

A Brief History of Artificial Intelligence



Alan Bundy

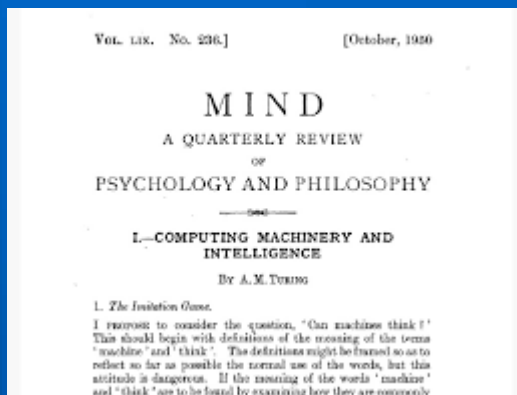
School of
informatics

University of Edinburgh

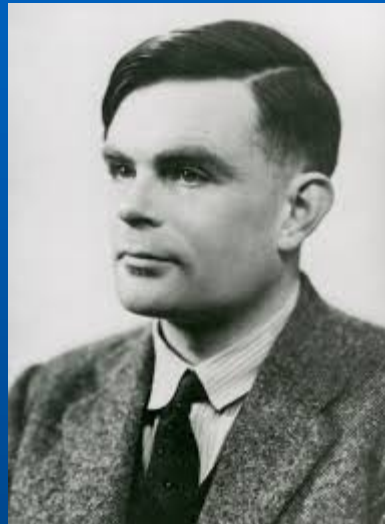
IT Futures 2019



Turing's Mind Paper & Test 1950



Turing's Mind Article



Alan Turing

The Turing Test



Dartmouth Conference 1956

1956 Dartmouth Conference: The Founding Fathers of AI



John McCarthy



Marvin Minsky



Claude Shannon



Ray Solomonoff



Alan Newell



Herbert Simon



Arthur Samuel



Oliver Selfridge



Nathaniel Rochester



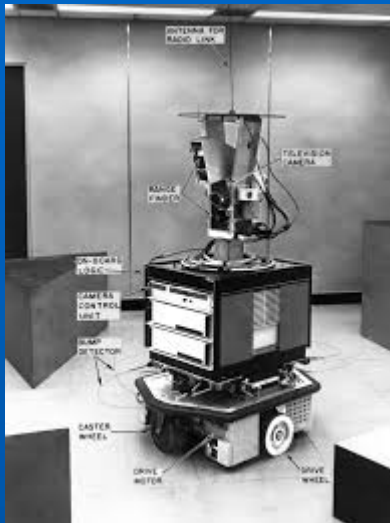
Trenchard More

Attendees
at Conference

The Credo

