Introduction

CS 470 Introduction To Artificial Intelligence

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Outline

Outline

What is intelligence

Wikipedia says : Intelligence has been defined in many different ways such as in terms of one's capacity for

- logic
- abstract thought
- understanding
- self-awareness
- communication
- learning
- emotional knowledge
- memory
- planning
- creativity
- problem solving

What is Artificial Intellgience

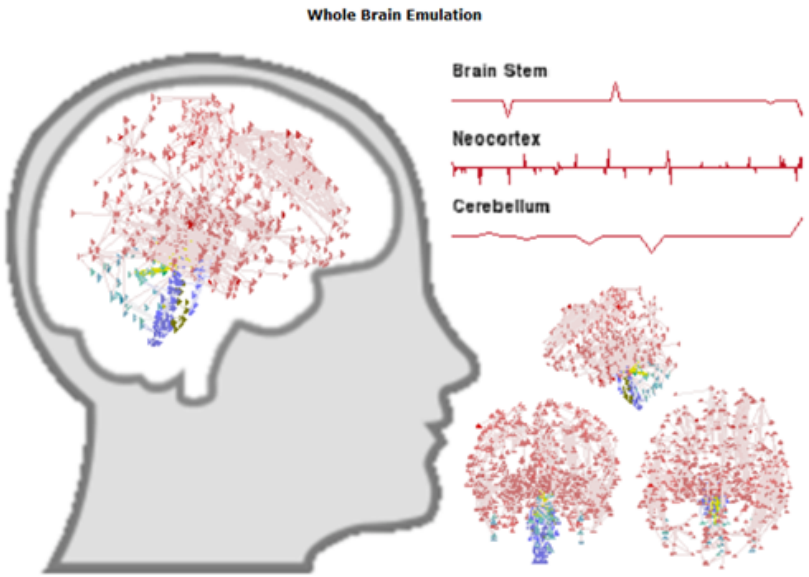
Four approaches of defining intelligence

