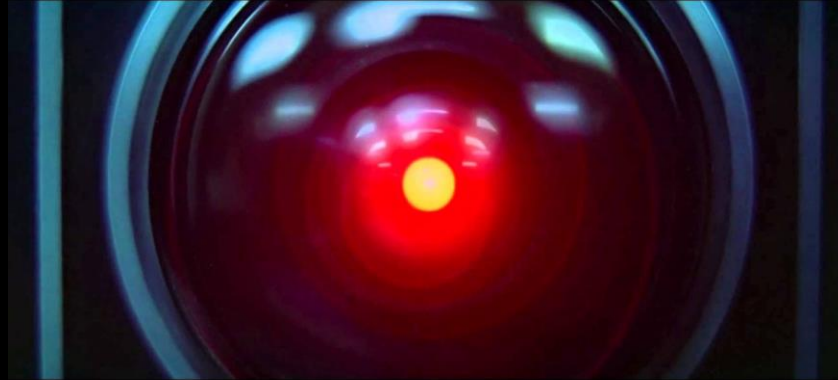


Artificial Intelligence

Introduction

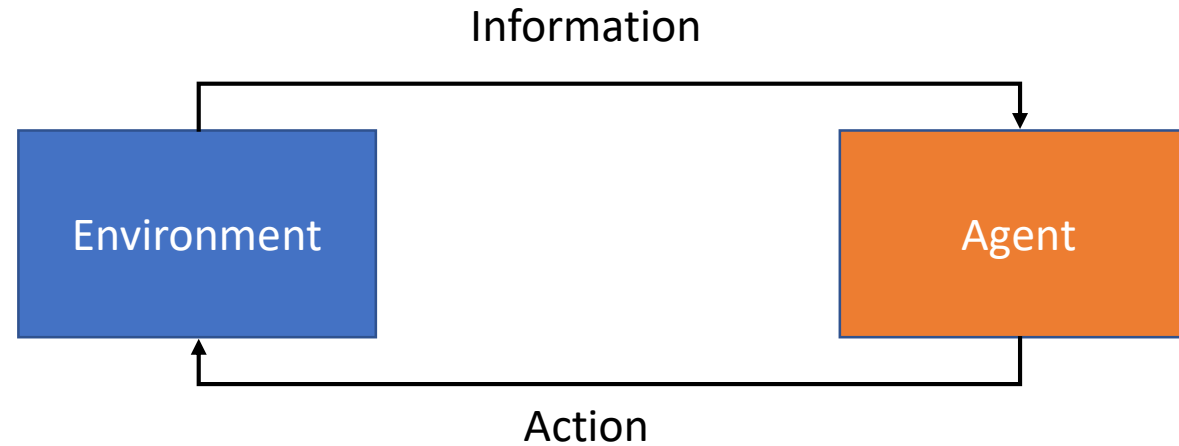


Instructor: Aaron Low

HELP University, Faculty of Computing and Digital Technology

What is Artificial Intelligence?

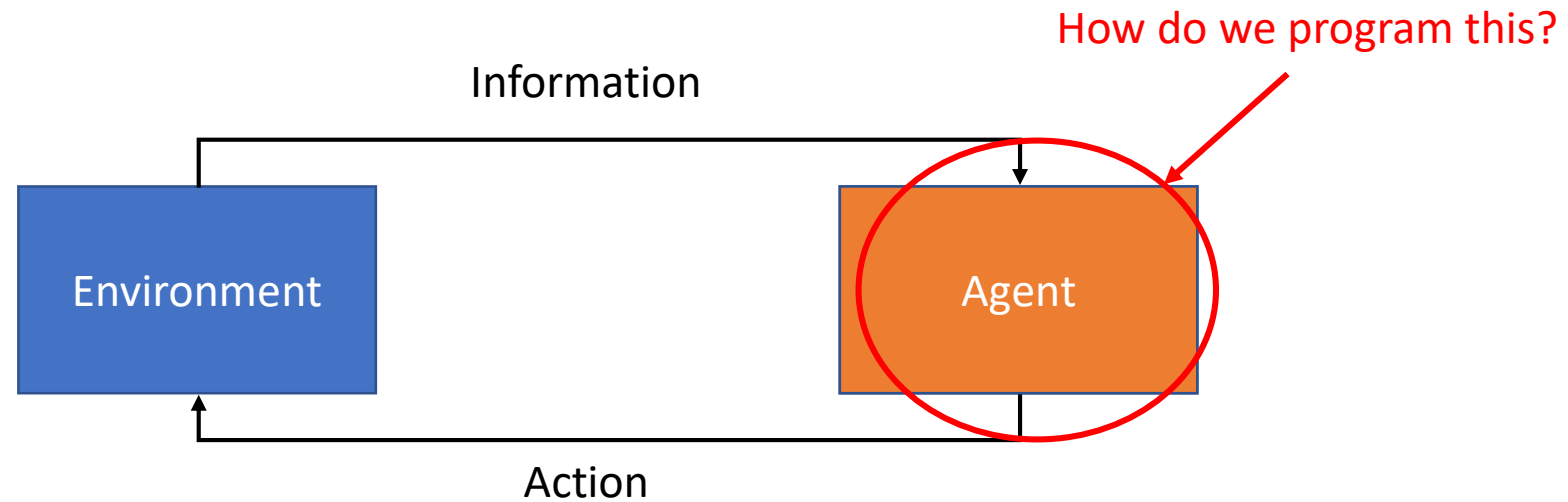
Defined as: *The study of agents that receive percepts from the environment and perform actions*¹



