

November 15th, 2018

Facebook AI Research

Armand Joulin, FAIR Paris

facebook
Artificial Intelligence Research

Facebook AI Research

- fundamental, open and collaborative research
- **160+ people:** 80/60/20 scientists/engineers/students



A light blue map of the world showing the locations of Facebook AI Research offices. The locations are marked with small white circles and labeled with text. The locations are: Seattle, Menlo Park, Pittsburgh, Montreal, New York, London, Paris, and Tel Aviv.

Seattle ○
Menlo Park ○
Pittsburgh ○
Montreal ○
New York ○
London ○
Paris ○
Tel Aviv ○

Our mission

advancing the state-of-the-art in artificial intelligence
through open research for the benefit of all

facebook.ai / developers

VISION

Detectron

DensePose

DeepMask

House3D

ResNetXt 3D

WSL

LANGUAGE

FastText

VoiceLoop

ParlAI

Wav2letter

Translate

MUSE

REASONING

DrQA

ELF Reinforcement Learning

bAbi

MemNets

StarCraft

CommNet

TOOLS

FAISS

Tensor Comprehensions

TorchMPI

Visdom

StarSpace

Glow

PERCEPTION



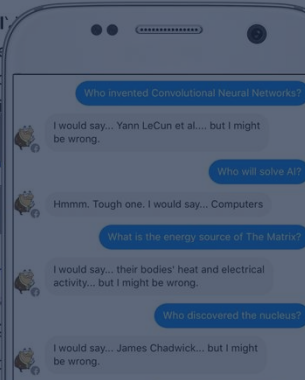
UNDERSTANDING & LEARNING

Artificial intelligence

From Wikipedia, the free encyclopedia

"AI" redirects here. For other uses, see AI and Artificial intelligence.

Artificial intelligence (AI) is the study of how to make machines that can perform tasks that would normally require human intelligence. AI research defines itself as the study of how to make machines that can perform tasks that would normally require human intelligence. Colloquially, the term "artificial intelligence" refers to functions that humans ascribe to machines, such as solving problems, learning from experience, and understanding natural language. AI research has been successful in developing machines that can perform tasks such as playing chess, recognizing speech, and understanding natural language. AI research is divided into two main branches: symbolic AI and connectionist AI.