that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it

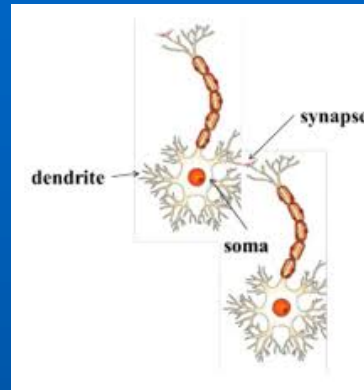
Symbolic vs Subsymbolic



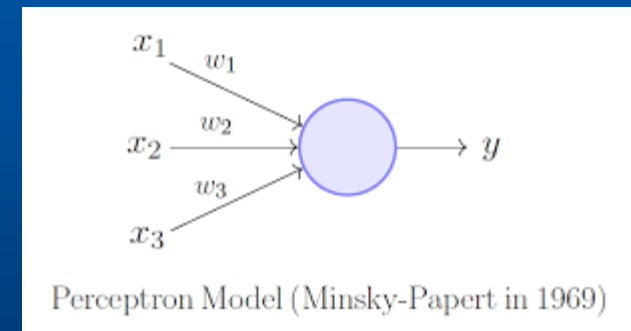
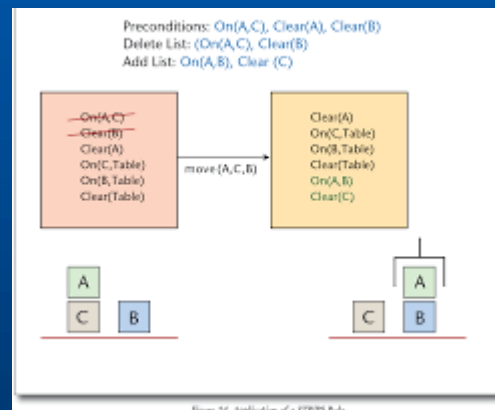
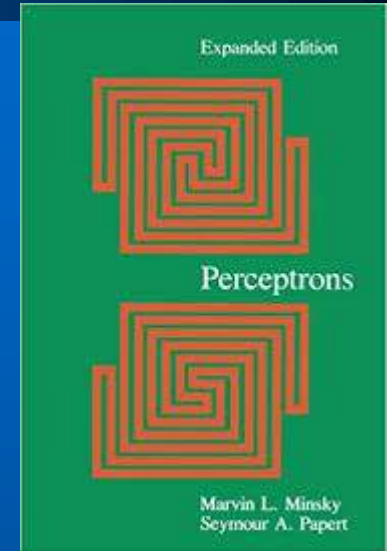
Shakey

STRIPS

Neuron



Critical Book



Perceptron

The Lighthill Report 1973

- Lighthill invited to write a report on AI by SRC (1973)
- Critical of AI: A, B, C classification
- BBC 'Controversy' Programme:
 - Lighthill vs Michie, McCarthy and Gregory
- Onset of 'AI Winter'
- Only reversed by Alvey Programme

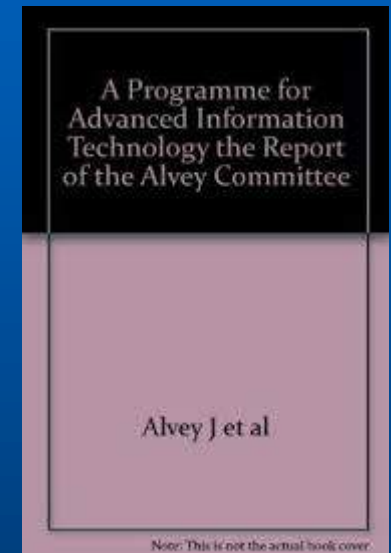
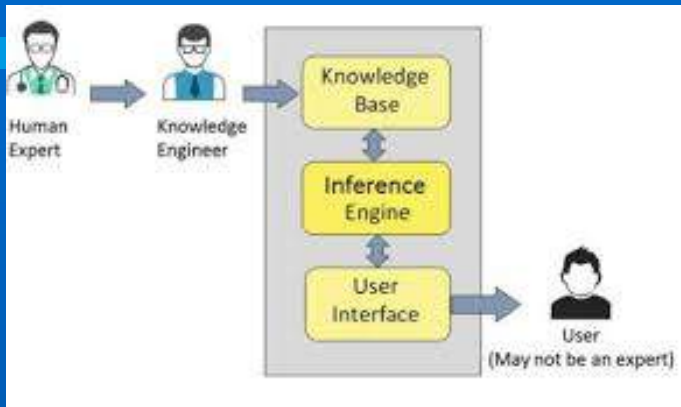
James Lighthill



