بسم الله الرحمن الرحيم

Introduction to Artificial Intelligence

Version 2.0

By Mohammad Mahdi Farahbakhsh

Mehr 1402

Topics:

- Introduction to Artificial intelligence
  - AI approaches
  - Intelligent Agent
  - Turing Test
- Classic AI
- Machine learning
- Artificial Neural Networks
- Deep learning
- Computer Vision

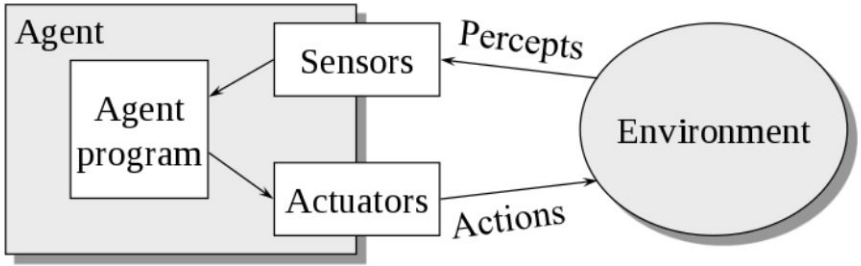
Intro

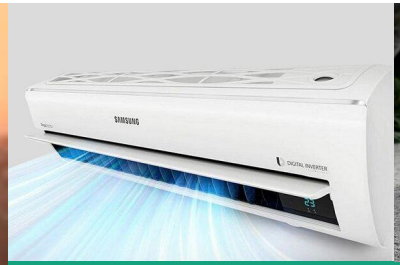
[UU Computer Club 07-24 Presentation Drive]

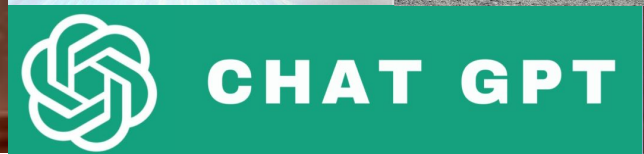
You can access presentation files here!

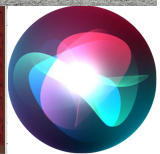
Introduction to Artificial intelligence

Intelligent Agent





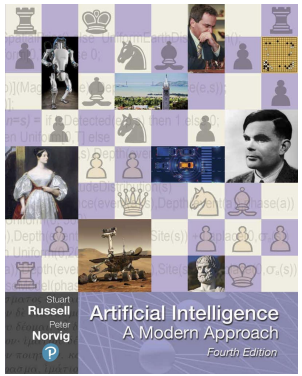




Is this an Agent?

What is AI?(approaches)

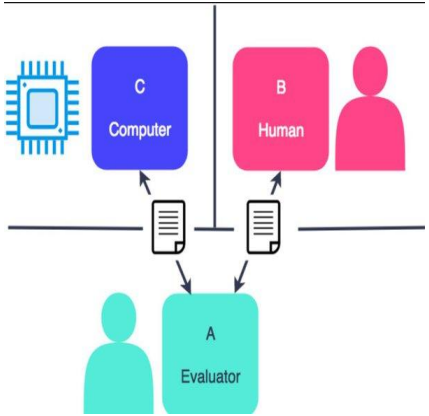
understanding how humans think and make intelligent agents

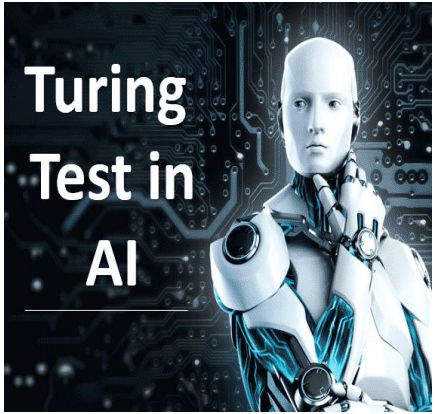


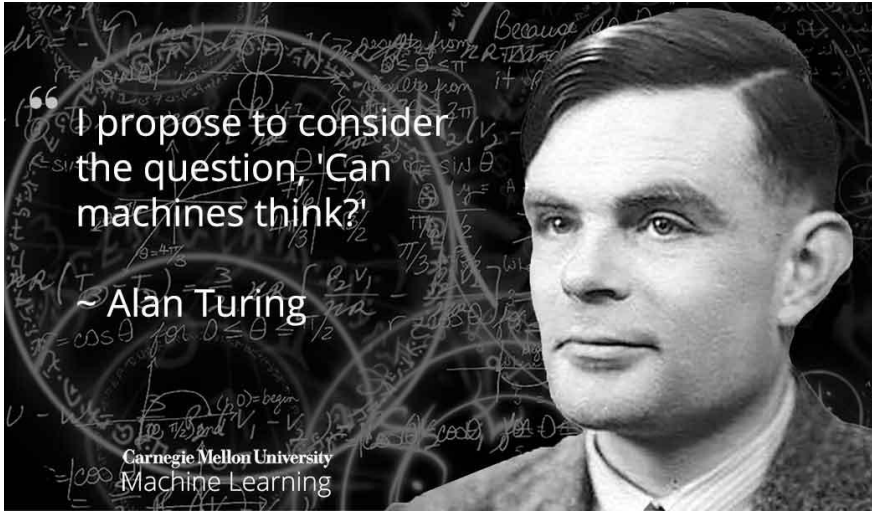
1. Thinking Rationality
2. Thinking Humanity
3. Action Humanity
4. Action Rationality

Action Humanity: Turing Test

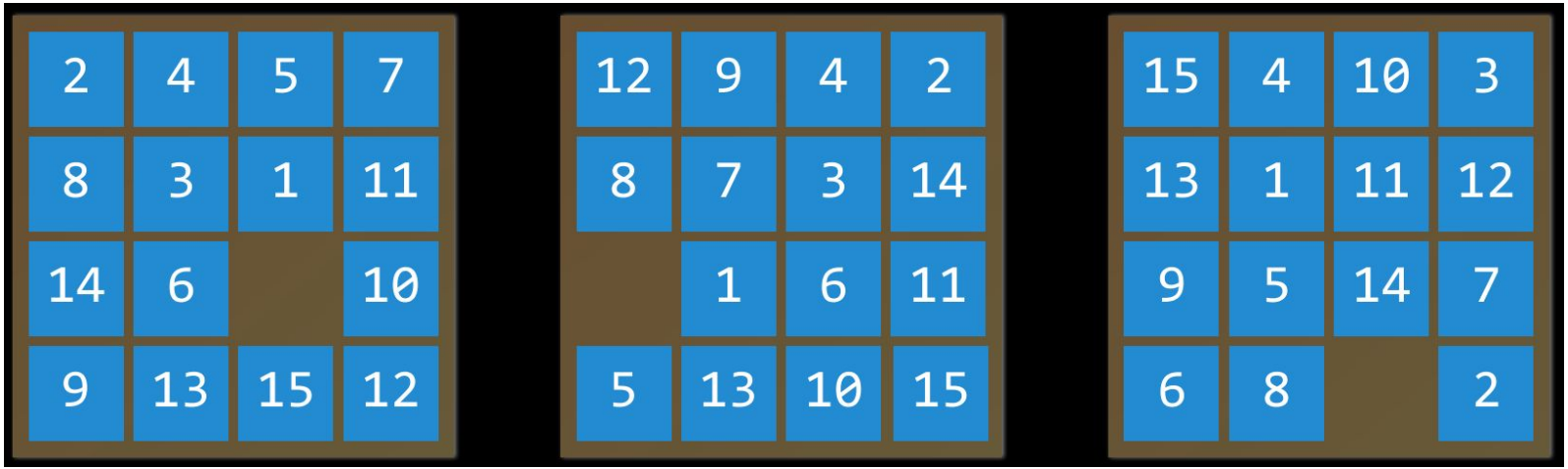
1. Natural Language Processing
2. Knowledge Representation
3. Automated Reasoning
4. Vision
5. Motor Control
6. Machine Learning







