
BOAS VINDAS | WELCOME | BIENVENIDAS
TDC FUTURE
O PAPEL DA TECNOLOGIA NA
CONSTRUÇÃO DO AMANHÃ
TECHNOLOGY CREATING TOMORROW
#thedevconf

Autonomous Robots with Deep Learning, Natural Language and Logic

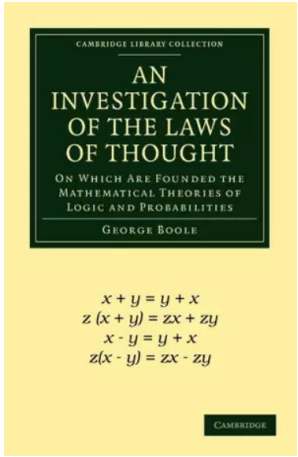
Let's change the world!

Autonomous Robots with Deep Learning, Natural Language and Logic

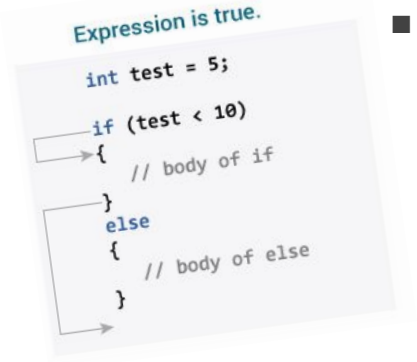
About me... Hobbert Evergreen or Bob (linkedin)

- CEO at EverThink, a StartUP of Smart Robots
- YouTuber at "Inteligência Mil Grau" channel
- Graduated in Psychology at the University of São Paulo (USP)
- Post graduated in Automation Engineering
- Worked with Robotics and Artificial Intelligence since 2012 as a researcher in a Innovation Institute

Interests



- Psychologist studying intelligence
- Connections between AI and Psychology
  - Coincidences
    - If-Else looks similar to our way of thinking
    - George Boole was researching human intelligence when he created his logic
      - * An Investigation of the Laws of Thought on Which are Founded the Mathematical Theories of Logic and Probabilities - 1984



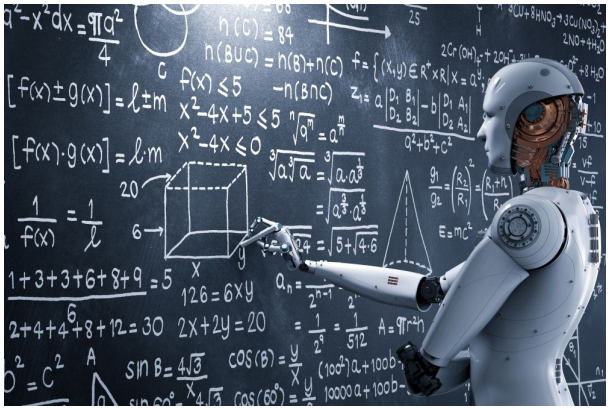
Interests

Real desire to understand our human intelligence in details!

Build a machine able to think!

Atlas from Boston Dynamics

Personal Mission



- Research Strong AI
- Encourage Strong AI around the World
- Participate Globally with others Researchers
- Encourage self-knowledge
- Encourage a happy life, intense, full of meaning
- Encourage a dreamy life

We are not dreaming alone

COMMUNITY OF RESEARCH

Embodied Intelligence Community of Research

Our goal is to understand the nature of intelligent behavior in the physical world, through the study of human intelligence and the design and implementation of intelligent robots.

Lead Ted Adelson

+13

RESEARCH GROUP

Learning and Intelligent Systems

We conduct interdisciplinary research aimed at discovering the principles underlying the design of artificially intelligent robots.

Lead Leslie Kaelbling, Tomas Lozano-Perez

+4

RESEARCH GROUP

Distributed Robotics Laboratory

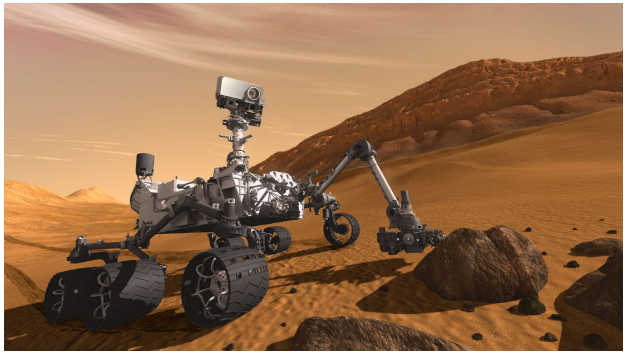
We aim to develop the science of autonomy toward a future with robots and AI systems integrated into everyday life, supporting people with cognitive and physical tasks.