- Thinking humanly
- Thinking rationally
- Acting humanly
- Acting rationally

Thinking humanly

Reproduce how the human thinks

- Cognitive science
- simulating how the brain might work



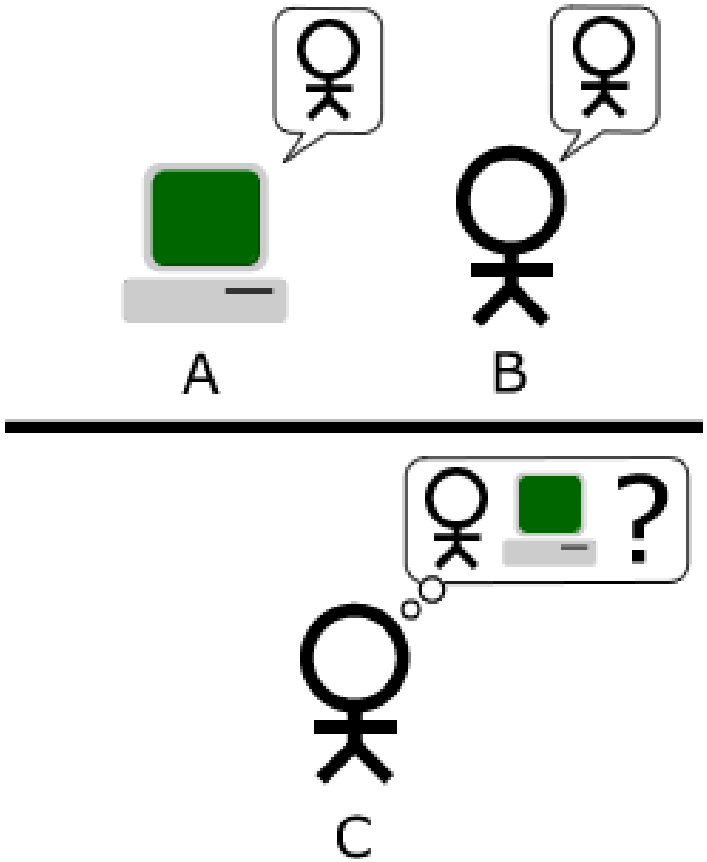
Signal processing in the brain

Acting humanly

Turing test

- human-like machine
- Loebner Prize
- Reverse application

Captcha



Turing test

Acting humanly

total Turing test

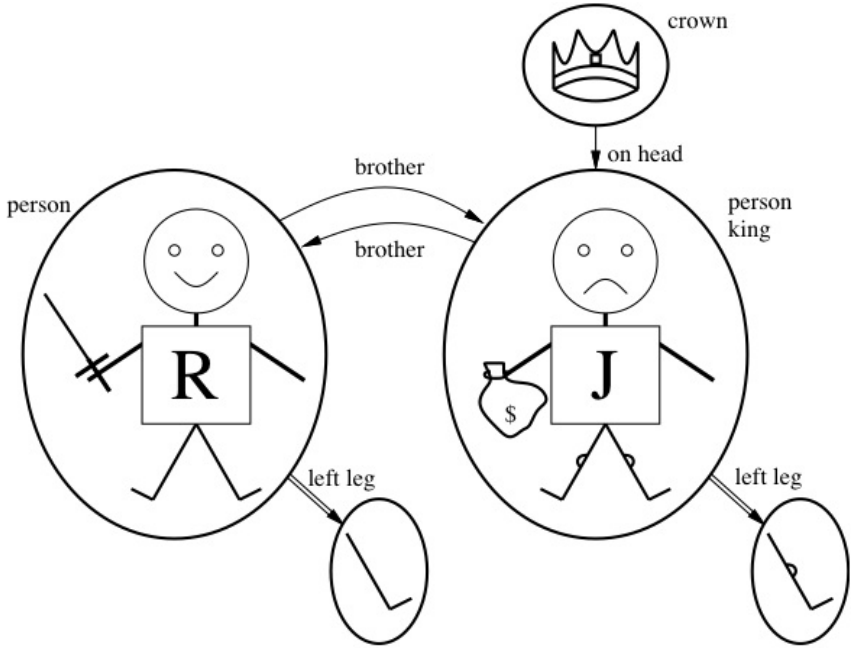
Six disciplines of AI

- natural language processing
- knowledge representation
- automated reasoning
- machine learning
- computer vision
- robotics

Thinking rationally

Logical reasoning

- logical operation
- computation complexity
- fuzzy and uncertainty



Logic relation - P291 in Textbook

Acting rationally

Maximize the expected utility

- objectives
- optimization
- rational agent
- depend on problem modeling

Relations with other fields

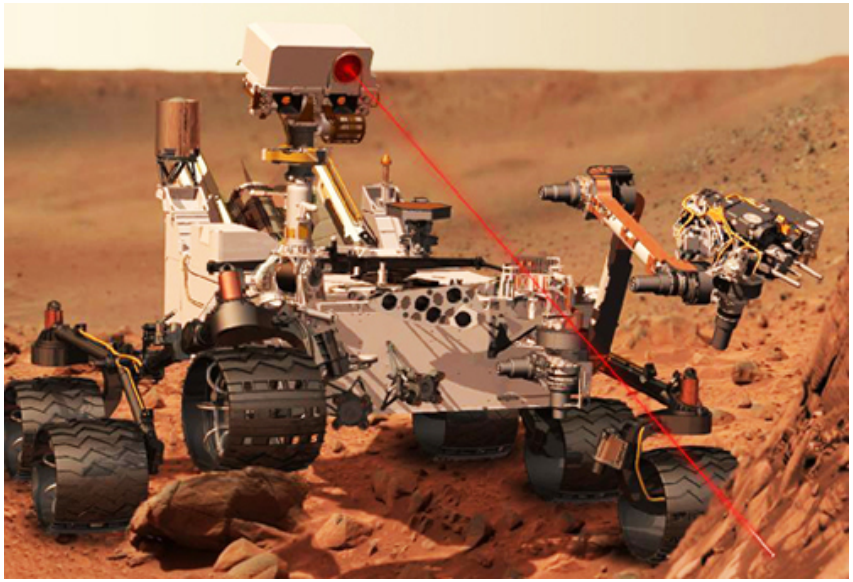
- Philosophy
- Mathematics
- Economics
- Neuroscience
- Psychology
- Computer engineering
- Control theory and cybernetics
- Linguistic