Classic AI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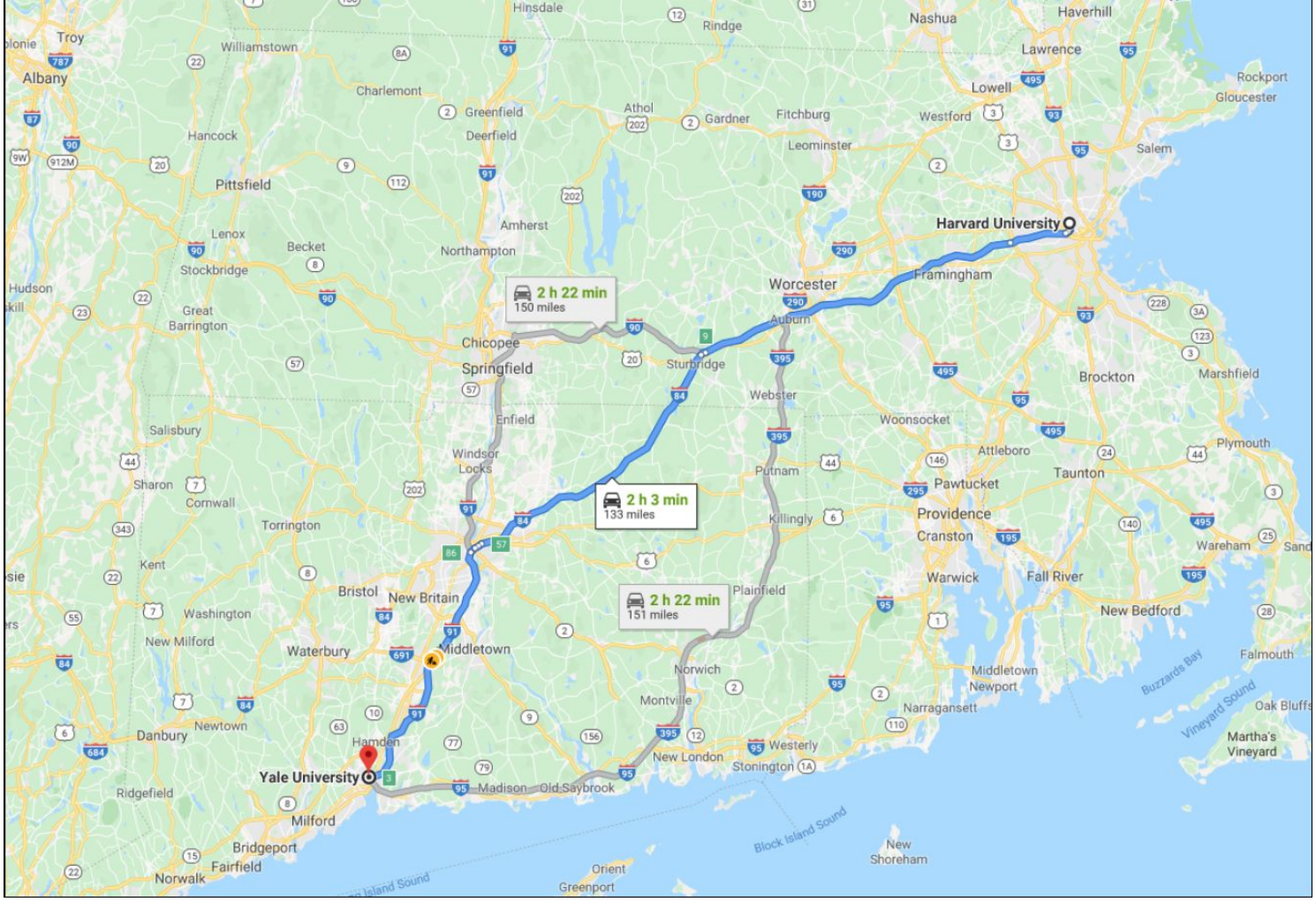
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2 h 3 min
133 miles
2 h 22 min
151 miles
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Troy
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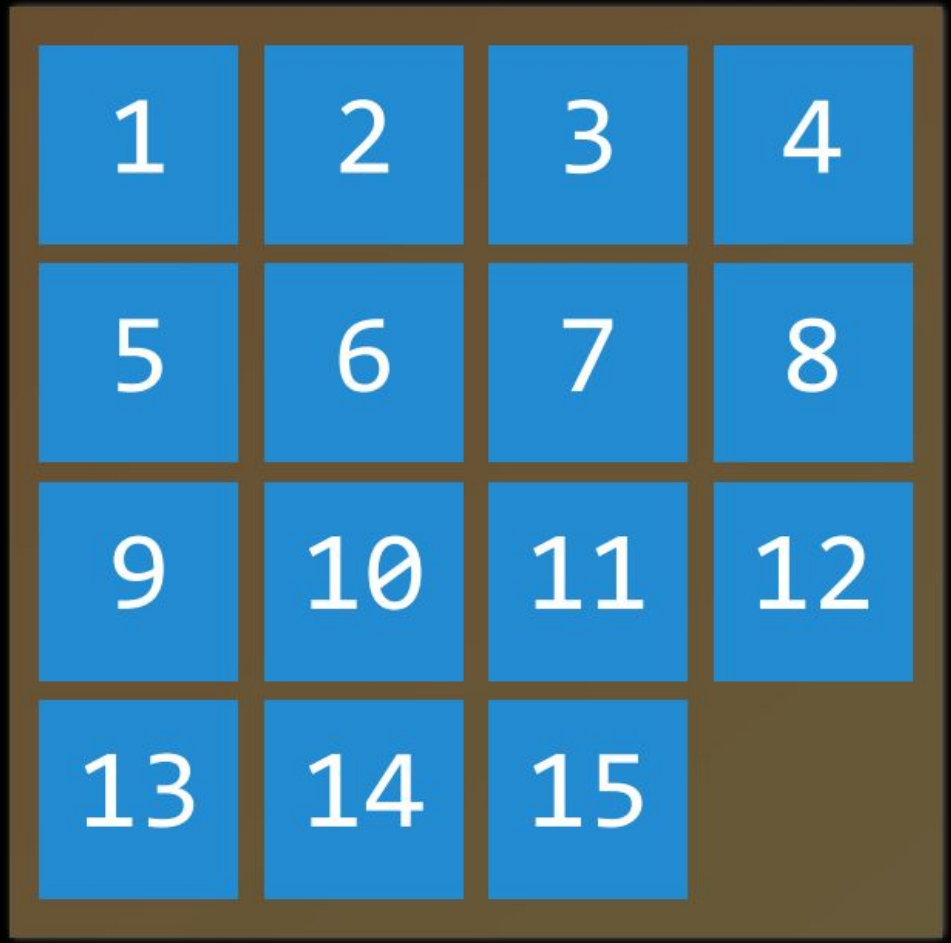
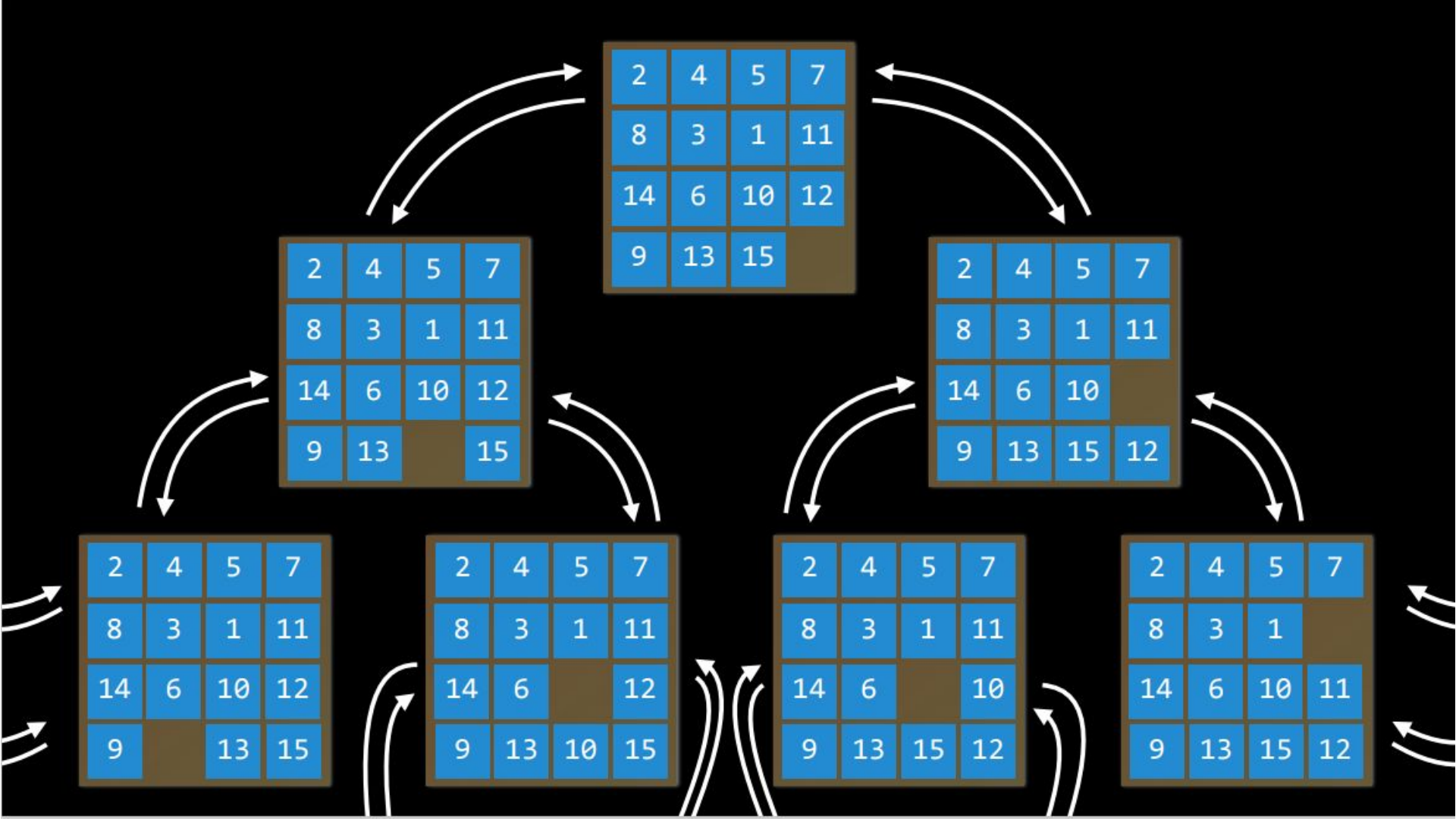
Pittsfield
Lenox
Becket
Stockbridge
Great Barrington
Hudson
Hinsdale
Greenfield
Deerfield
Amherst
Northampton
Chicopee
Springfield
Enfield
Windsor Locks
Salisbury
Sharon
Cornwall
Torrington
Kent
Bristol
New Britain
Washington
New Milford
Waterbury
Middletown
Danbury
Newtown
Hamden
Ridgefield
Milford
Bridgeport
Fairfield
Norwalk
Sturbridge
Webster
Worcester
Auburn
Framingham
Rindge
Nashua
Haverhill
Lawrence
Lowell
Rockport
Gloucester
Athol
Gardner
Fitchburg
Westford
Leominster
Salem
Brockton
Marshfield
Woonsocket
Attleboro
Plymouth
Taunton
Pawtucket
Providence
Cranston
Wareham
Warwick
Fall River
New Bedford
Putnam
Killingly
Plainfield
Norwich
Montville
New London
Stonington
Westerly
Madison
Old Saybrook
Middletown
Newport
Narragansett
Falmouth
Oak Bluffs
Martha's Vineyard
Buzzards Bay
Vineyard Sound
Block Island Sound
New Shoreham
Orient
Greenport

Classic AI: Search Problems

Harvard Course

Link here!