1: Russell, S. and Norvig, P. Artificial Intelligence: A Modern Approach (3rd Edition). 2010

What is Artificial Intelligence?

Defined as: *The study of agents that receive percepts from the environment and perform actions*¹



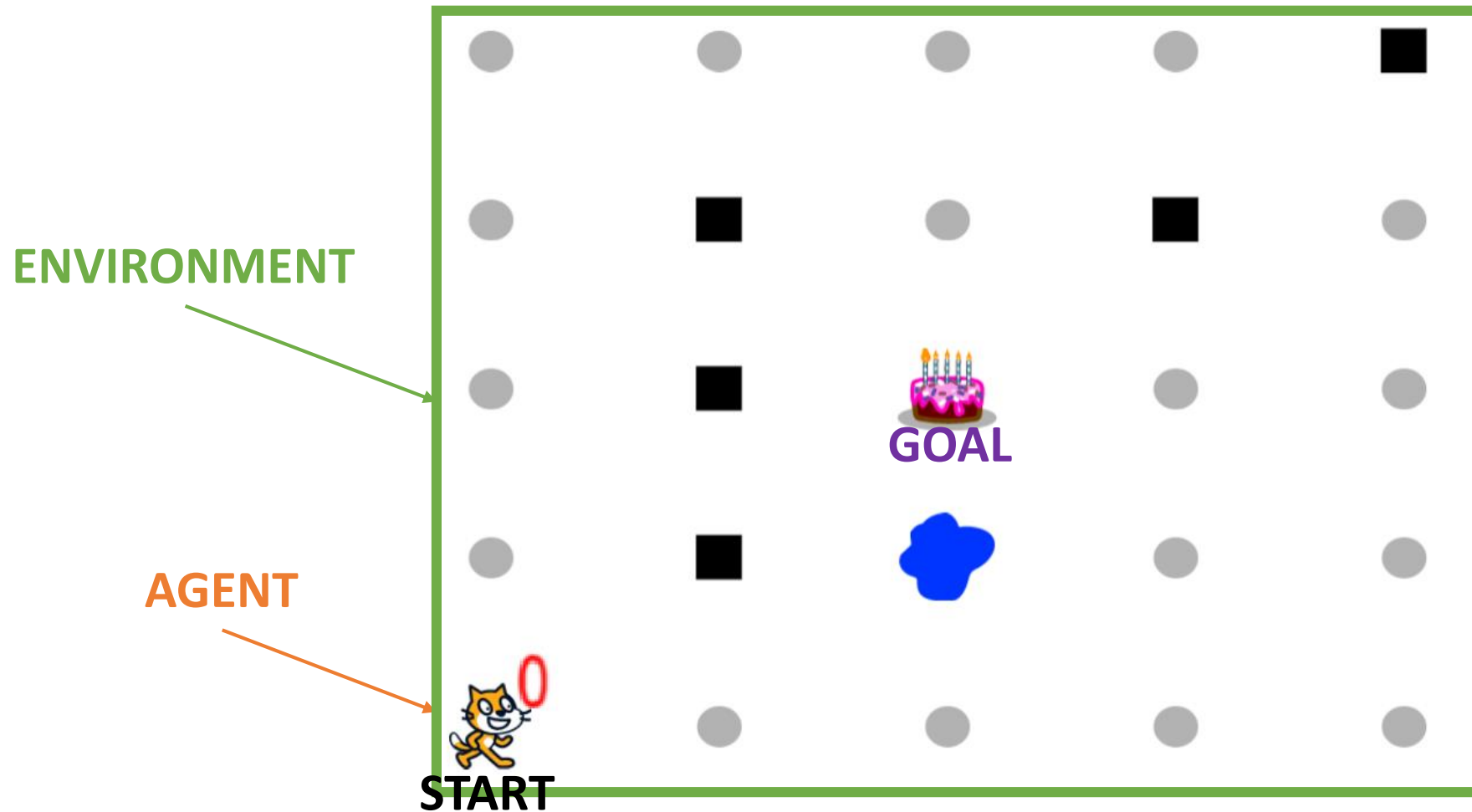
AI Pathfinding Example

PROBLEM: How do we get the **AGENT** to the **GOAL**?



AI Pathfinding Example

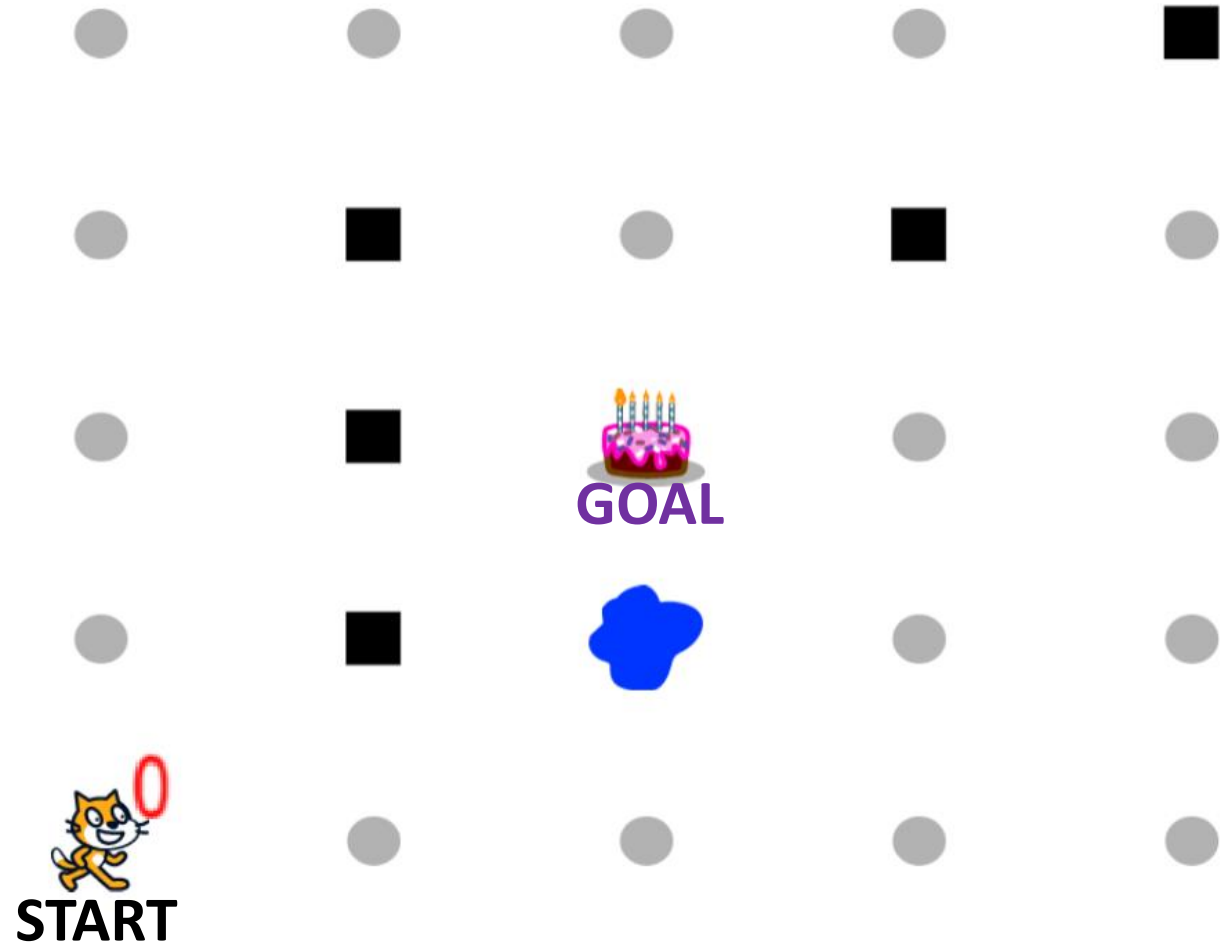
PROBLEM: How do we get the **AGENT** to the **GOAL**?



