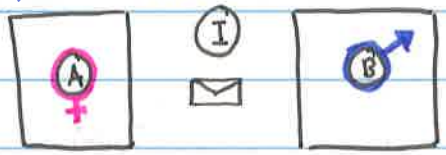
artificial intelligence

* DEVELOPING TECHNIQUES FOR FUNCTIONALITY ASSOCIATED WITH INTELLIGENCE
  - GAME PLAYING
  - EXPERT SYSTEMS
  - NATURAL LANGUAGE PROCESSING
  - ETC.
* STUDYING INTELLIGENCE THROUGH COMPUTER MODELLING

turing test

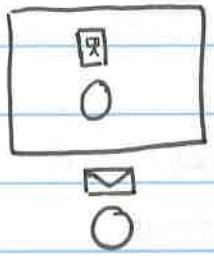
THE IMITATION GAME



* 3 PEOPLE: A, B, INTEROGATOR
* INTEROGATOR DOES NOT KNOW WHO IS WHO
* BY SENDING QUESTIONS AND RECIEVING ANONYMOUS ANSWERS, CAN THE INTEROGATOR GUESS WHO IS MALE AND WHO IS FEMALE
* IF MALE AND FEMALE WERE REPLACED BY HUMAN AND COMPUTER, WOULD THE INTEROGATOR BE MORE OR LESS CORRECT WHEN GUESSING WHICH IS WHICH

TURING'S ARGUEMENT: IF THE INTERROGATOR IS NO MORE ACCURATE IN THE COMPUTER/PERSON THAN THE MALE/FEMALE, WE CONCLUDE THE COMPUTER HAS SOME DEGREE OF INTELLIGENCE

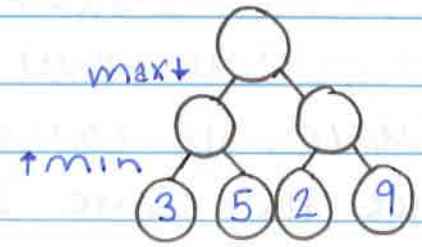
SEARLE'S CHINESE ROOM ARGUMENT



* A ROOM CONTAINS A PERSON WHO DOES NOT SPEAK CHINESE AND A MAGIC BOOK CONTAINING ALL POSSIBLE CHINESE QUESTIONS AND ANSWERS
* WRITTEN QUESTIONS SUBMITTED TO ROOM THROUGH SLOT
* PERSON IN ROOM LOOKS UP QUESTION AND COPIES DOWN RESPONSE
* ANSWER IS SENT OUT THROUGH SLOT

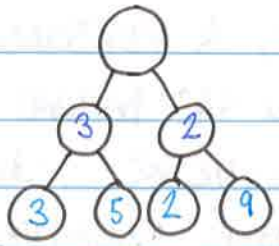
SEARLE'S ARGUMENT: NO MATTER WHAT SOMEONE OUTSIDE THE ROOM THINKS, THE PERSON IN THE ROOM CAN'T SPEAK CHINESE

minmax game playing

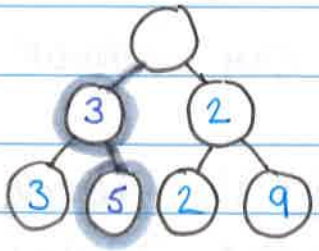


* EACH OF THE FINAL OUTCOMES HAS A NUMBER THE HIGHER THE NUMBER, THE BETTER THE OUTCOME FOR THE COMPUTER

* WORKING BACKWARD YOU PUT THE MIN IN THE BOX ABOVE

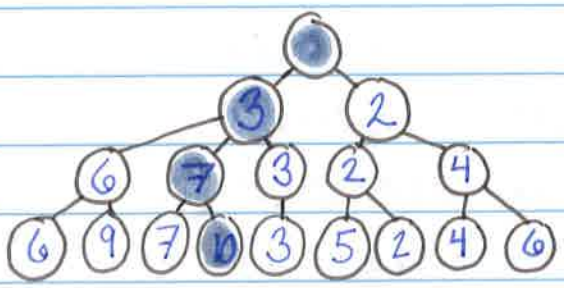


* THEN THE MAX CHOOSES THE BEST PATH



* THIS OUTCOMES THE "BEST" STRATEGY

ON A LARGER SCALE:



expert systems

* BASED ON 2 PARTS
  - IF-THEN RULES
  - INFERENCE ENGINE
* START WITH A SET OF FACTS & OBSERVATIONS & REQUIREMENTS
* IF A RULE WHERE KNOWN FACTS MATCH CONDITIONS, THE CONCLUSION IS ADDED TO KNOWN FACTS
* REPEATS UNTIL FINAL ANSWER IS FOUND

NEURAL NETWORK

* INSPIRED BY HOW NUERONS ARE WIRED IN THE NERVOUS SYSTEN
* INFORMATION REPRESENTED IN CONNECTION WEIGHTS
* NEURONS MODELED BY...

$$o_i = f(\sum w_{ij} o_j)$$

* LEARNING ADJUSTS WIEGHTS
* WIDE VARIETY OF MODELS AND LEARNING RULES

PERCEPTRONS

* EARLY SIMPLE NUERAL MODEL
  - ROSENBLATT, 1957
* $f(\cdot)$ IS A SIMPLE THRESHOLD STEP FUNCTION

$$f(x) = \begin{cases} 0, & x < \theta_i \\ 1, & x \geq \theta_i \end{cases}$$

* LEARNING RULE: $\Delta w_{ij} = \alpha (d_i - o_i) o_j$
* PERCEPTRON LEARNING THEOREM: SHOWS COMPLENESS OF LEARNING RULE
* IN 1969, MINSKY & PAPERT SHOWED PERCEPTRONS INCAPABLE OF COMPUTING XOR
* HIDDEN NODES ALLOW HIGHER CLASS FUNCTIONS BUT NO d_i FOR LEARNING
* RULES LIKE BACK PROPOGATION GENERALIZE TO MULTIPLE LAYERS BUT NO COMPLETENESS THEORY

PROBABILISTIC AUTOMATA

* STATE MACHINE WITH MULTIPLE TRANSISTIONS SELECTED AT RANDOM
* TWO TYPES OF LEARNING
  - GROW NEW STATES
  - ADJUST POSSIBILITIES ON TRANSISTIONS