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8 3 1 11
14 6 10 12
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2 4 5 7
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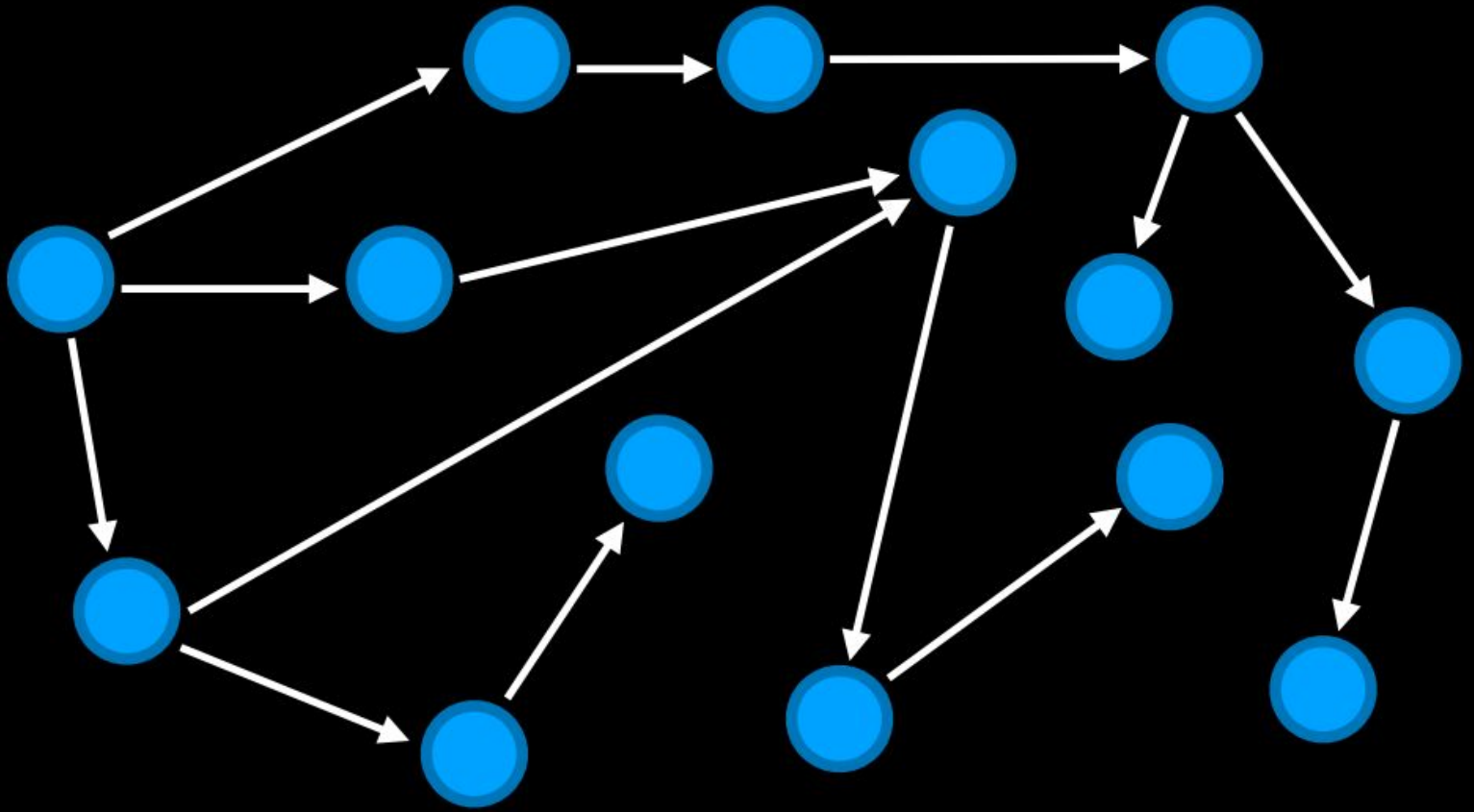
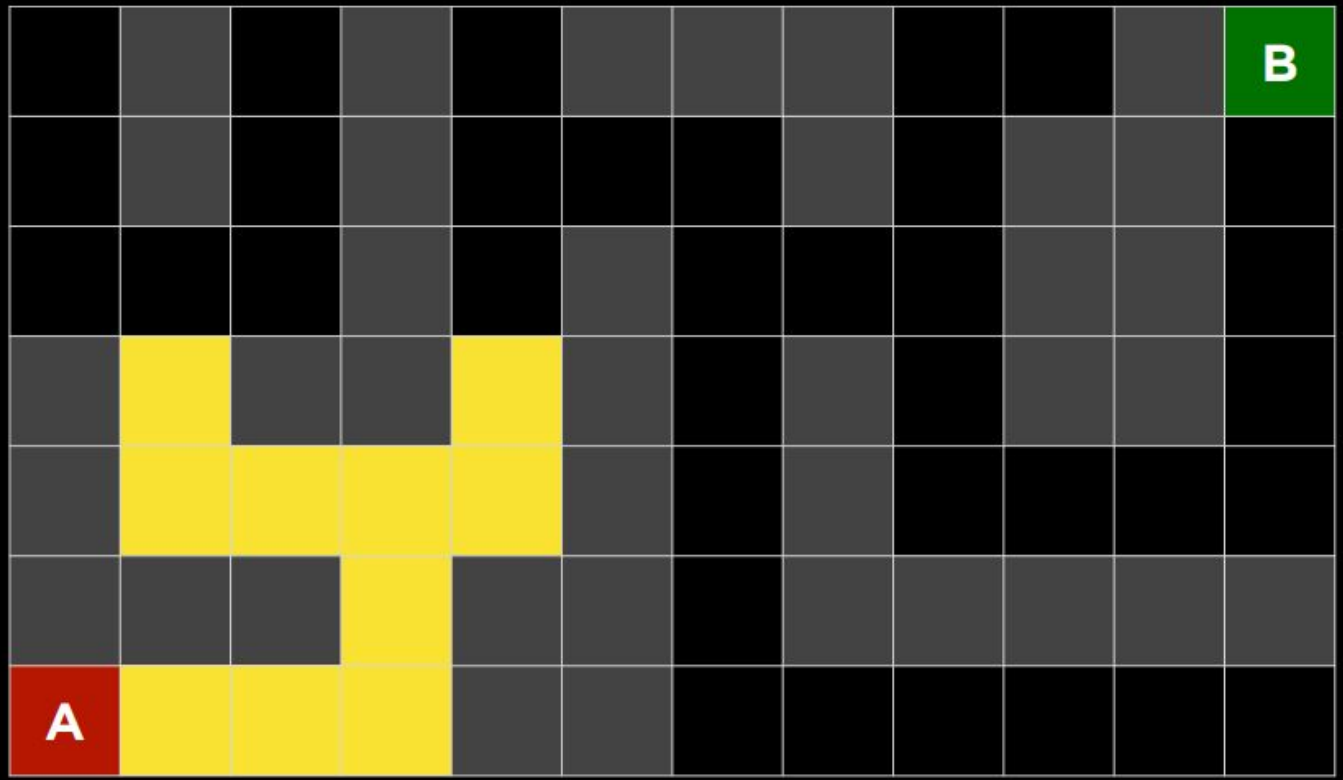
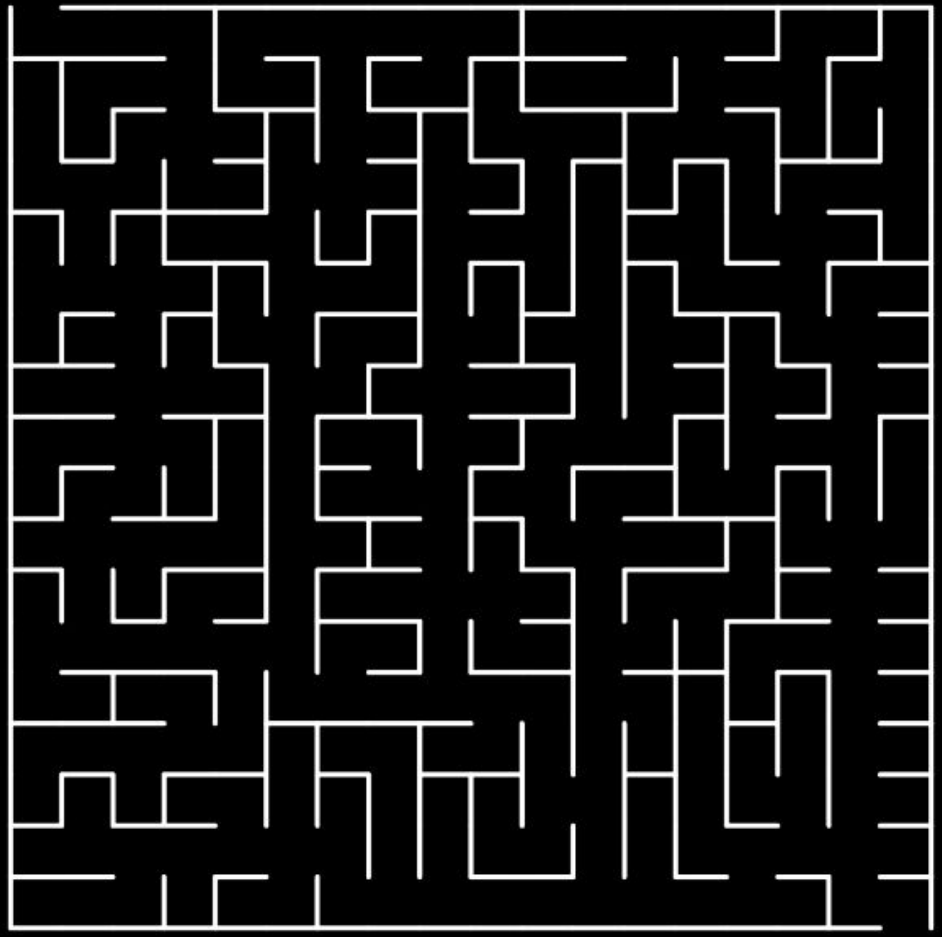
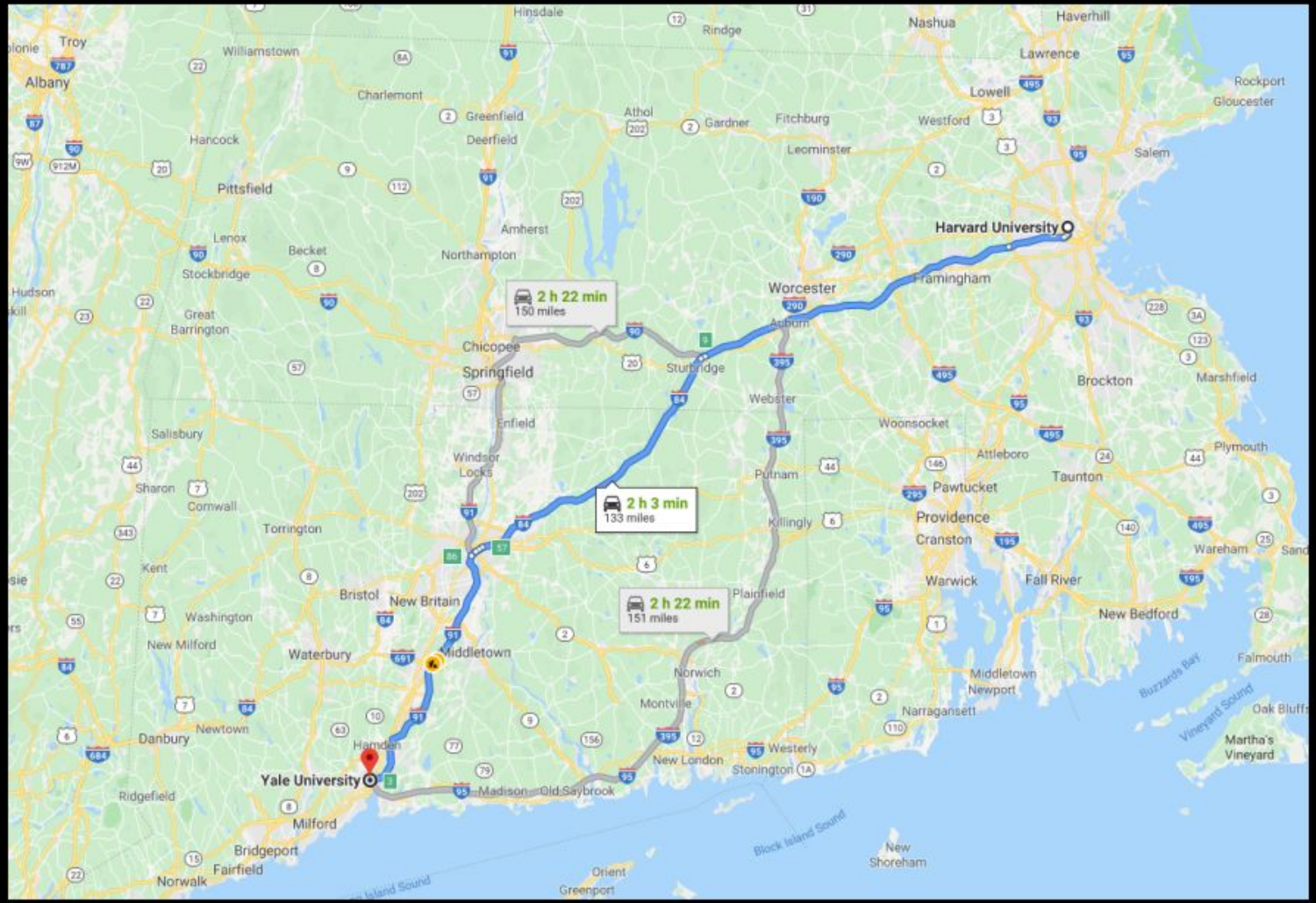