Lead Daniela Rus

+8

What do you expect for the future?

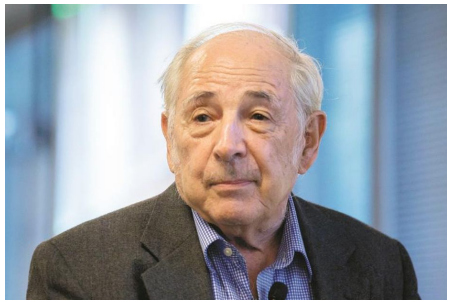
- Intelligent Machines or Intelligents Humanoid Robots?
- Artificial intelligence replacing the human being and us with all the free time in the world or a co-participation
- War between human and IA or a collaborative way?



Can a machine think?

John Searle like answer

- First, we need to understand how the Intelligence happens!
- After, maybe, we can build one!



Robotics Challenges

First

When we play a game using deep reinforcement, we have the score to evaluate performance and the pixels of the screen to create our world

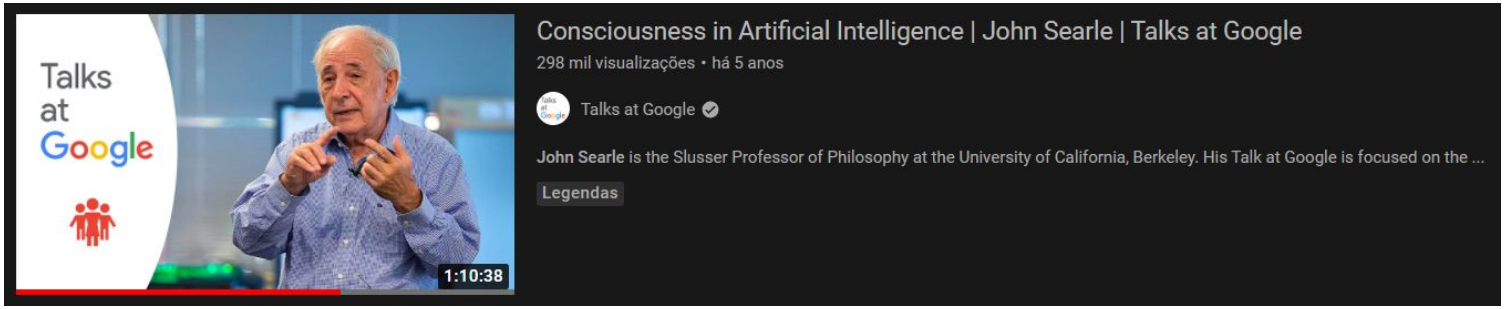
How do you imagine our life score to optimize? We have one?

That score is absolute to everyone or relative?

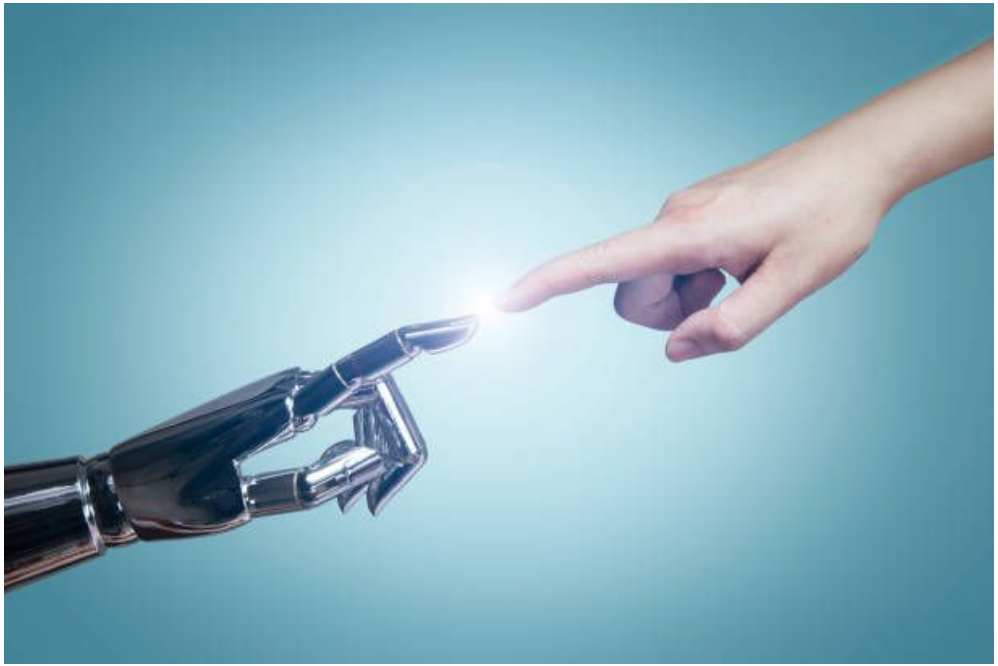
Consciousness

- Chinese Room Argument (John Searle)
  - Just manipulate symbols
  - Machines are syntactical, not semantics
  - Calculator don´t understand what a sum is like us