Outline

AI in Computer Science

Robotics

PR2

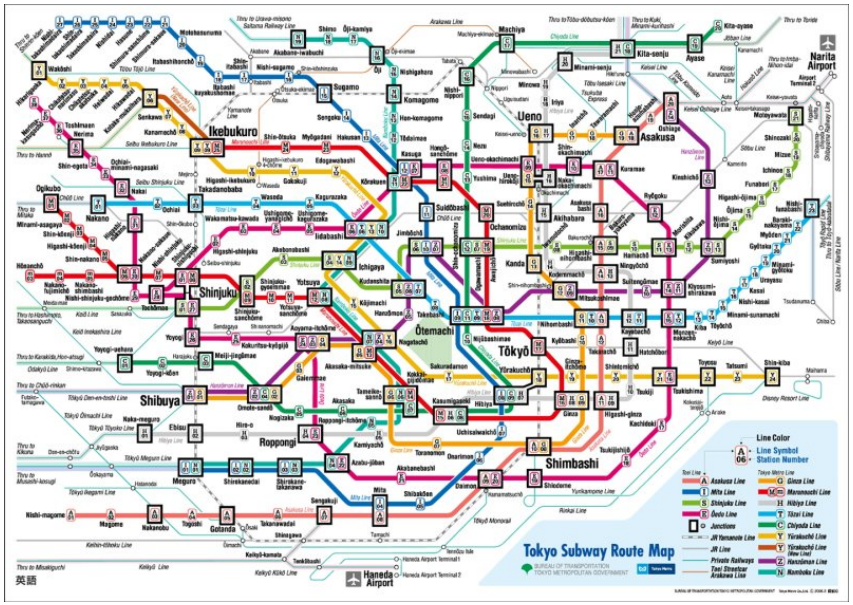


Curiosity

AI in Computer Science

Planning and scheduling

Process optimization



Vehicle scheduling

AI in Computer Science

Game

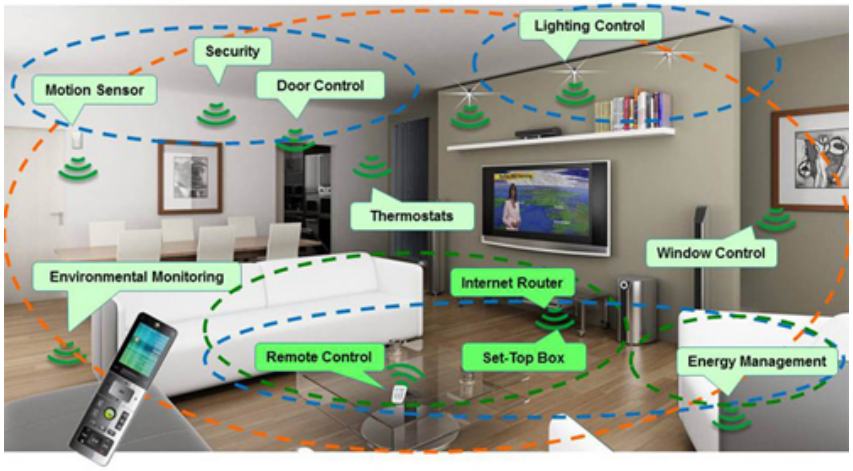
Video game

Robot chess

AI in Computer Science

Data mining

Social network



Home living pattern

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Natural language communication