Breadth-First Search






Harvard University
Yale University
2 h 22 min
150 miles
2 h 3 min
133 miles
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151 miles
Worcester
Framingham
Springfield
Chicopee
Middletown
Waterbury
New Britain
Bristol
Hartford
Providence
Pawtucket
Brockton
Fall River
New Bedford
Lowell
Lawrence
Haverhill
Nashua
Albany
Troy
Pittsfield
Northampton
Amherst
Greenfield
Fitchburg
Leominster
Gardner
Athol
Salem
Rockport
Gloucester
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Webster
Sturbridge
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Middletown
Newport
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Plainfield
Killingly
Putnam
Windsor Locks
Enfield
Simsbury
Avon
Farmington
Southington
Meriden
Wallingford
Cheshire
Hamden
New Haven
West Haven
Milford
Orange
Derby
Shelton
Stratford
Bridgeport
Fairfield
Norwalk
Westport
Danbury
Newtown
New Milford
Washington
Kent
Cornwall
Sharon
Salisbury
Torrington
Lenox
Stockbridge
Great Barrington
Becket
Hancock
Charlemont
Williamstown
Rindge
Hinsdale
Madison
Old Saybrook
Ridgefield
Orient
Greenport
New Shoreham
Block Island Sound
Buzzards Bay
Vineyard Sound

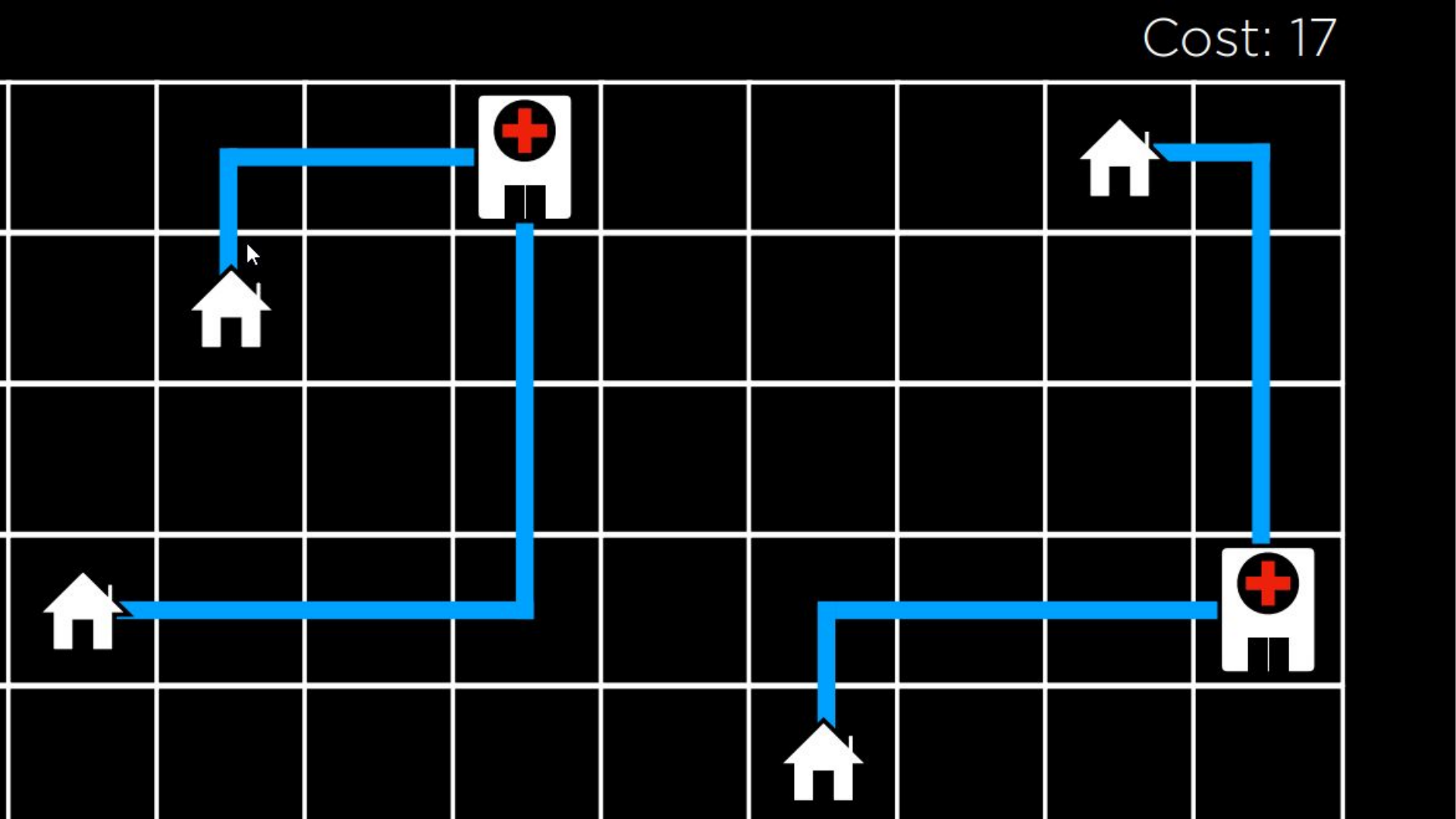
Deep Blue (Chess Computer)

