dropdown arrow, along with a green "G" logo and the character count "25/5000". The right panel, representing the target text, contains the Vietnamese translation "xin chào" and "Tôi tên là linh". Below this text are icons for a star, a document, a speaker, and a share icon.

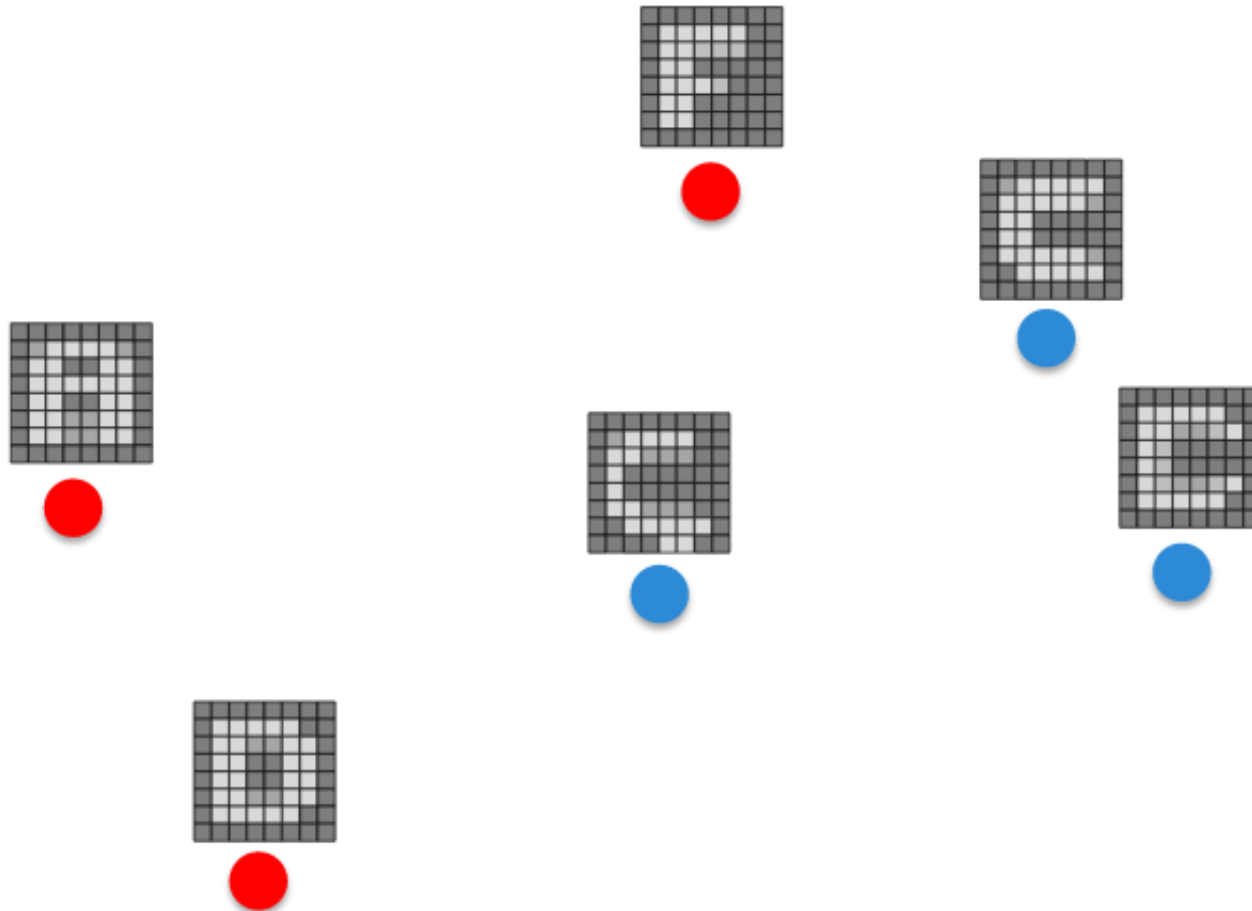
## Speech recognition





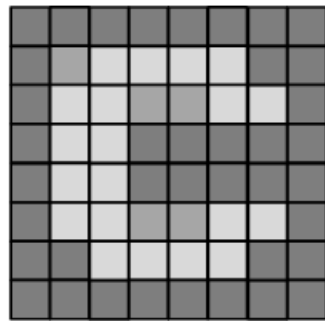
[beamandrew, 2017]

- Collect data for training: includes positive and negative examples





- Represent data as vectors:



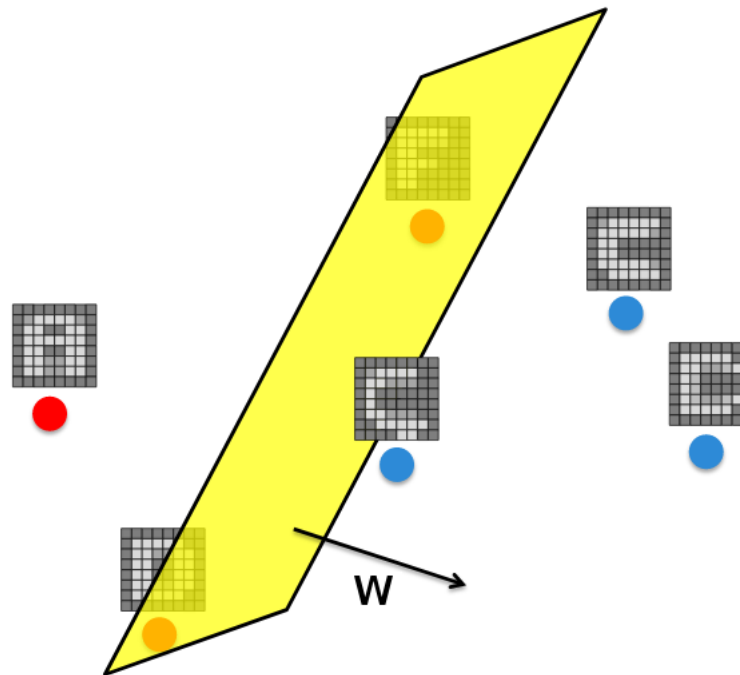
Image



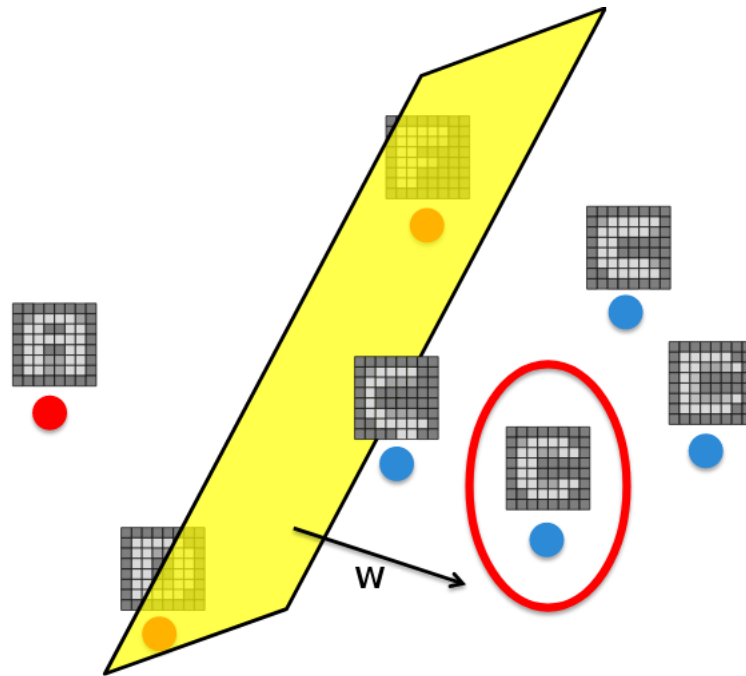
$$\begin{pmatrix} \vdots \end{pmatrix}$$

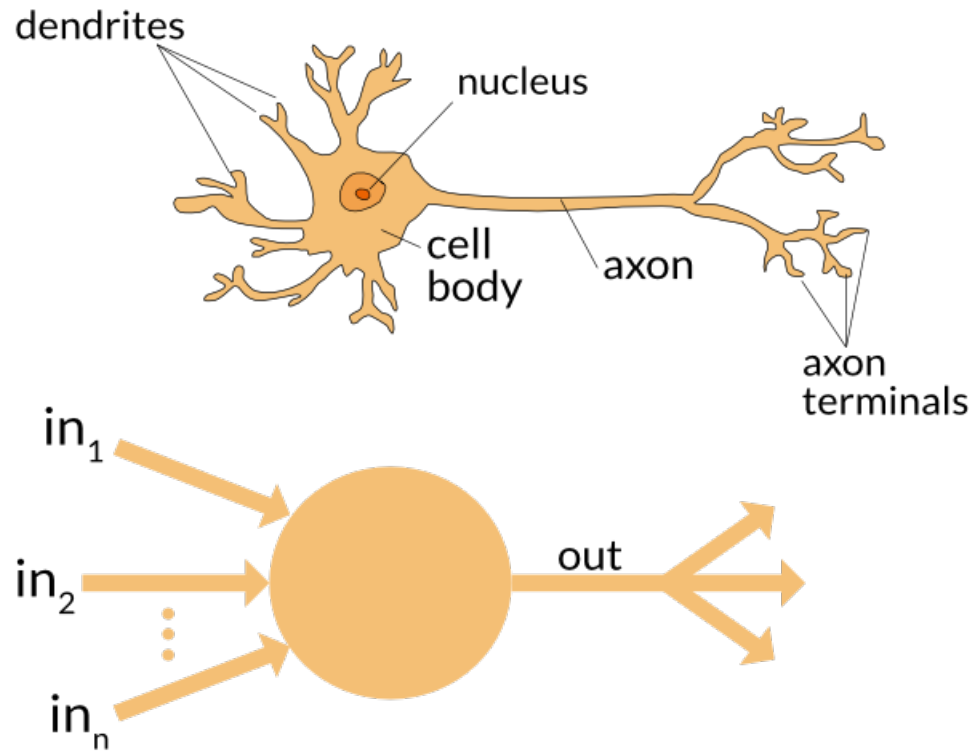
vector

- Function:  $f(x) = w^T x + b$
- Train the function on training data: find  $w$  and  $b$  so that
  - If sample  $x$  is positive,  $f(x)$  is positive
  - If sample  $x$  is negative,  $f(x)$  is negative



- Testing on new examples





[appliedgo, 2016]

- Sequence 1: Introduction Deep Learning and Logistic Regression Problem
- Sequence 2: Overview Neural Networks
- Sequence 3: Deep L-Layers Networks
- Sequence 4: Application: Deep Neural Network for Image Classification

Note: Each sequence includes 1h lecture and 2h TD

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