PREDICTION



PLANNING



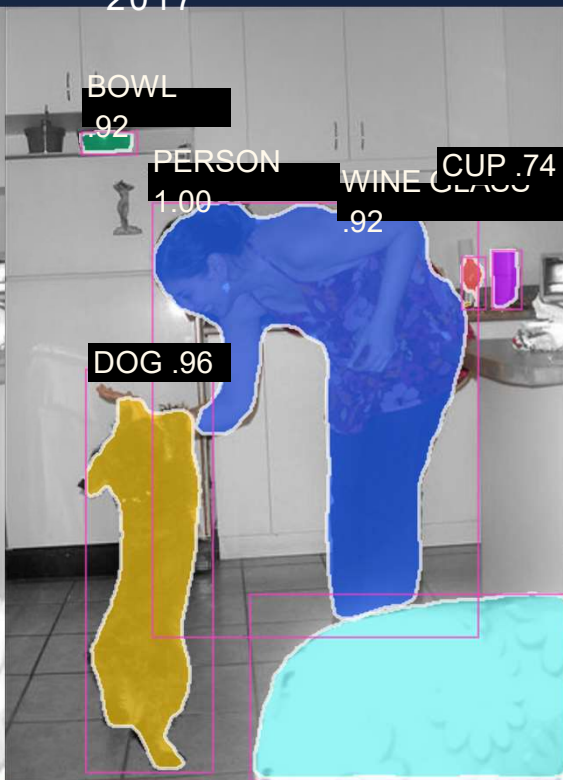
ALEXNET | 2012



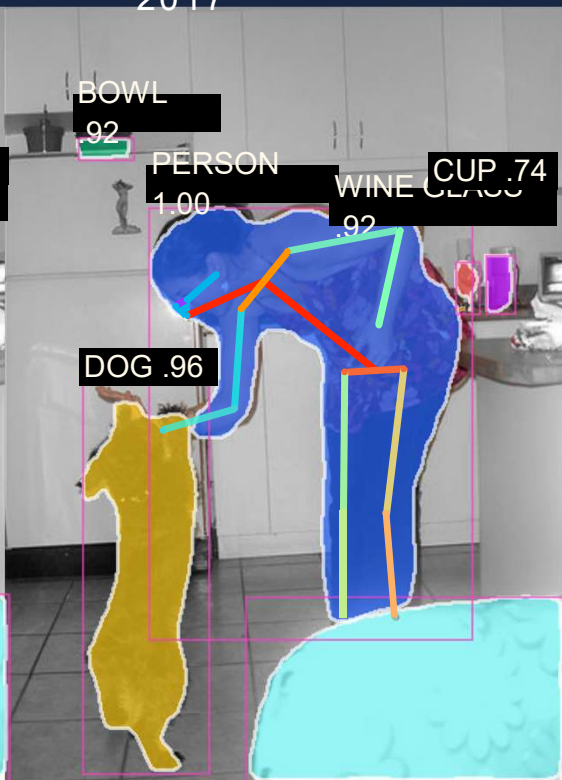
MSRA_2015 | 2015



MASK R-CNN | 2017



MASK R-CNN | 2017



He et al. | 2017

DensePose



training set



Food



Tea



Dog



Landmark

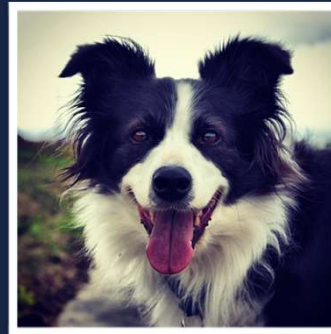
test set



?



Tea



Dog



?



#instastyle

#pet

#lovepuppies

#mypet

#cat

#animals

#cloudyday

#wander

#shotoftheday

#awesome

#iloveny

#pets

#instacat

#catlove

#sketch

#dogstagram

#nyc

#ilovenyc

#dogstagram

#adorable

#meow

#cloud

#white

#city

#lovedogs

#newyork

#puppy

#usa

#kittens

#beautiful

#jade

#lovepuppies

#birds

#newyorkcity

#catofinstagram

#instapet

#dog

#selfie

#hound

#followme

#us

#newyorkcityfeelings

#doggo

#cutecat

#pretty

#doglover

#snow

#america

#instagood

#wander

#ilovenewyorkcity

#instadog

#cutedogs

#instakitty

#tbt

#ny

#manhattan

#travel

#mynyc

#sand

#pup

#green

#cute

#food

#puppylove

#puppyoftheday

#lifestyle

#puppyoftheday

#libertyisland

#catlover

#pic

#doglovers

#nice

#winter

#Instapuppies

#cutedog

#cutecats

#lovedogs

#photographers

#cateyes

#doggylove

#instapuppy

#photo

#picture

#tree

#peace

#weeklyfluff

#adventure

#dogsofinstagram

#dogstagram

#watercolor

#adorable

#wintertime

#catoftheday

#instadogbreeds

#trees

#photograph

#doggy

#forests

#love

#sky

before



Food

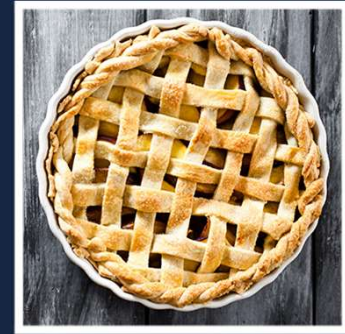


Food

after



Cupcake



Apple Pie



Landmark



???