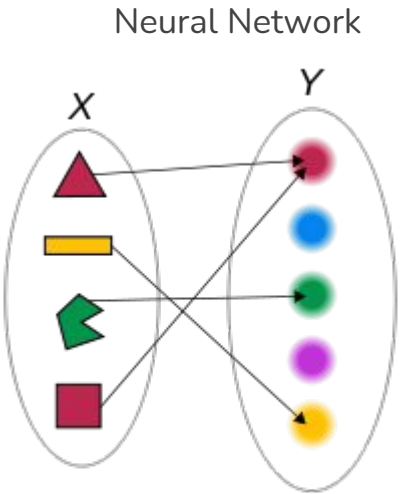
https://www.youtube.com/watch?v=rHKwIYsPXLg

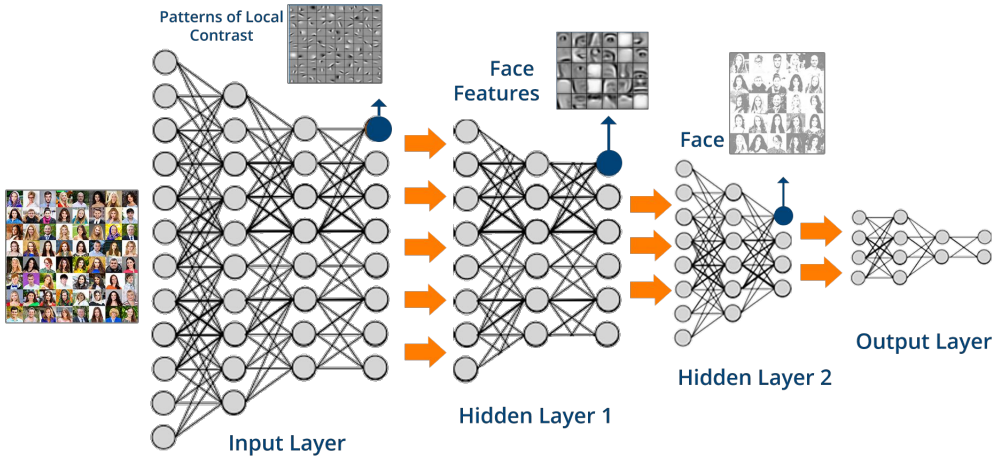


How far we are?



Functions Models



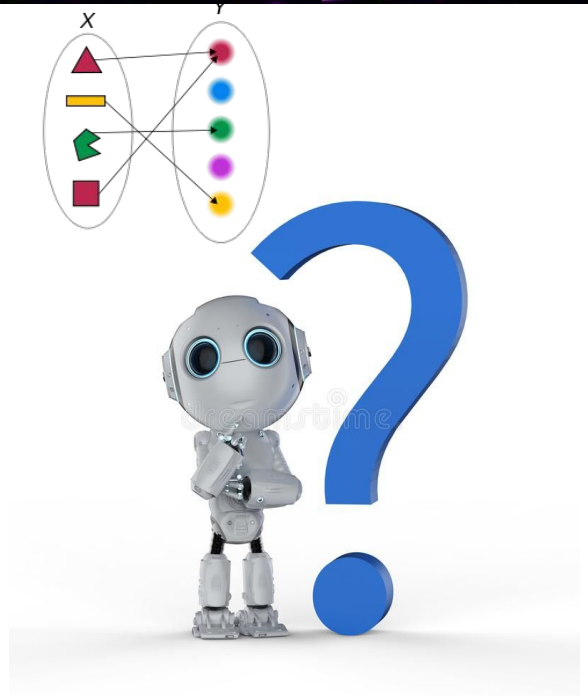


The AI based on “functions”

Our intelligence are a simple connection between sets?