The Report

Expert Systems 1980s

Japanese
Fifth
Generation



Knowledge as Rules

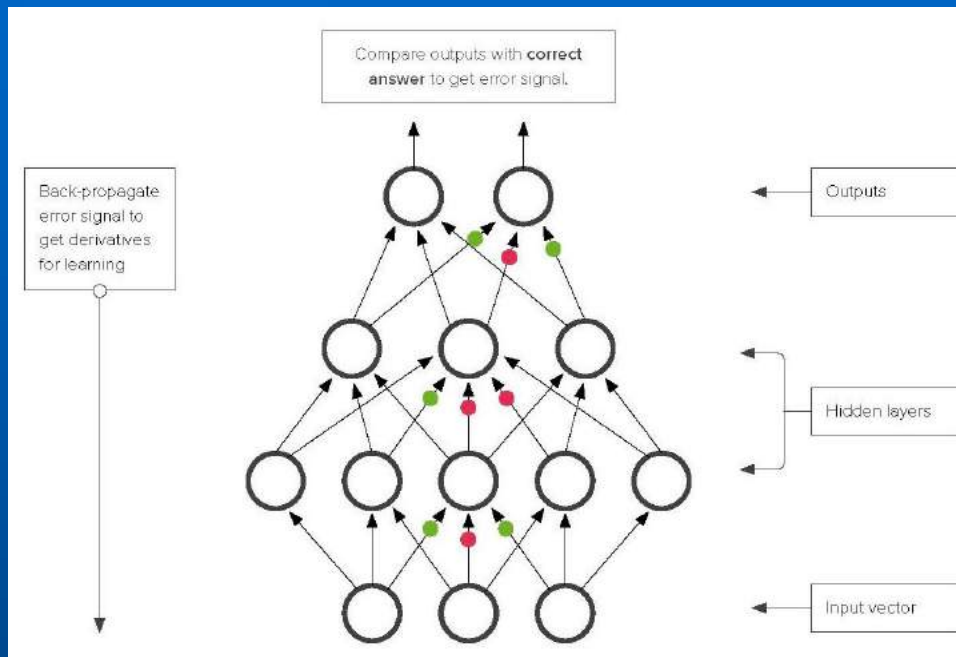
MYCIN rule example:
IF the infection is meningitis
AND patient has evidence of serious skin or soft tissue infection
AND organisms were not seen on the stain of the culture
AND type of infection is bacterial
THEN There is evidence that the organism (other than those seen on cultures or smears) causin the infection is *Staphylococcus coagulans*.

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US Strategic
Computing
Initiative

UK's Alvey
Programme

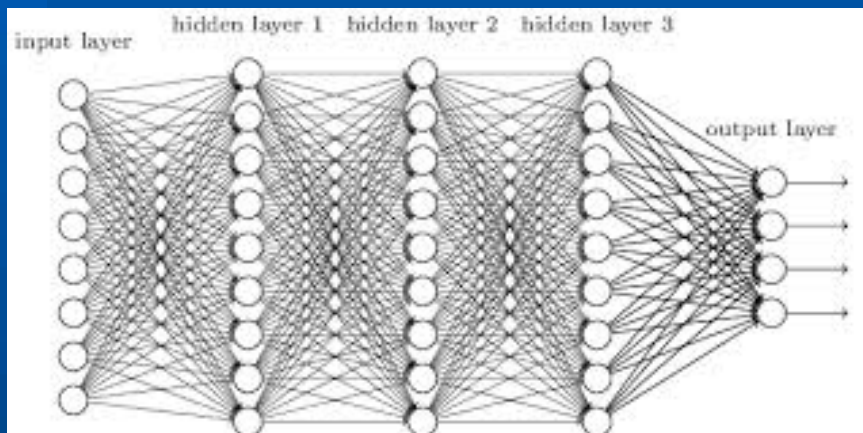
Backpropagation 1986



- Impractical on more than one hidden layer.
- Computers too slow.
- Datasets too small.
- Poor weight initialisation.
- Wrong type of non-linearity
- Alternatives more successful
 - e.g., State Vector Machines.
- 1990-date: Steady growth of interest and achievement in ML, data-mining, etc.
- Displacement of GOF AI

Deep Neural Nets 2010s

- Moore's Law + GPUs
- Huge datasets.
- Use Stochastic gradient descent.
- Now many hidden layers can be handled.
- Successful applications in diverse domains.
- Explanation a major challenge (GDPR).
- 3rd wave of AI?



21st Century AI Successes

Tarten Racing's
Boss (2007)



Hopeless at
anything else.

World
champion at
narrow task

IBM's Watson (2011)



Too easy to overestimate
their potential



AlphaGo (2016)

Hybrid teams are the future



Humans, robots and apps
must collaborate.



Humans must
orchestrate,
adjudicate and relate
to other humans.



We need to invent
this future.

DFKI HySociaTea Project