**Statue of
Liberty**



Taj Mahal

Flower



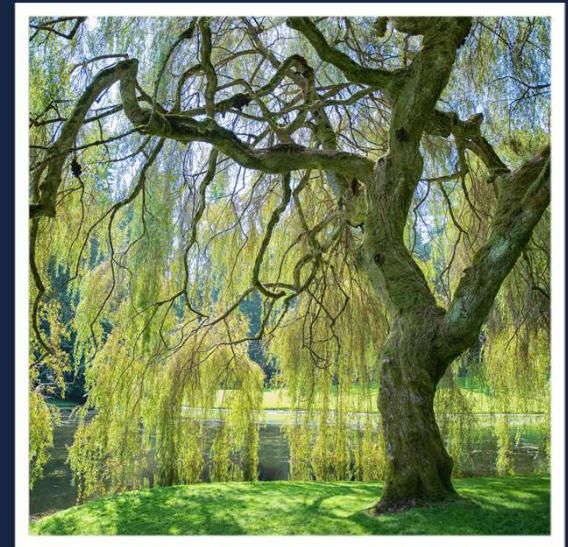
Bird of Paradise
Strelitzia

Bird



Eastern Meadowlark
Snow

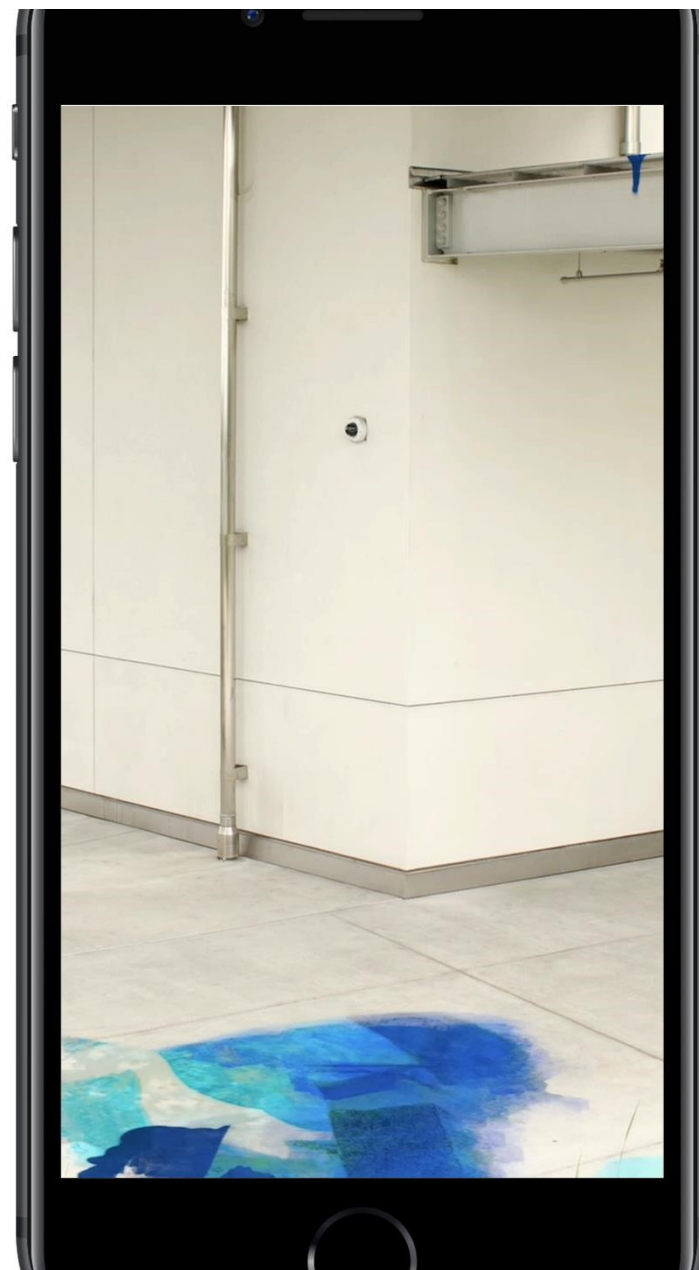
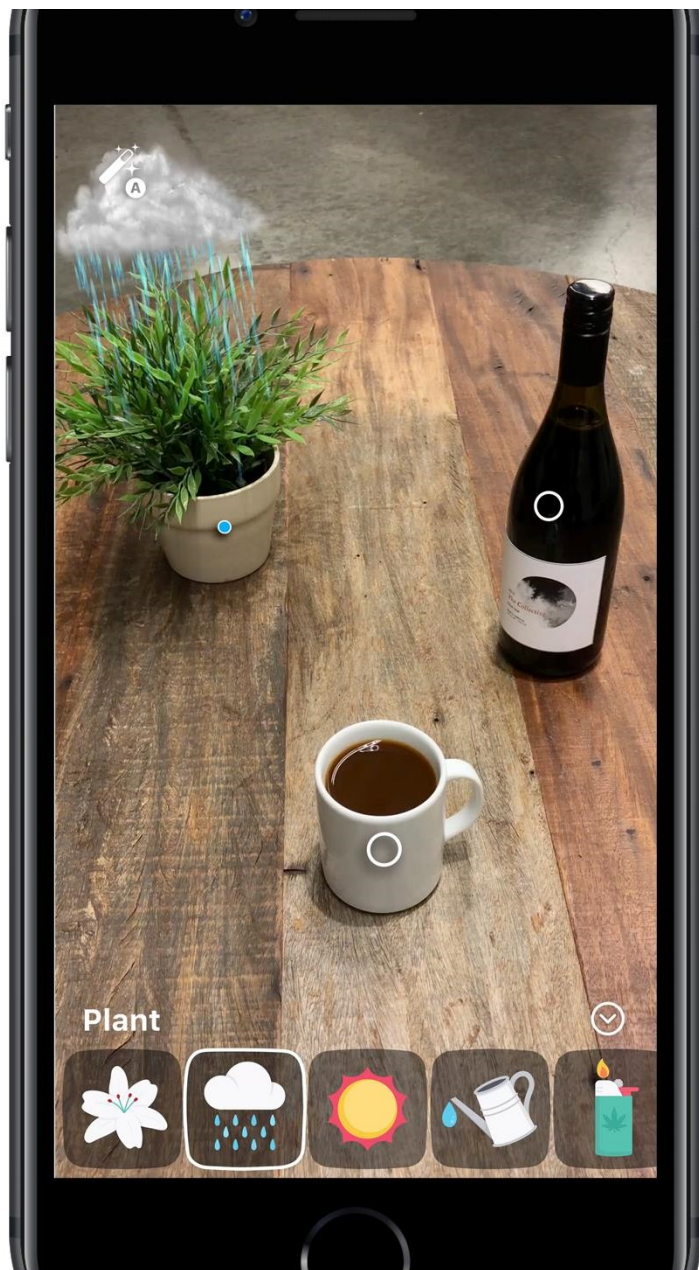
Tree