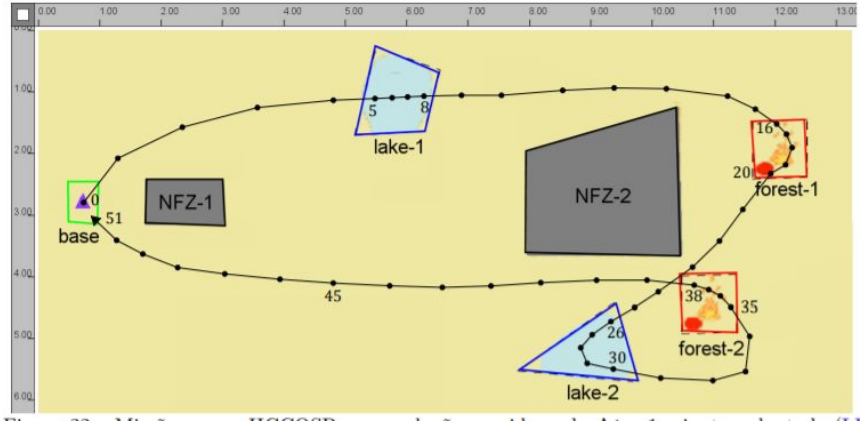
How to think about something if our thoughts are just a “function”?

We can evaluate some possibilities using a “function”?



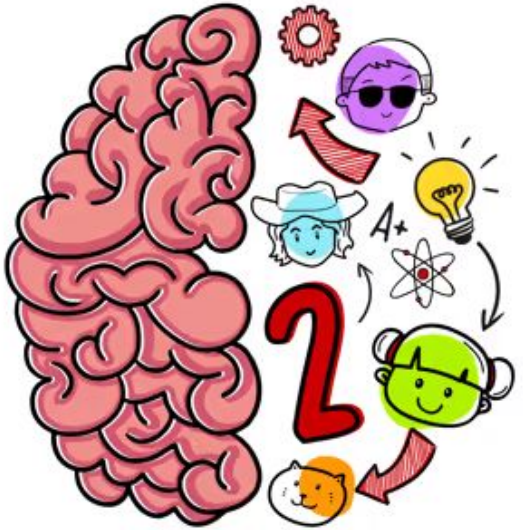
An example solution for AI for drones

- Be guided by goals
- MIT (https://www.csail.mit.edu/research/cognitive-ai#projects)
- Use NLP
- Solver
- Computer Vision



AI Approaches

- Human like intelligence based on:
  - biology
  - chemistry
  - nanotechnology
  - psychology
  - philosophy
- Intelligence as a process
  - machine learning



Intelligence and Intelligent

Intelligence is something someone can have

Intelligent is something relative to a solution

Robotics Challenges

Second

Intelligence presumes consciousness?

Intelligence can exist without someone?

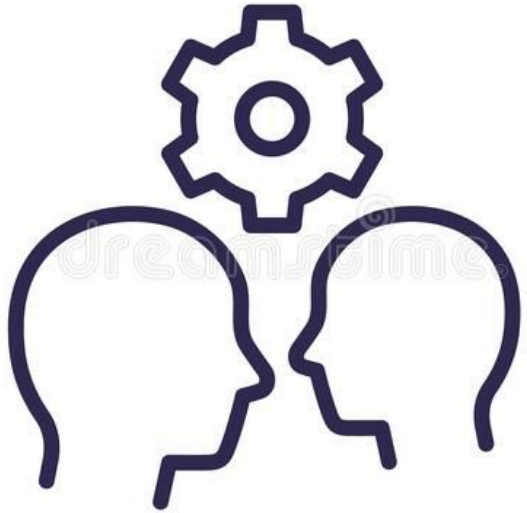
Do we need to find consciousness to put into our robots so they can finally think?

AI Models

- Lots of weak AIs to correspond to an Strong
- Build an one and simples Strong AI (Brain)
- AGI - Artificial General Intelligence
  - Deep Reinforcement with Multi-Agents?

Intelligent Robotics Challenge

- Human Interaction
    - Truly Language Comprehension
    - Complex Long Term Goals
    - Complex Decision Making
    - Self-Living Learning



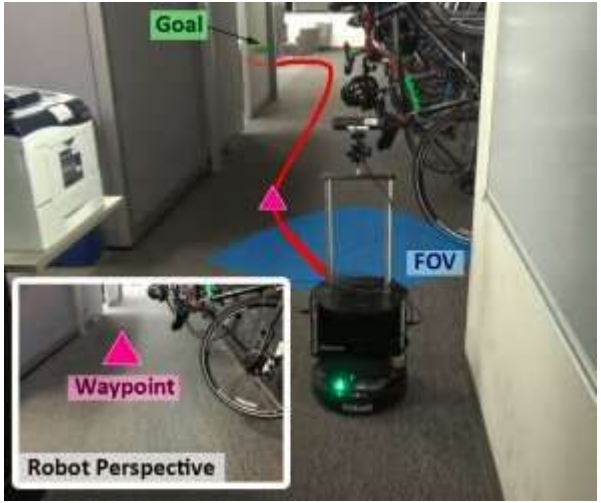
Combining Models

Maths to navigate with a Robot

Deep Learning for object detection

TTS do understand words

NLP to understand Goals



Intelligence versus useful stupidity

We can teach a dog to do something

we can teach a computer to extract emotion from a text...