Deep Blue was a chess computer developed by IBM. It is famous for defeating the chess world champion, GM Garry Kasparov, in their 1997 match. Deep Blue's victory was viewed as a symbolic testament to the rise of artificial intelligence—a victory for machine versus man.

By the time of the 1997 match, Deep Blue's alpha-beta search algorithm (the same type of search that is still used by many conventional computer engines today) along with its custom hardware allowed it to consider up to **200 million positions per second**.

Read More: Deep Blue (Chess Computer)

➢ Classic AI: Optimization Problems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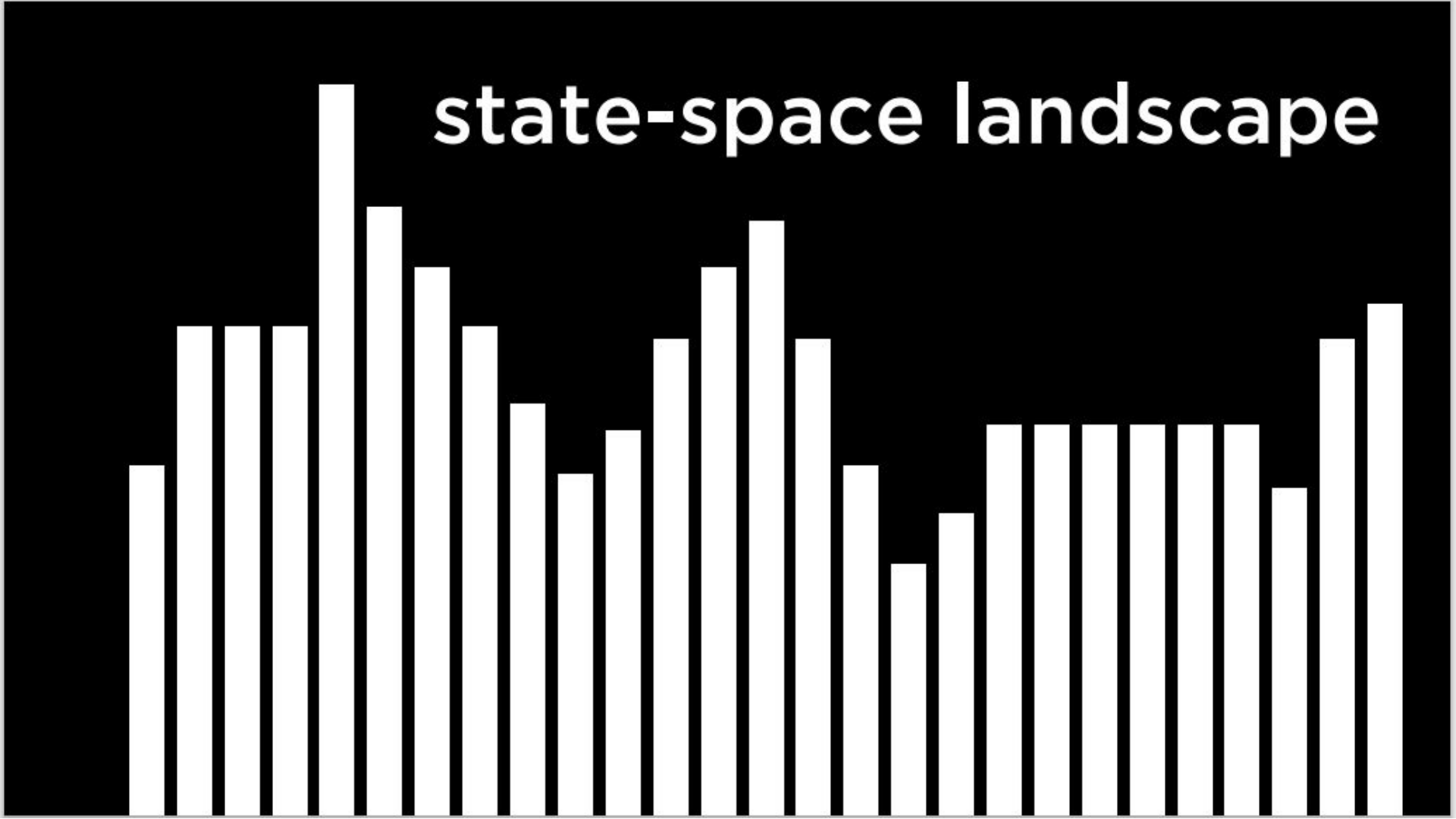
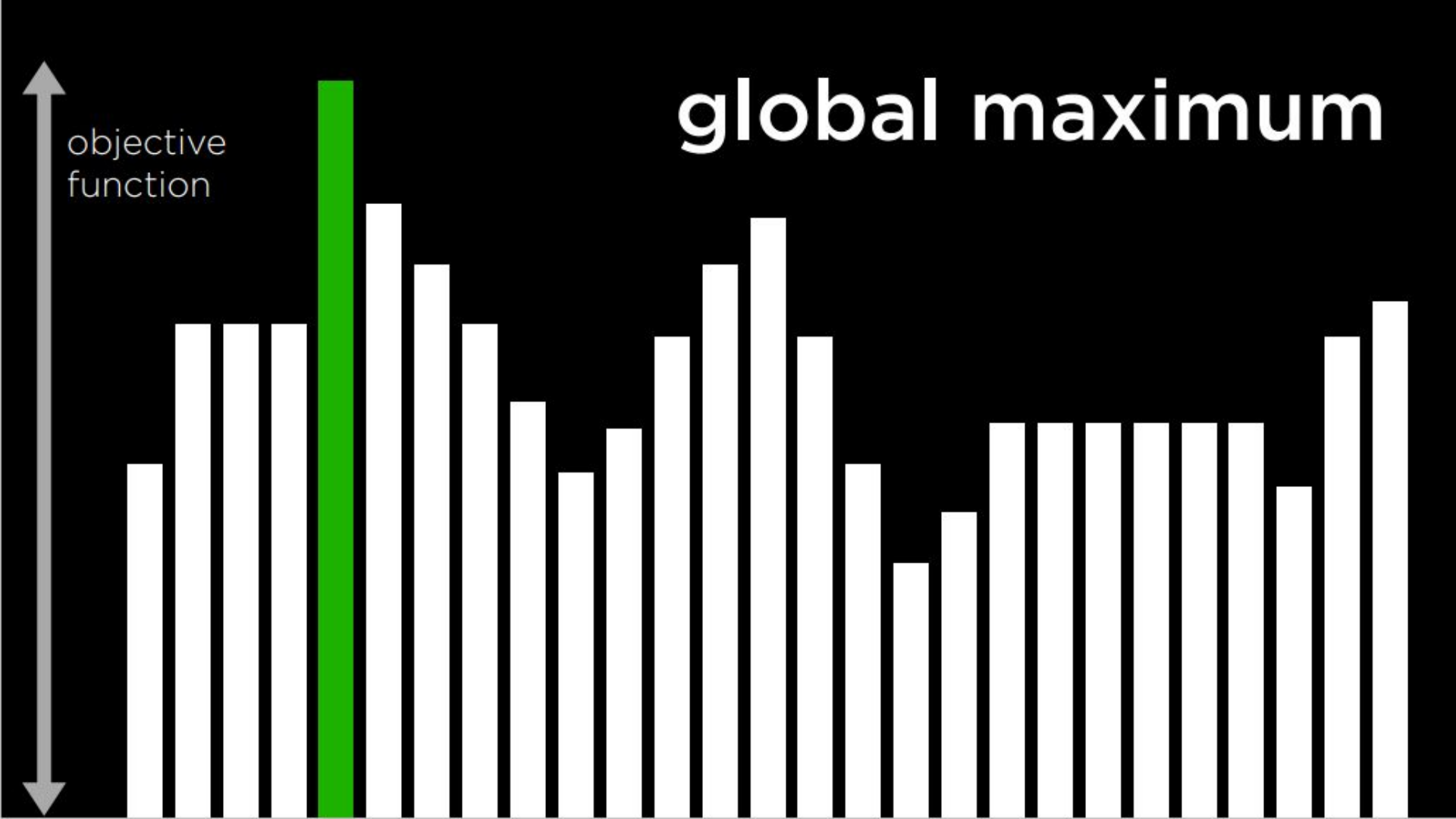
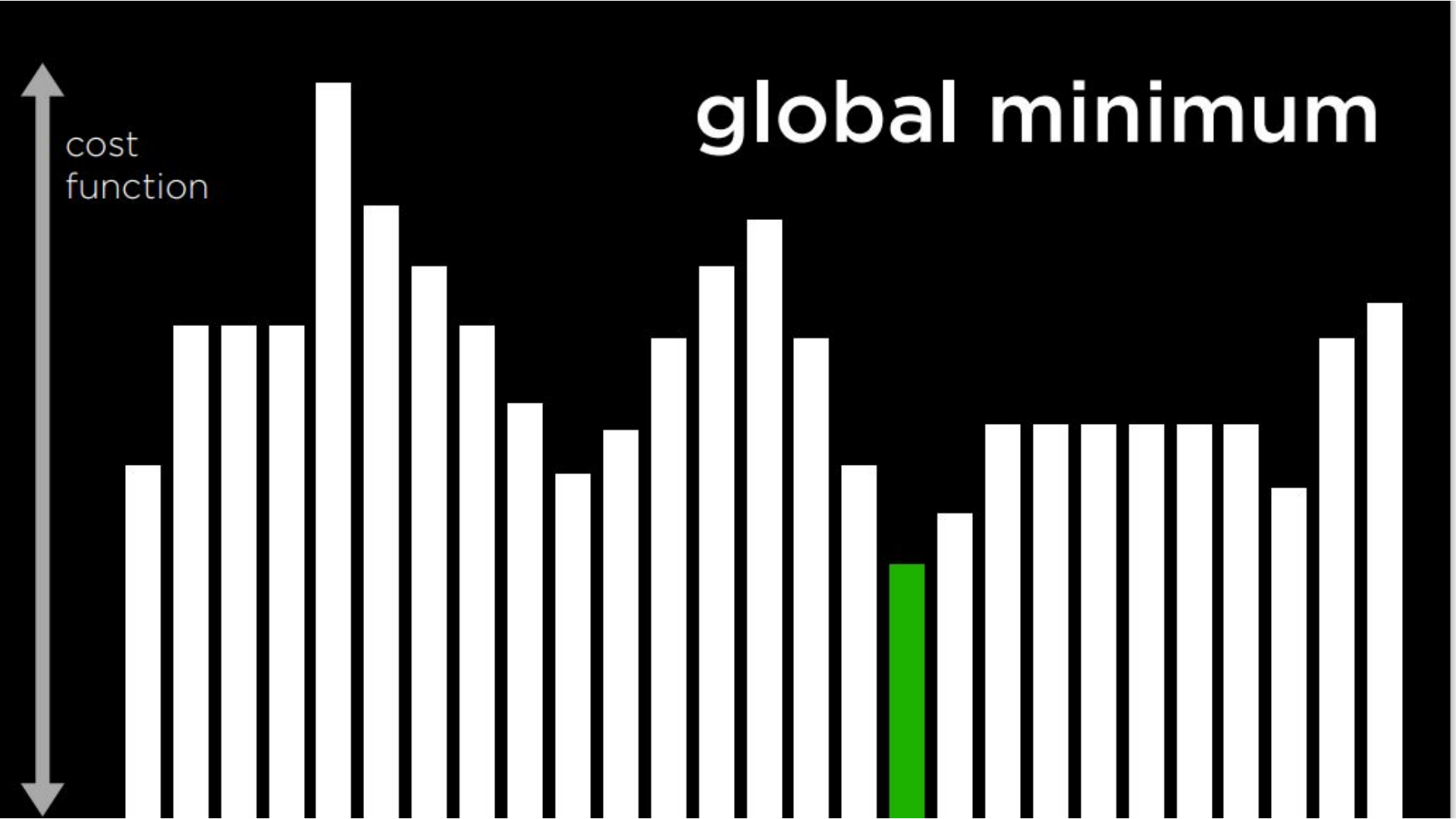
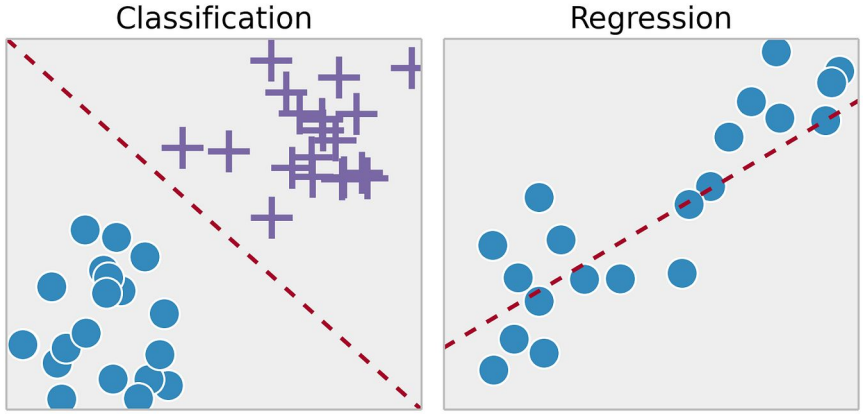