Willow Tree
Salicaceae

Applications: Augmented and Virtual reality

Facebook Reality labs & AI teams



PERCEPTION

UNDERSTANDING & LEARNING

PREDICTION

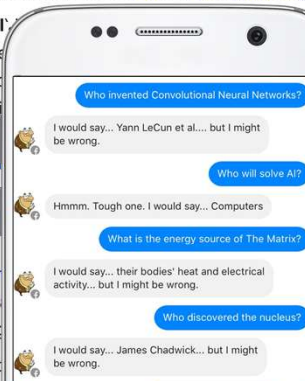
PLANNING

Artificial intelligence

From Wikipedia, the free encyclopedia

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Artificial intelligence (AI) is a branch of AI research defines itself as a machine that operates in a human environment and takes actions to achieve its goals. Colloquially, the term "artificial intelligence" refers to functions that humans are good at solving" (known as **Mach**ine intelligence). Early AI facilities once thought to be **optical character recognition** (OCR) systems, having become a routine part of many systems, successfully **understanding** natural language systems (such as **Chess**), **expert systems**, **neural networks**, and interpreting speech. AI research is divided into



Language
translation

5.95B

translations a day

facebook
Artificial Intelligence Research



Abélia Cocher and 23 others 8 Comments

Like

Comment

Share



Abélia Cocher

Gardez les étagères loin du lit.

1h Like Reply See Translation

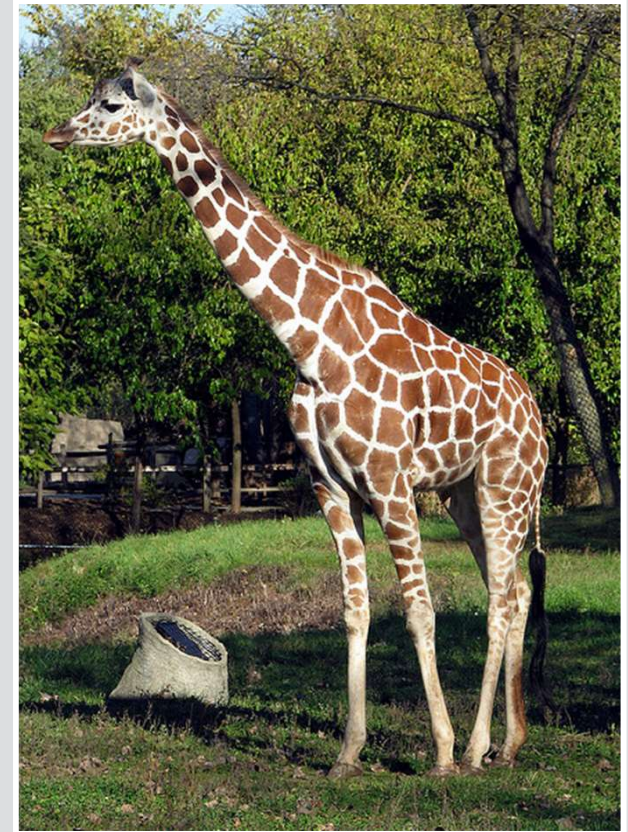
Write a comment...