The dog is smarter, but the computer may be more useful?

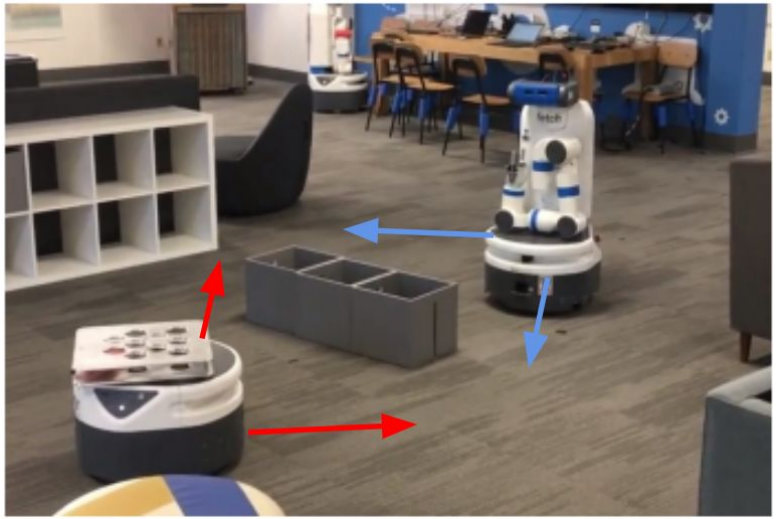
Who matters if a autonomous car have consciousness?

Combining Models

Deep Neural to recognize Objects

Reinforcement Learning to define actions on World

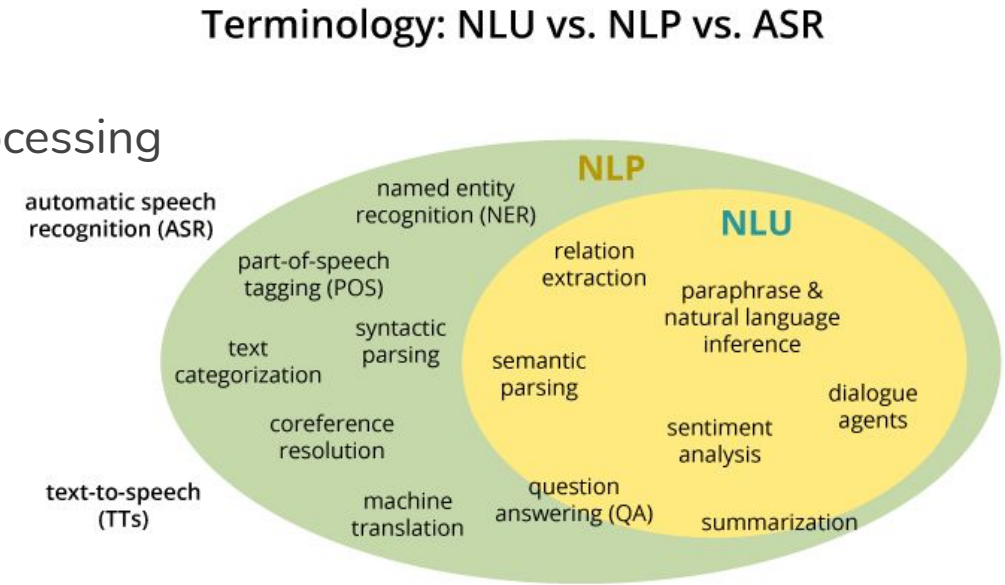
Multi-Agent to communicate



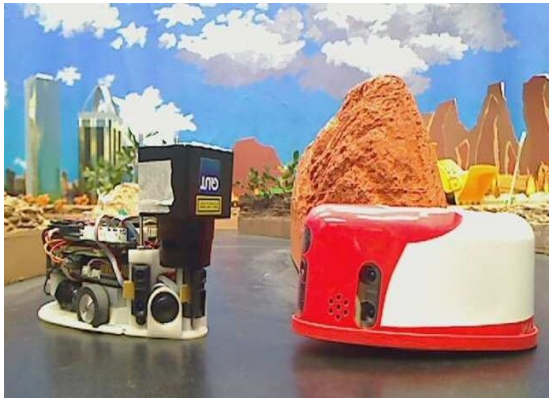
https://ai.googleblog.com/2021/04/model-based-rl-for-decentralized-multi.html