state-space landscape


objective
function
global maximum


cost
function
global minimum

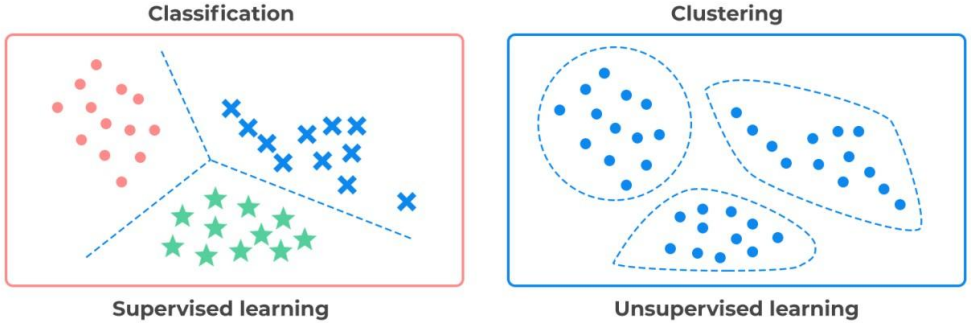
Machine learning



Supervised vs. Unsupervised Learning

KNN

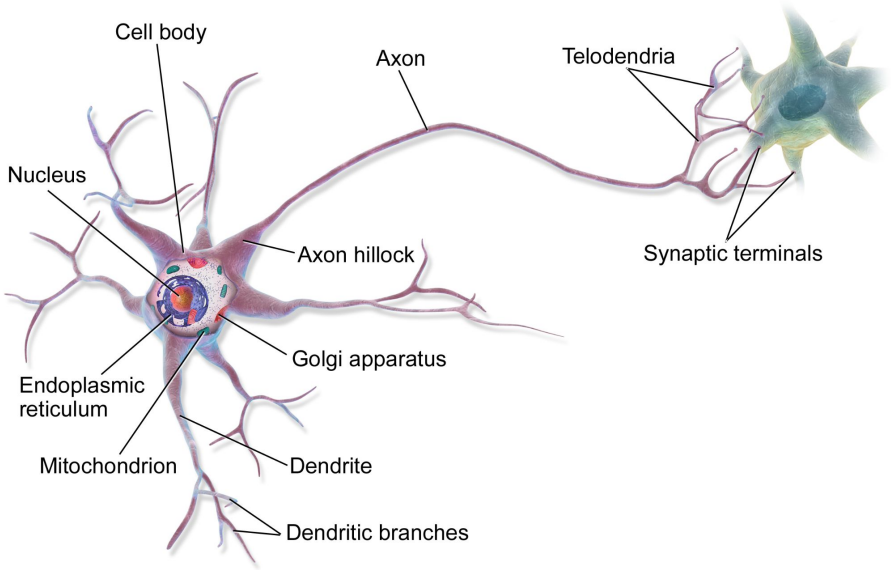
SVM

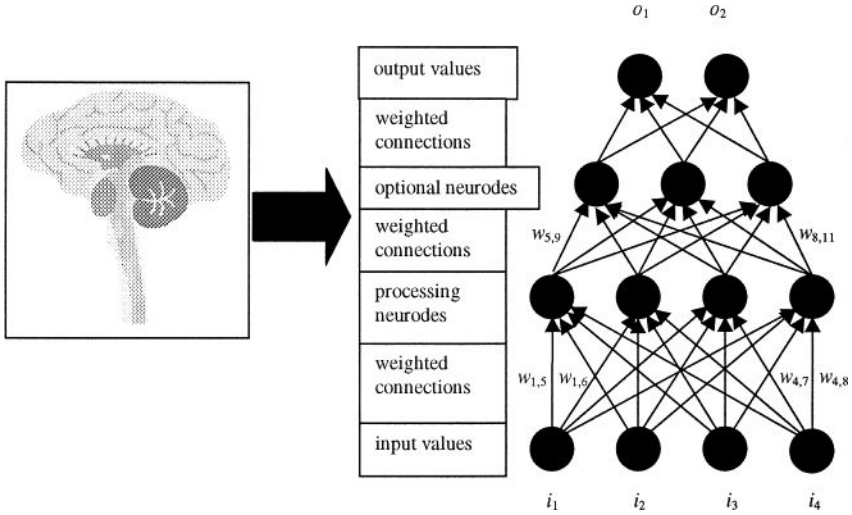


K-Means

SVM

Artificial Neural Networks

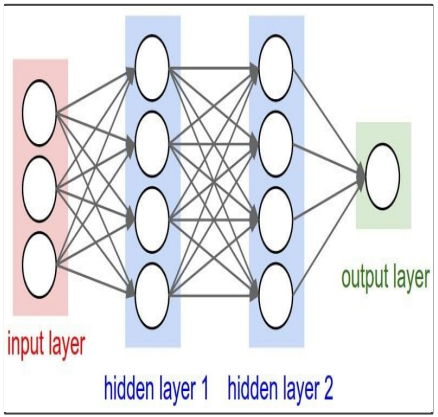

Cell body
Axon
Telodendria
Nucleus
Axon hillock
Synaptic terminals
Golgi apparatus
Endoplasmic reticulum
Mitochondrion
Dendrite
Dendritic branches

