History of Artificial Intelligence

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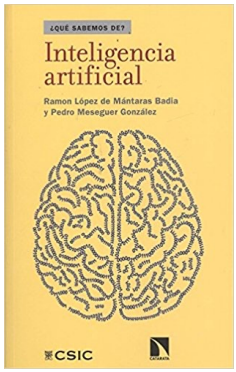
Follow the book



Using the path metaphor

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1. Origins
2. First advances
3. Winter
4. A new spring
5. Successes
6. Future

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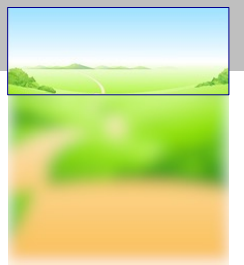
1. Origins…



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JUMILLA 18/05/22

Second World War

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JUMILLA 18/05/22

Second World War

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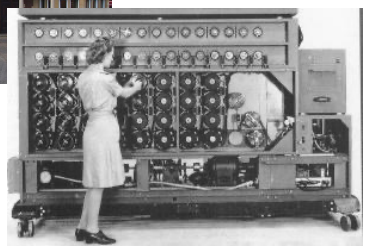
JUMILLA 18/05/22

Deciphering

Bletchley Park



Bombe

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JUMILLA 18/05/22

Turing (1912-1954)

- Great british mathematician
- Turing machine: theoretical computational model (1936)
- Breaks the german encription (~1940-1942)
- Precursor:
  - First program to play chess (1948)
  - Anticipated intelligence by computers(1950)
- Convicted by homosexuality, he commits suicide (1954)

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Dartmouth College 1956

- *Summer Research Project on Artificial Intelligence*
- Computers: from numerical calculus to intelligent action through logical operations


McCarthy, 1927


Simon, 1916


Newell, 1927


Minsky, 1927

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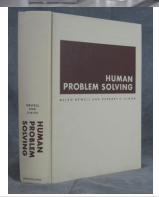
Initial steps

- Logic Theorist (N&S)
- General Problem Solver (N&S)
- Checkers (Samuel)
- Pandemonium (Selfridge)
- Perceptron (Rosemblatt)
- Adaline (Widrow)
- Baseball, SAD SAM
- Student (Bobrow), SIR (Raphael)
- Eliza (Weizenbaum)



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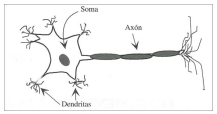
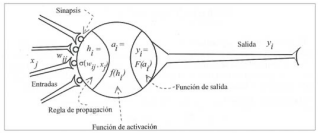
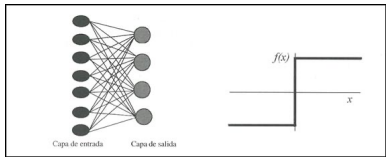
Perceptrón (1957)



Neuron computational model (McCulloch,Pitts, 1943)



- Neuron output: either 0 or 1.
- Each neuron is connected to all neurons of the preceding layer.
- Weight w_{ij} in the connection between neuron *i* and neuron *j*, value in [-1,1].
- A neuron adds inputs x wheights and applies the activation function.



Limits: book Perceptrons by Minsky and Papert (1969)

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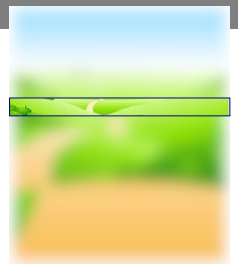
2. First advances



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Search and planning

- State: a specific configuration of a problem: i.e. in chess →
- State space: huge graph of all the states of a problem; arcs are labeled with feasible operations
- Solution: Trajectory in this graph, A* algorithm
- Planning: real objects and actions, sequence of actions to reach a goal
- STRIPS (preconditions, conditions to add and to delete)
- Subgoals: Sussman anomaly -> partial order planning

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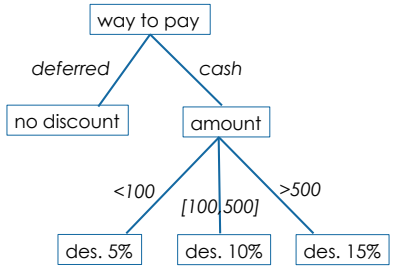
Machine learning: classification

- Inductive inference: learning from examples

atributos				clase



- Decision trees, ID3 algorithm

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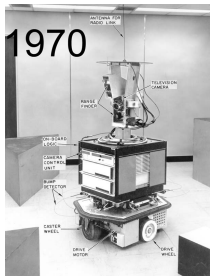
Vision and robotics

- Motivation: to guide robotic arms
- *Hand-eye research*
- The blocks world
- Robot Shakey (temblón) (SRI)
- Sensors: TV cameras, laser, contact
- Software:
  - internal: control, sensors
  - intermediate: image processing, navigation
  - external: STRIPS planner



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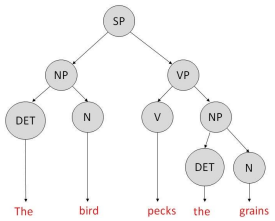
Natural language processing

- Written:
  - Tasks:
    - Recuperación de datos
    - Question answering
    - Information extraction
    - Automatic translation
  - Internal representation
  - Lexical, sintactical, semantical, pragmatical analyses
- Spoken:
  - Signal processing
  - Sequencing: language corpus
  - Speaker model



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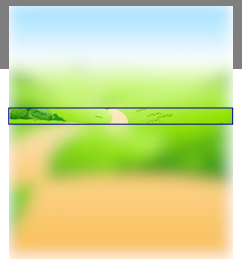
3. Winter



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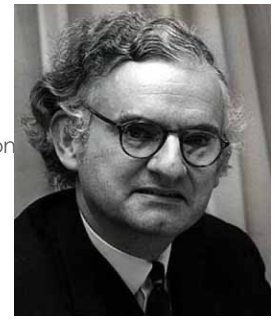
The Lighthill report

- Sir James Lighthill
  - Lucasian chair of mathematics in Cambridge
- Report on IA: devastating
  - Critisizes its "great goals"
  - Identifies the combinatorial explosion
  - Issues with scalability: for "toy problems" was OK, but not for problems of real size
- Consequences:
  - Research on AI stops / continues at slower pace



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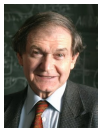
Philosophical criticisms

- Searle and the chinese room
- Dreyfus and AI assumptions
- Penrose and the new physics
- Weizenbaum and the moral dilemma



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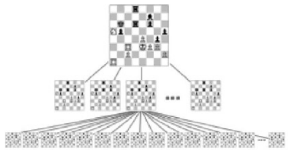
Combinatorial explosion

Given a problem:

- Excat formulation:
  - From the curret state, all chances(1st level)
    - For each possible state, all chances (2nd level)
      - For each possible state, all chances (3rd level)
        - .....
  - Huge number of combinations: COMBINATORIAL EXPLOSION
- Heuristics
- Prunning



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