Language and Logic

- TTS
- Natural Language Processing
- LISP
- Prolog



Multi-Agent



Agent Speak (Prolog)

Logic and Reasoning

Comunication

LingoDroids https://www.youtube.com/watch?v=E6YZ_qnZsjg

Pay Attention

When we talk about strong AI
We are not talking about something a professor can teach
Or a neuroscientist can explain
Or a psychologist knows what is about
Talking about strong AI is something like a researcher looking for the unknown
To create a truly AI can bring us a real big change in the world
And to ourselves

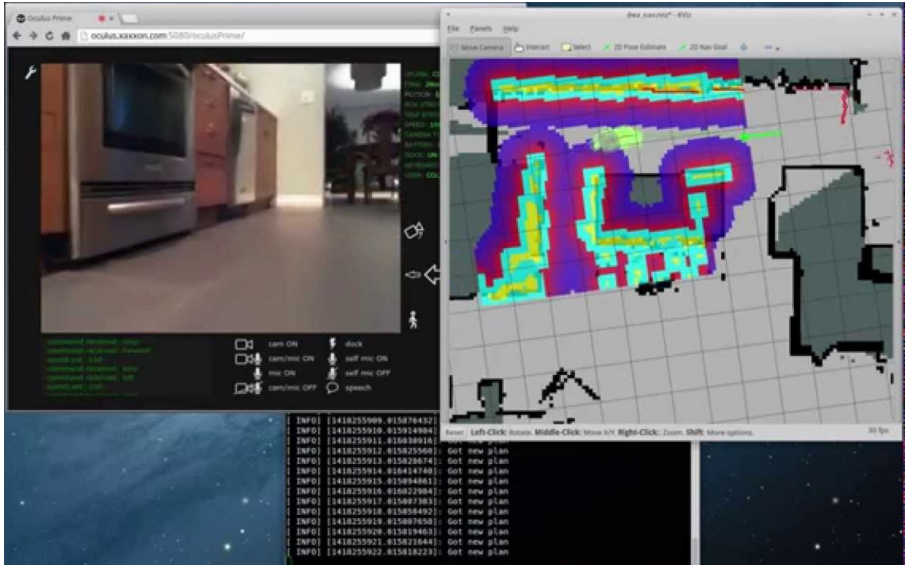
Is not about get a new job
Maybe we are talking about not have a job anymore
And find another goals to our lives

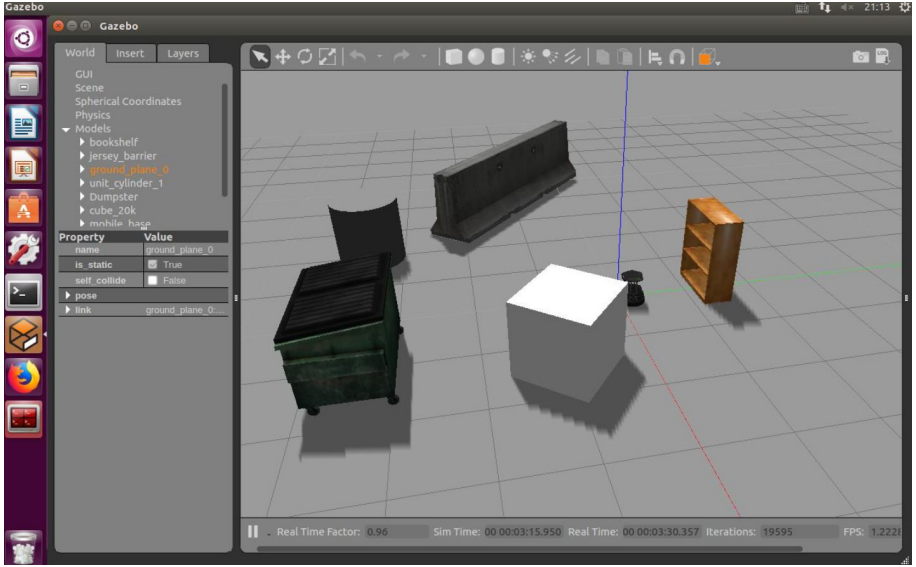
ROS

WHY ROS? GETTING STARTED COMMUNITY ECOSYSTEM

ROS - Robot Operating System

The Robot Operating System (ROS) is a set of software libraries and tools that help you build robot applications. From drivers to state-of-the-art algorithms, and with powerful developer tools, ROS has what you need for your next robotics project. And it's all open source.