Image -> caption?



A man riding a wave on a surfboard in the water.



A giraffe standing on the grass next to a tree.

work in progress



An airplane is parked on the tarmac at an airport.



A man riding a motorcycle on a beach.

PERCEPTION



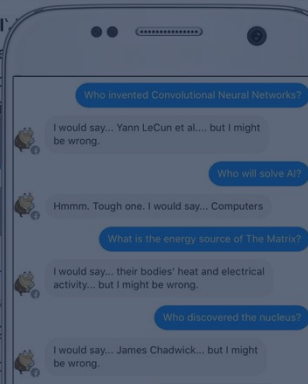
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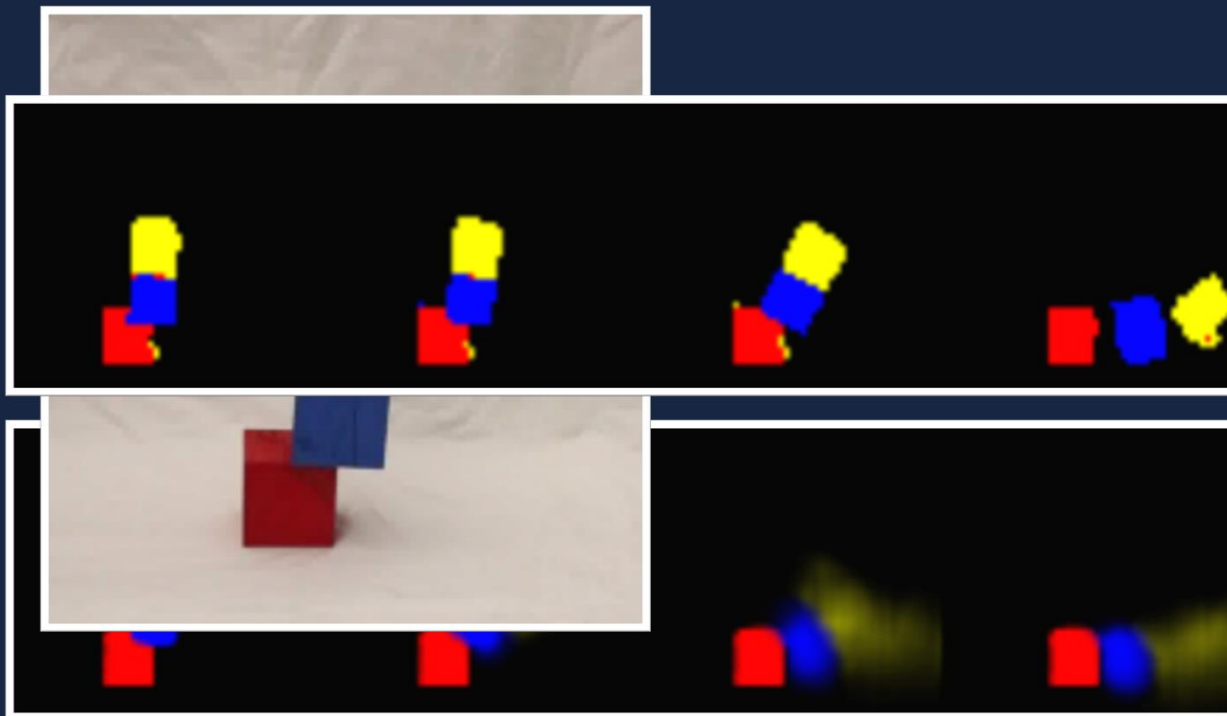
PREDICTION



PLANNING



Learning intuitive physics



Lerer et al. | 2016

predictive learning





input



Barnes et al. |
2009



Darabi et al. |
2012



Huang et al. | 2014



Pathak et al. | 2016



Iizuka et al. |
2017

Learning to predict the future



Mathieu et al. | 2015

Artificial intelligence

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Artificial intelligence (AI) is the study of how to make computers do what humans do. The field of AI research defines itself as the study of how to make computers do what humans do. It is a branch of computer science that deals with the design and development of intelligent machines that can perform tasks that require human intelligence. It is a branch of computer science that deals with the design and development of intelligent machines that can perform tasks that require human intelligence.

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Colloquially, the term "artificial intelligence" is often used to describe functions that humans ascribe to machines, such as "solving" (known as Machine Learning) or "learning" (known as Machine Learning) facilities once thought to be the domain of human intelligence. It is a branch of computer science that deals with the design and development of intelligent machines that can perform tasks that require human intelligence.