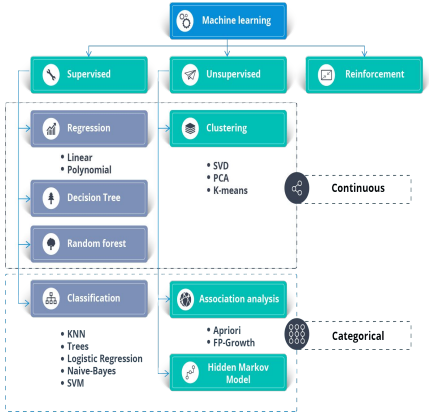

output values
weighted connections
optional neurodes
weighted connections
processing neurodes
weighted connections
input values
o_1
o_2
$w_{5,9}$
$w_{8,11}$
$w_{1,5}$
$w_{1,6}$
$w_{4,7}$
$w_{4,8}$
i_1
i_2
i_3
i_4

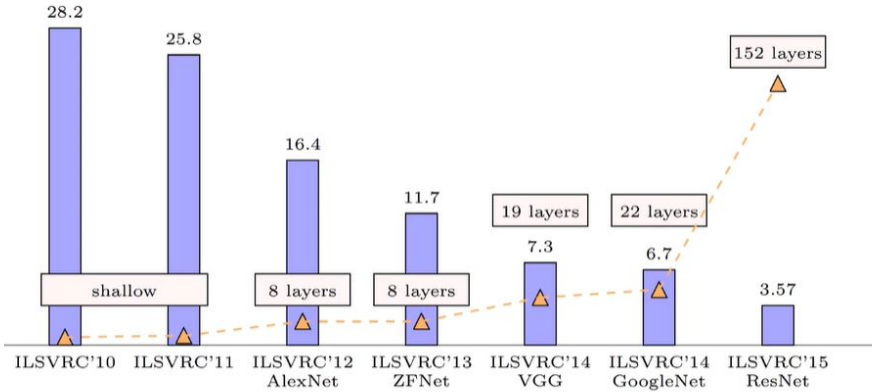
Deep learning

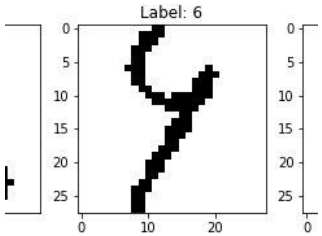
Deep learning

1. Machine Learning Methods
2. Shallow
3. Neural Networks
4. Vanishing Gradient
5. Relu activation function
6. Deep Learning