Jibo

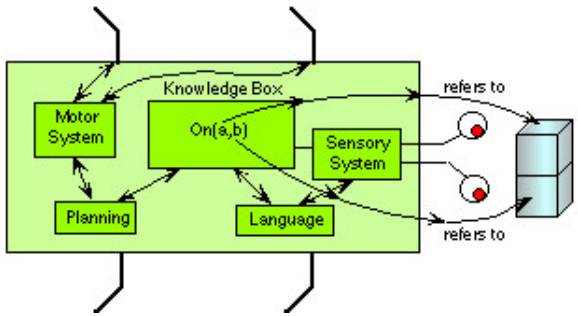
Siri

Outline

History of AI

Symbolic AI $(1956 -)$

- logic + operation
- knowledge representation
- expert systems

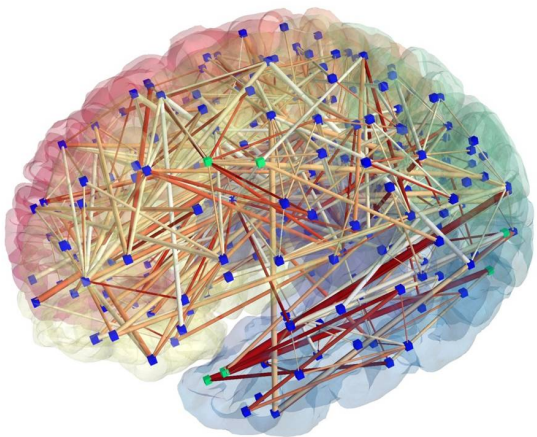


Expert system

History of AI

Connectionism $(1962 -)$

- perceptron + Hebbian learning
- artificial neural network
- deep network structure
- spiking neural network

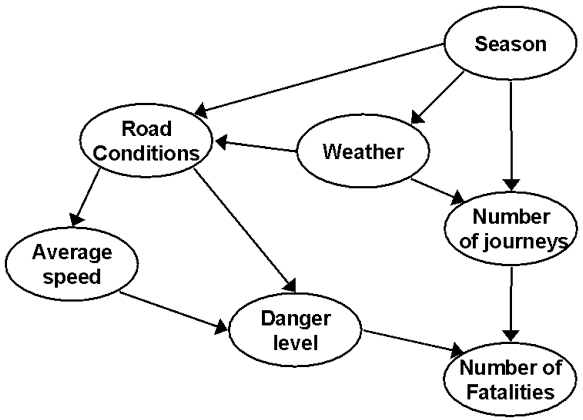


Neural network

History of AI

Statistical (1987 -)

- priori + posteriori + likelihood
- graphical model
- inference (statistical interpretation)