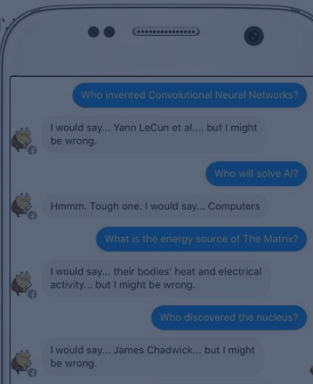
optical character recognition, speech recognition, and machine learning have become a routine part of many computer systems. It is a branch of computer science that deals with the design and development of intelligent machines that can perform tasks that require human intelligence.

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AI research is divided into several subfields, including:

- Machine Learning
- Computer Vision
- Speech Recognition
- Natural Language Processing
- Robotics
- Expert Systems
- Neural Networks
- Genetic Algorithms
- Evolutionary Computation
- Artificial Neural Networks
- Artificial Intelligence

A smartphone screen is shown in the foreground, displaying a chat conversation. The chat bubbles are blue and white, and the text is in a sans-serif font. The conversation is about AI, with one person asking questions and the other providing answers. The background is a solid blue color.

Who invented Convolutional Neural Networks?

I would say... Yann LeCun et al.... but I might be wrong.

Who will solve AI?

Hmmm. Tough one. I would say... Computers

What is the energy source of The Matrix?

I would say... their bodies' heat and electrical activity... but I might be wrong.

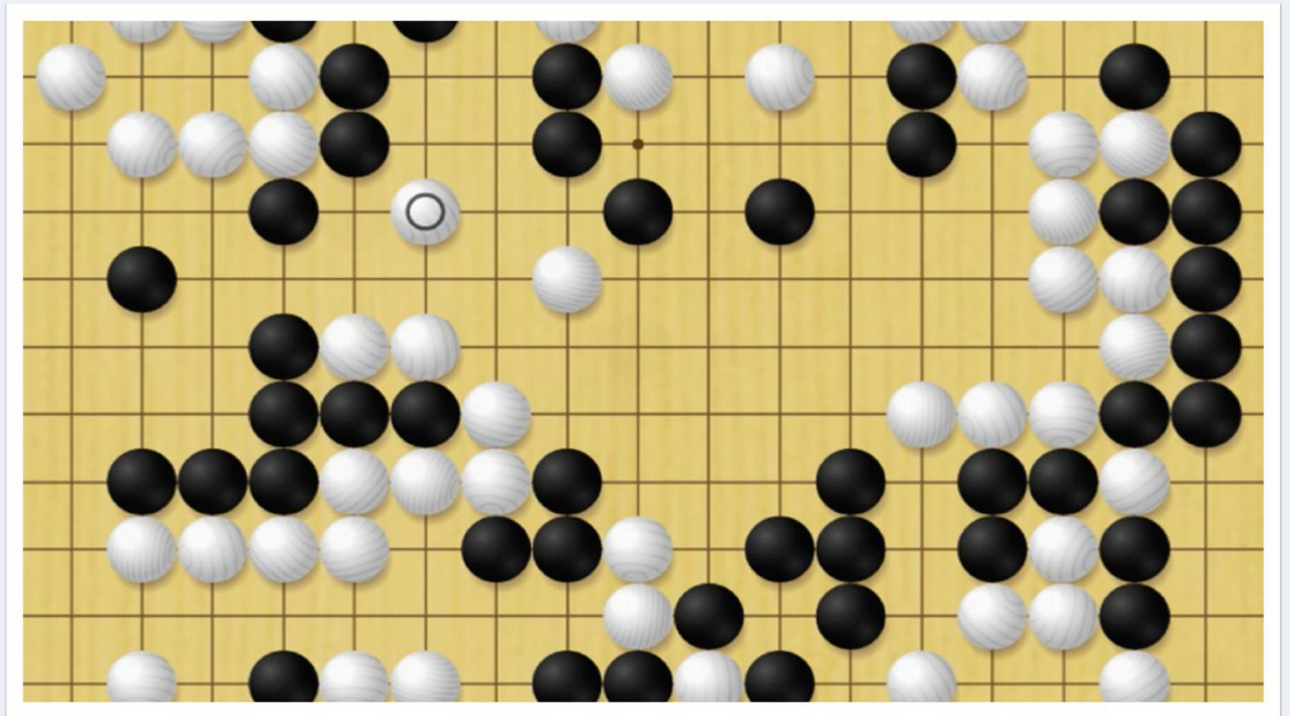
Who discovered the nucleus?