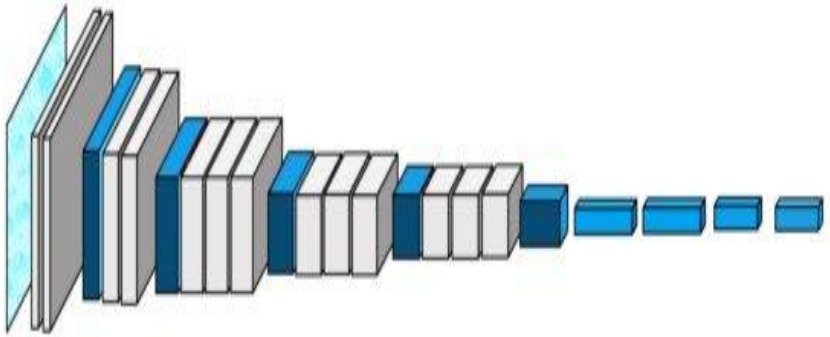




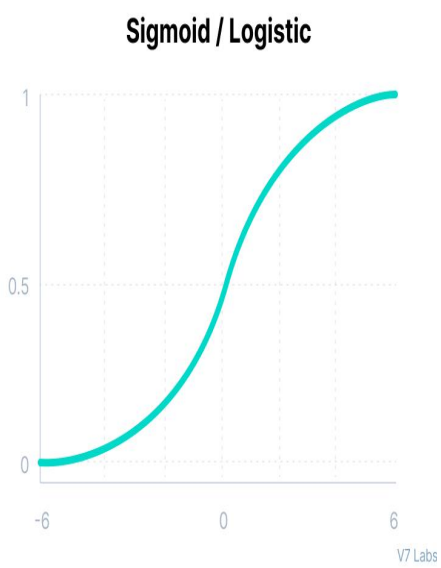


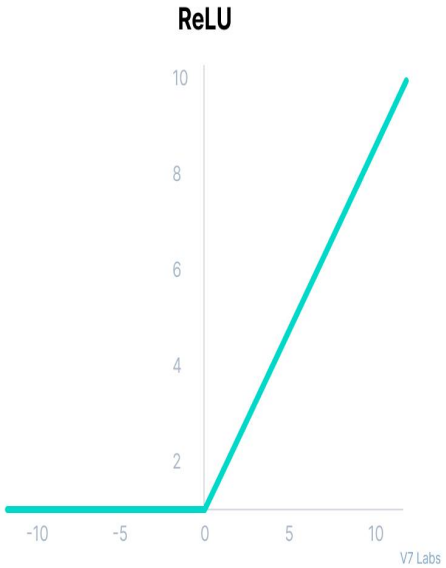
pyimagesearch UNIVERSITY

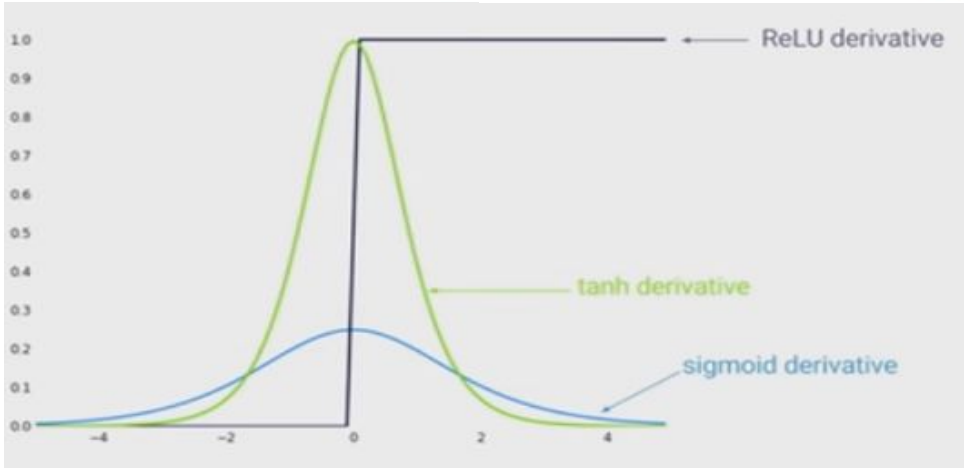
Torch Hub Series 2: VGG and ResNet



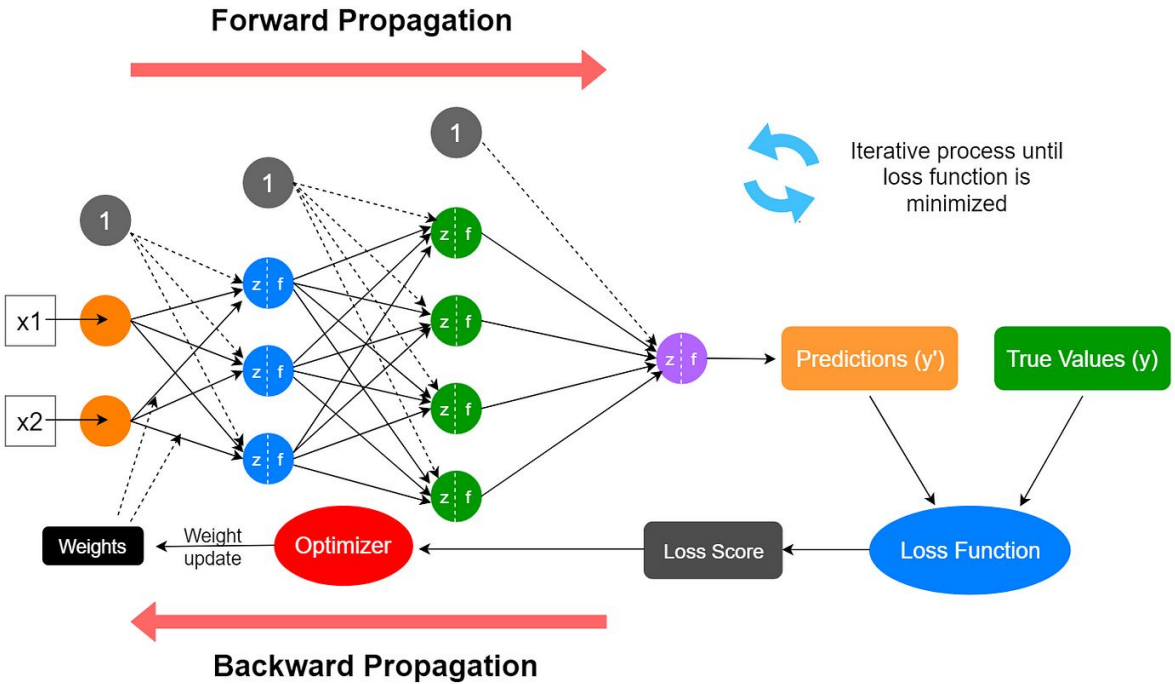
PyTorch



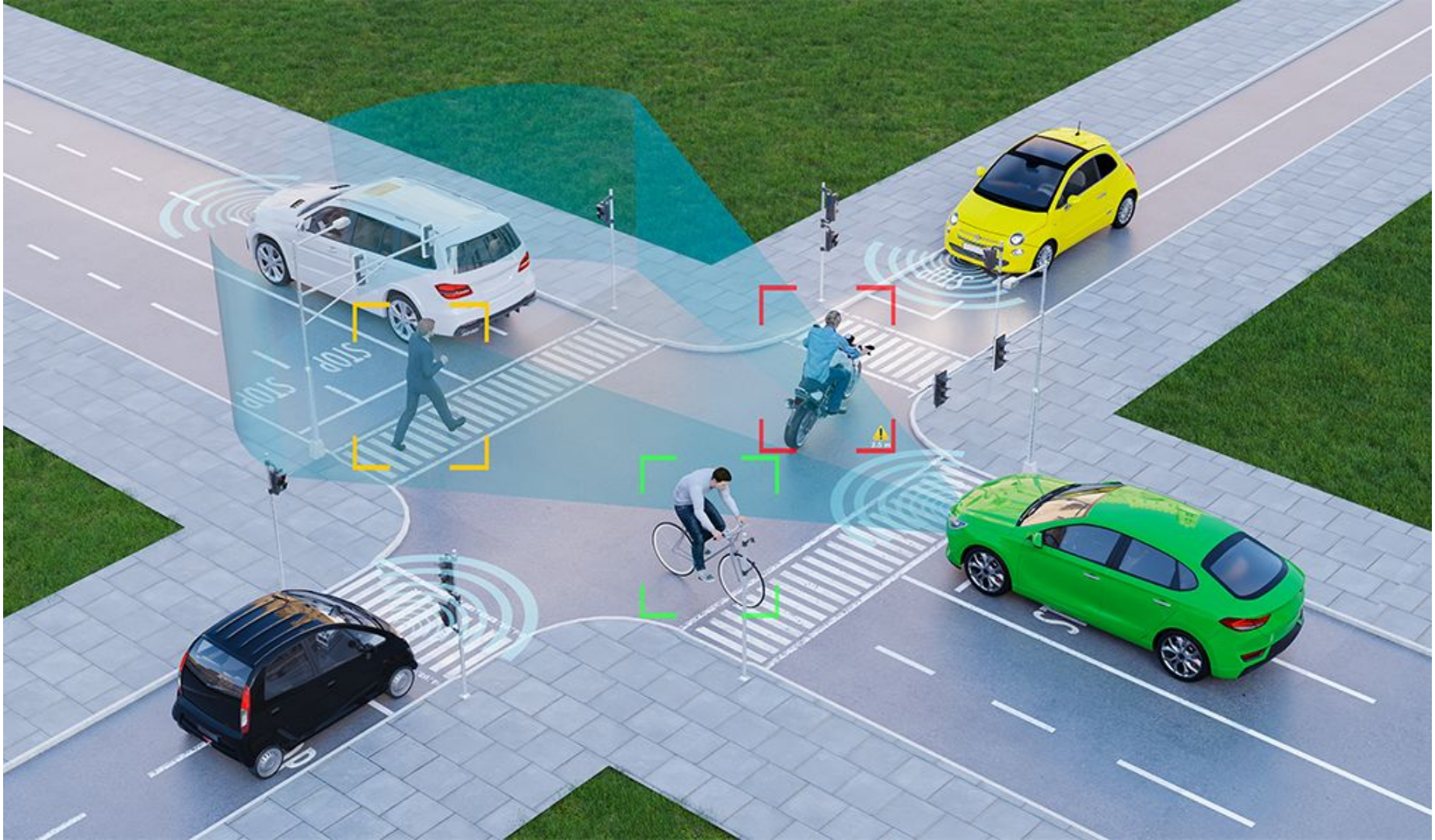




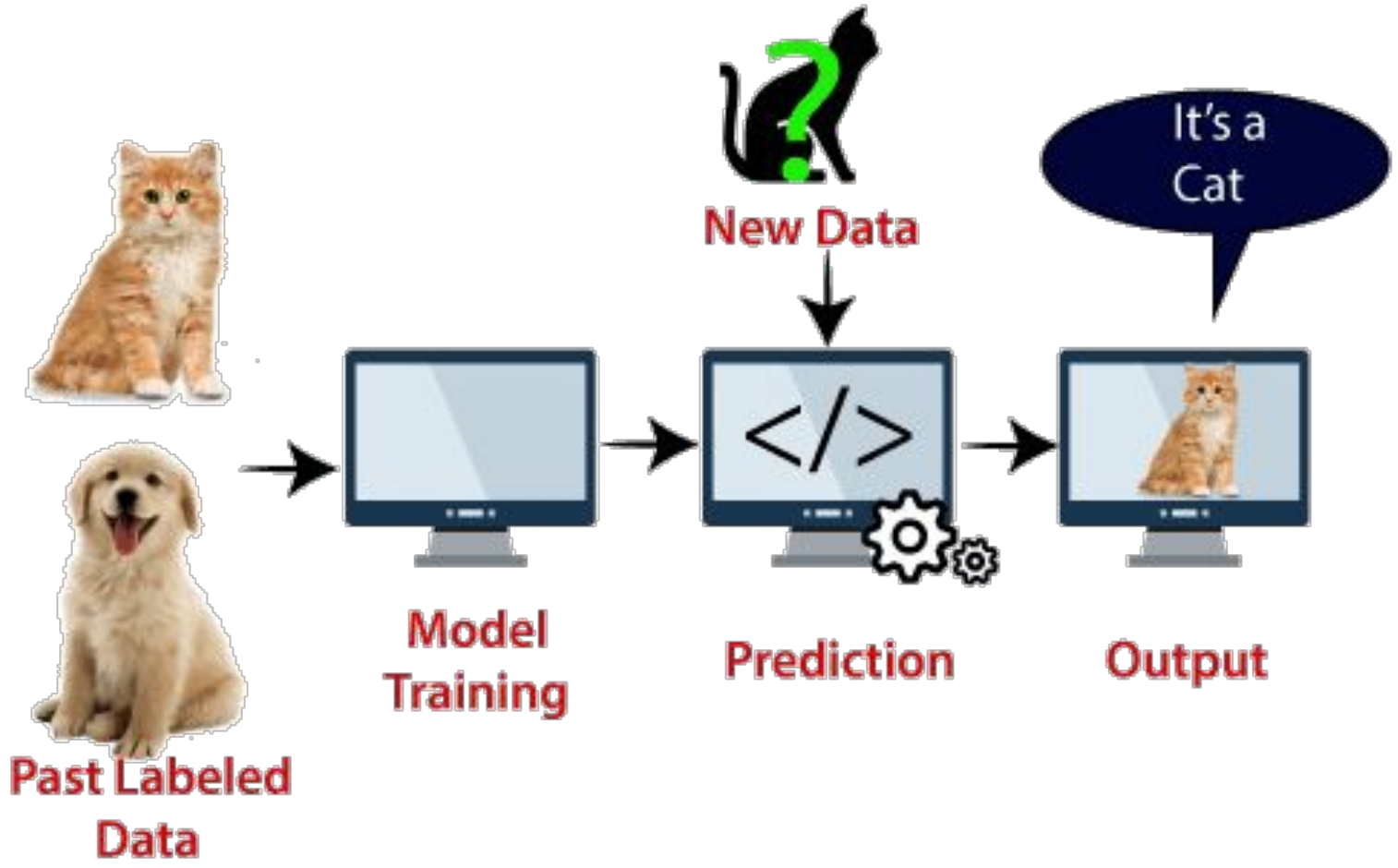
back propagation algorithm



Computer Vision


STOP
STOP

- **Computer Vision**
  - **Applications: Classification**


New Data
It's a Cat
Past Labeled Data
Model Training
Prediction
Output

- **Computer Vision**
  - **Applications: Real or Fake?**

Anybody Knows this person?

Link 1

Link 2

Thank you!