Graphical model

Outline

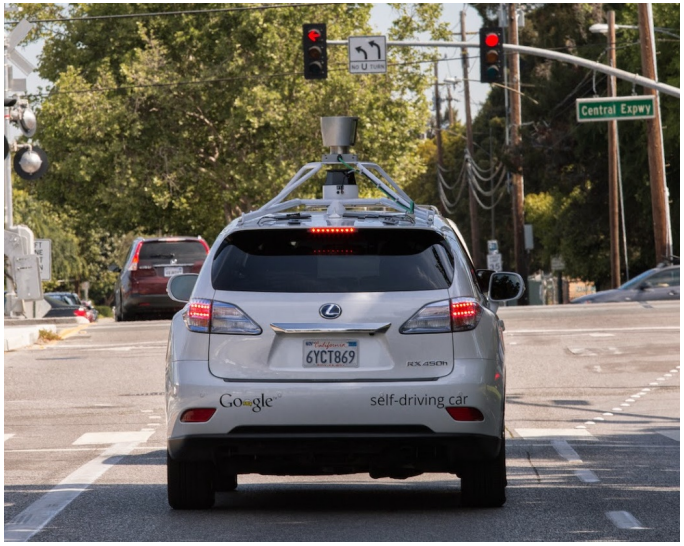
Topics in CS470

Agent

- Potential field
- P(I)D control

Application

- Control system
- Machine learning
- Computer vision



Google driveless car

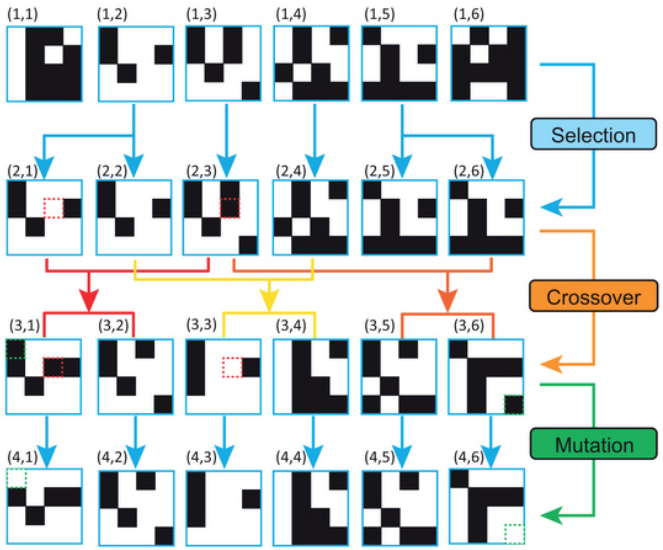
Topics in CS470

Optimization

- Informed search
- Genetic algorithm

Application

- Scheduling optimization
- Machine learning
- Computer vision



Genetic algorithm

Topics in CS470

Bayesian inference

- Naive Bayes
- Bayesian network

Application

- Machine learning
- Natural language processing
- Image understanding

Detecting spam

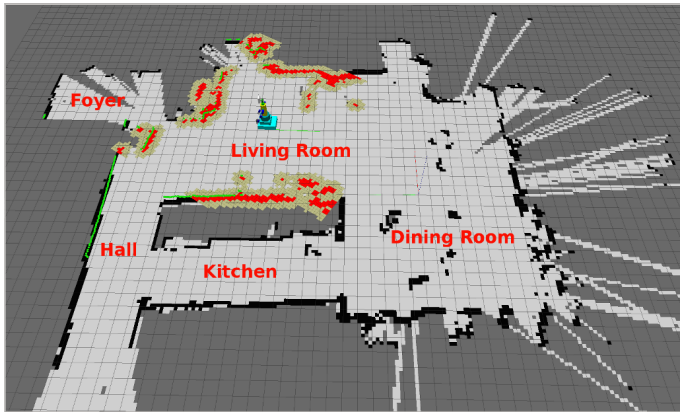
Topics in CS470

Bayesian filter

- Grid filter
- Kalman filter

Application

- Machine learning
- Localization and navigation



Simultaneous localization and mapping

Topics in CS470

Game

- Decision and utilities
- Q-Learning

Application

- Machine learning
- Game theory

Boston dynamic - Little dog

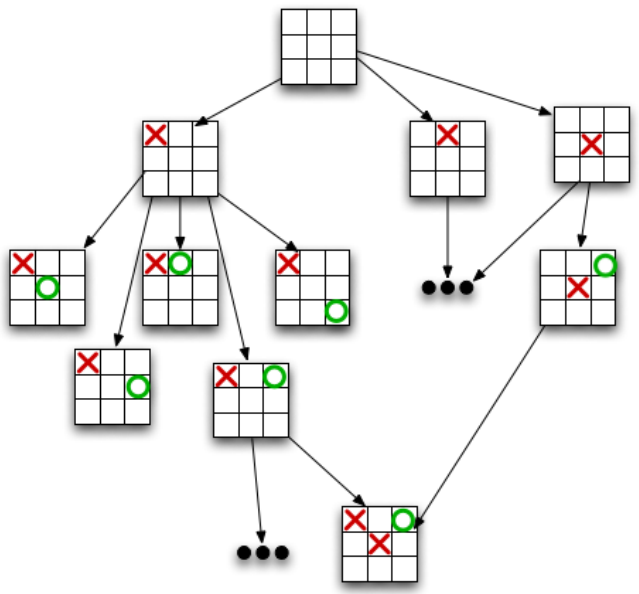
Topics in CS470

Search

- Uninformed search
- Alpha-beta pruning

Application

- Scheduling and planning
- Game theory



Tic Tac Toe