I would say... James Chadwick... but I might be wrong.

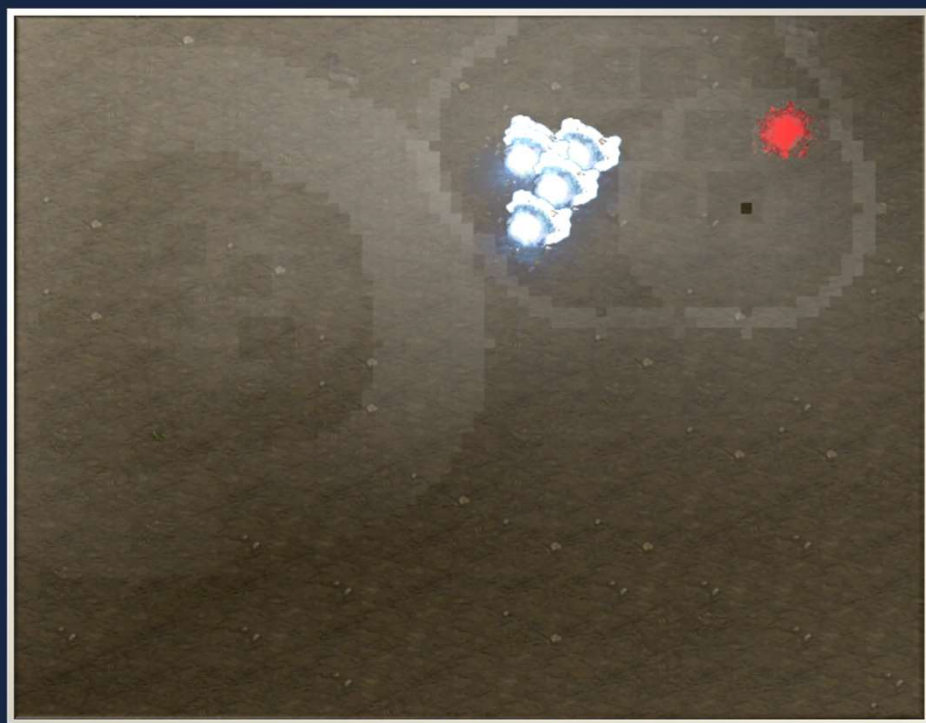
A stylized illustration from a driver's perspective. A yellow car is ahead in the same lane. A bright green arrow curves from the yellow car's lane into the adjacent left lane, indicating a lane change. The road has white dashed lane lines and red crosswalk markings. The background shows green bushes and a blue sky with clouds. The car's rearview mirror and part of the dashboard are visible at the top and bottom of the frame.