Linux friendly... C++ native and Python portability

No excuses to not start build robots today!!

ros.org

Get ROS Noetic Ninjemys on Ubuntu Linux

(Recommended for Latest ROS 1 LTS)

Install

Get ROS Foxy Fitzroy on Ubuntu Linux, macOS, or Windows 10

(Recommended for Latest ROS 2 LTS)

Install

Get ROS Galactic Gechelone on Ubuntu Linux, macOS, or Windows 10

(Recommended for Latest ROS 2)

Install

Challenges

Sometimes we learn through repetition

And other times using logic and reasoning

But there is a kind of event that we can solve that will occur just one time in life

And you need to use logic and think about this event

For months or years, maybe

We have to keep this in mind

Prototyping Robotics, Maths and Electronics

Prototype with raspberry pi

- Wifi
- GPS

Camera for vision

Kalman filter for navigation

No excuses to not start build robots today AGAIN!!

AI for Games and Robots

Games can be a simplified version of the world

Games have scores

We can test algorithms against humans

Performance must be in real time

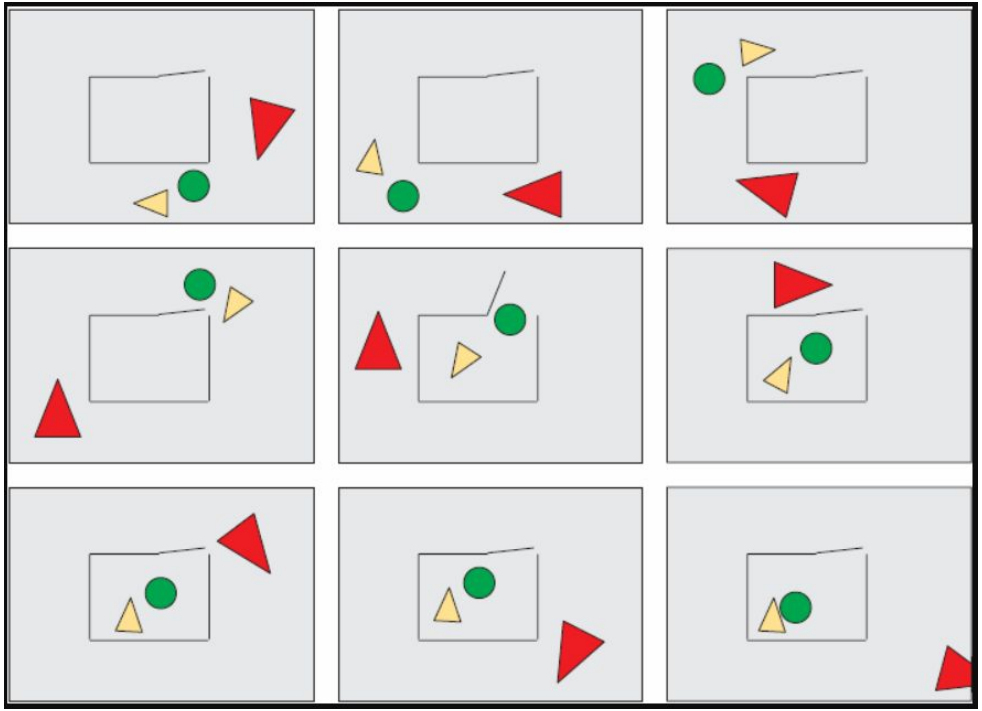
Images are stable without light variation

Perception and Abstraction

Heider and Simmel

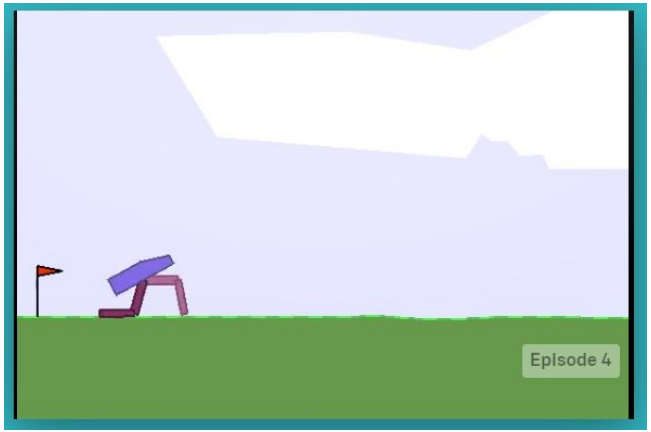
How much of our understanding needs a real object to create emotions and an history?

We can easily build a detector for every part in this image, but we can tell a history?



AI Models

- - Based on Maths and Logics
  - Fuzzy Logic
  - Probabilistic Reasoning
- - Based on Life
  - - Rat SLAM - Animals
  - - Genetic Algorithm - Biology - Nature
  - - Reinforcement Learning - Psychology
  - - Neural Networks - Biology - Neuroscience



https://gym.openai.com/

AI advances

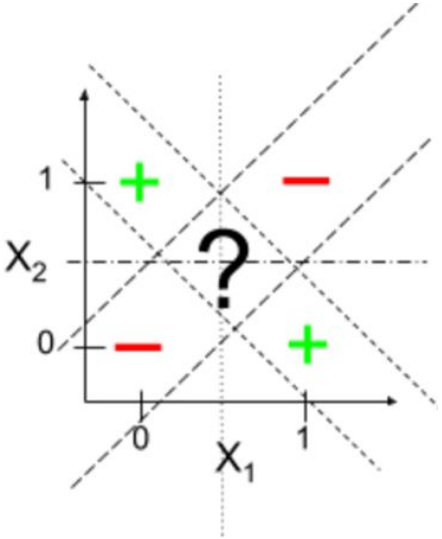
Pay attention

Sometimes AI just improve performance, but keeps the same concept

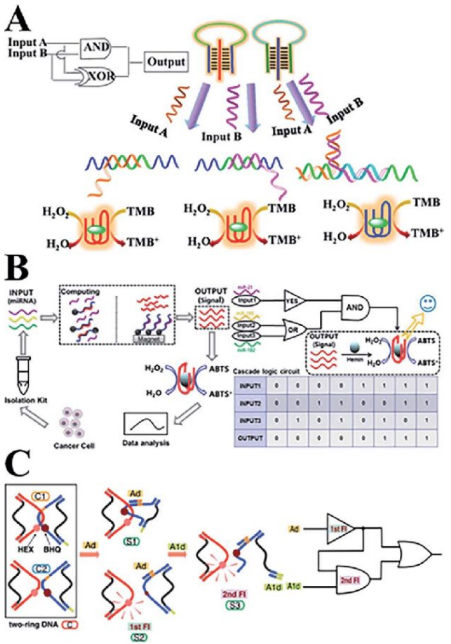
Sometimes it means to be faster and nothing more

But sometimes, nothing more is everything

And sometimes we need to change our point of view



NanoTech - Hybrid models



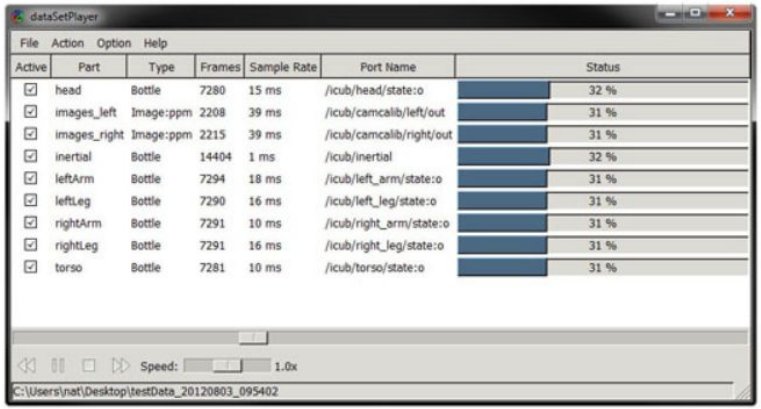
SCIENCE —

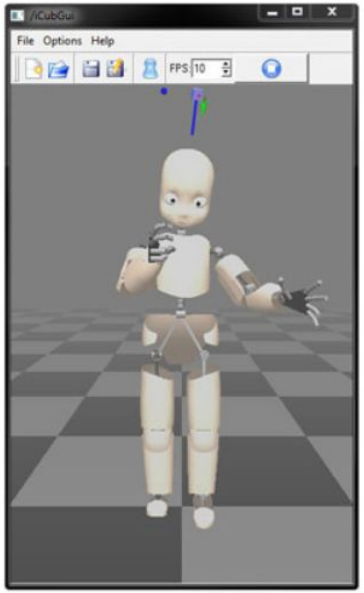
DNA-based logic gates operate inside cockroach cells

The logic units are driven by molecular collisions, not voltage.

ICUB

https://icub.iit.it/





No excuses to not start build robots today, AGAIN, AGAIN!!

Intelligent Robotics

this is not a new world

is the same world

with a new comprehension

Bonus Slide - Psychological issues

building a society with autonomous machines will involve intense psychological changes

What humans will do without job? (7 Billion Humans - Game Dilema)

New Objectives?