Game AI

ELF OpenGo:
open source platform



BEFORE TRAINING



AFTER TRAINING



StarCraft

Towards human-like AI

Learning by interacting with the
physical world

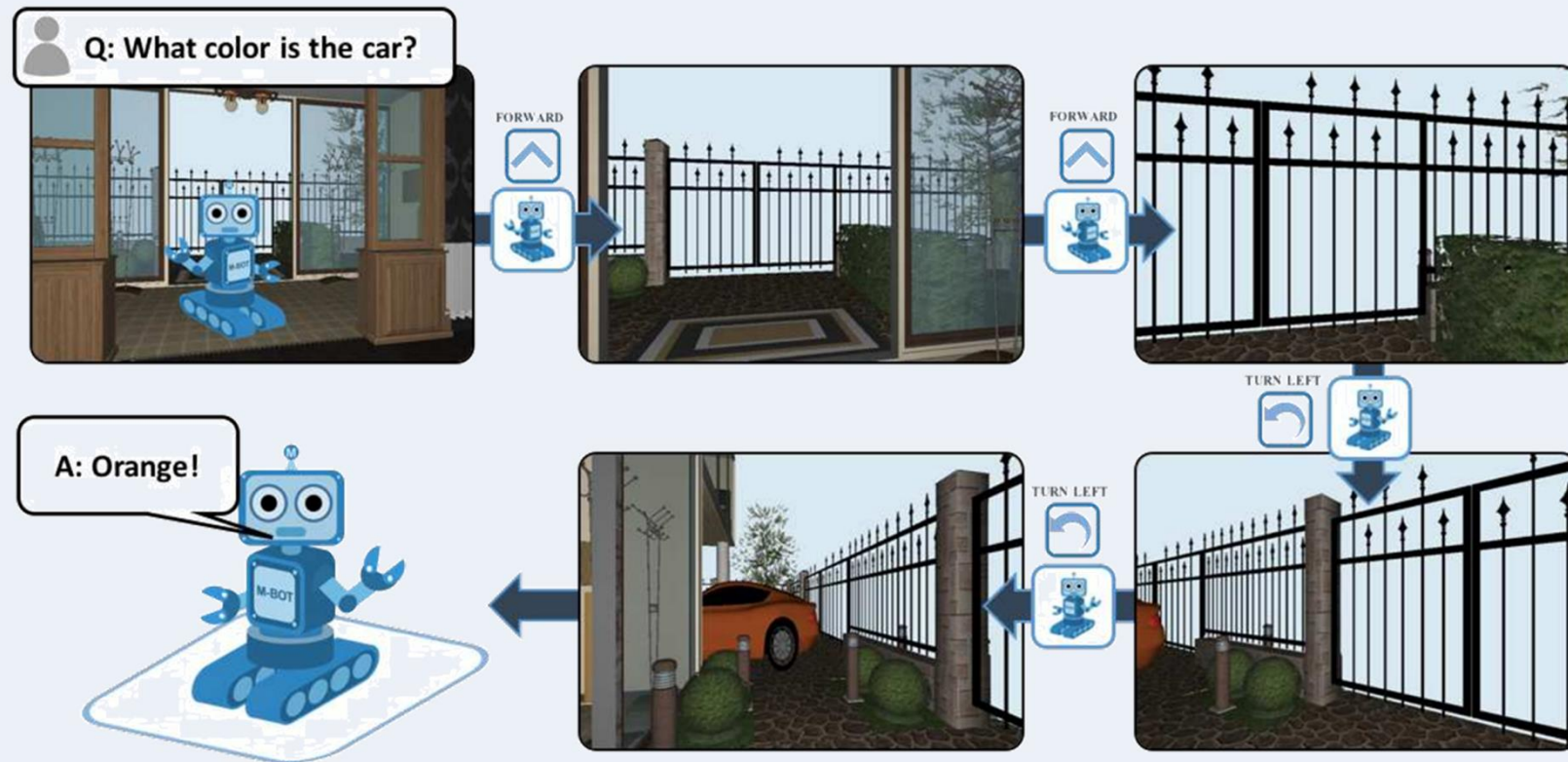


Embodied Agents

Learning by solving tasks in
virtual environments



House 3D: virtual environment for embodied agents



Das et al. | 2018

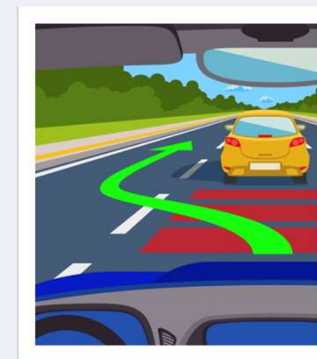
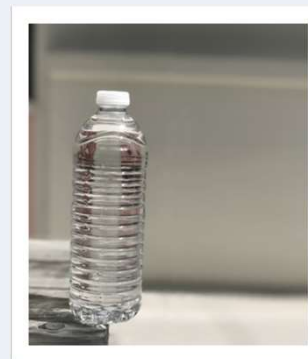
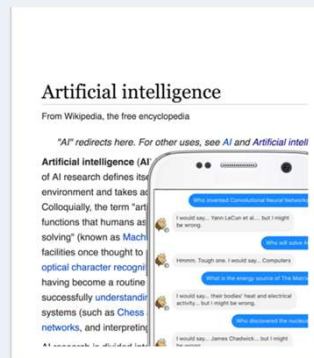
A path toward solving AI?

perception: strong performance on core tasks (cornerstone of AI models)

reasoning: bringing reasoning capabilities to machines

prediction: progressing on predictive / unsupervised learning

planning: investigating how machines could define strategies



Learning to generate new concepts (*Creative AI*)





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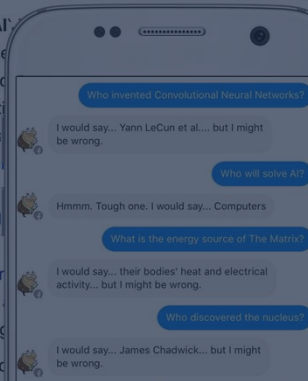
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ARMAND JOULIN– FACEBOOK AI RESEARCH, 2018