AI Pathfinding Example: Information

Information:

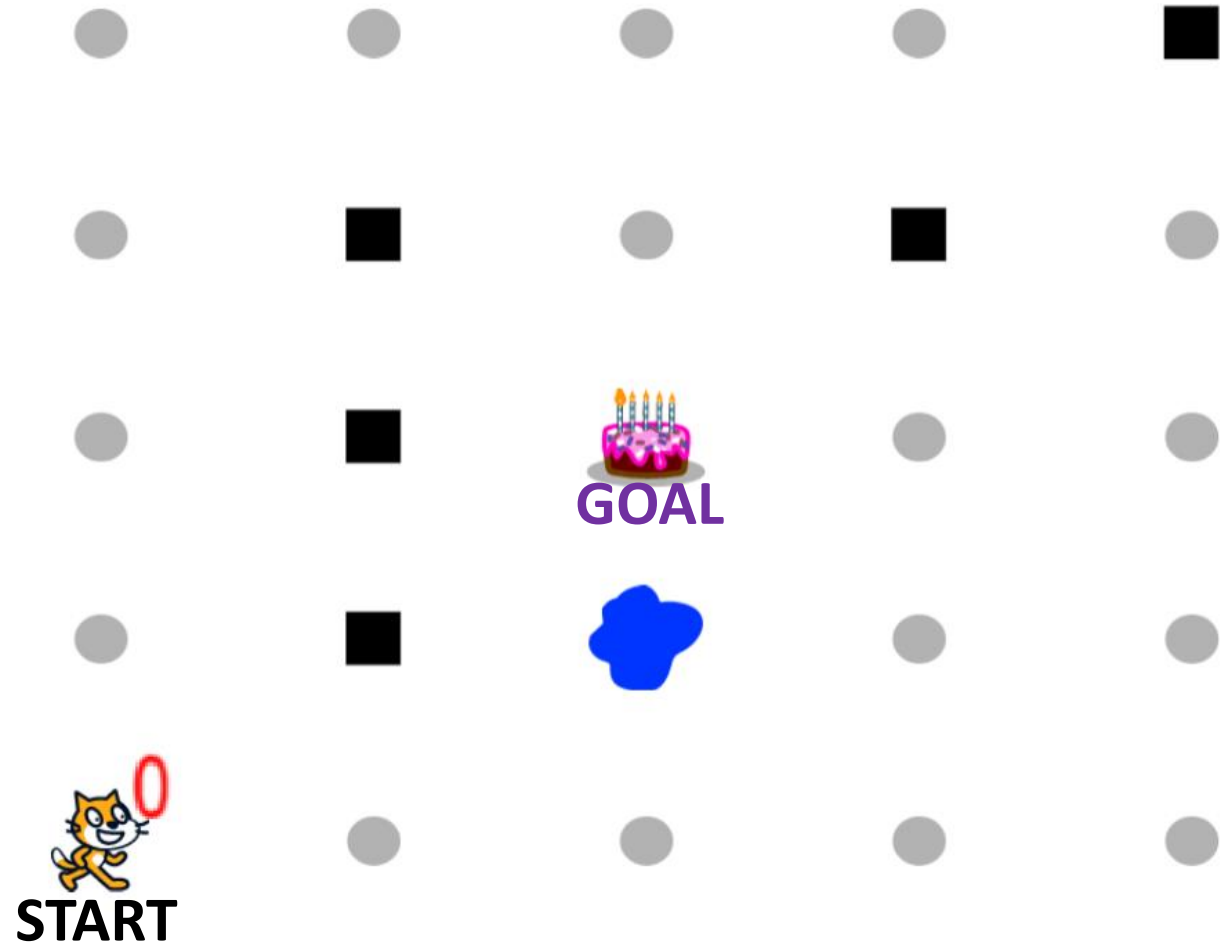
- **AGENT** position
- **ENVIRONMENT** state



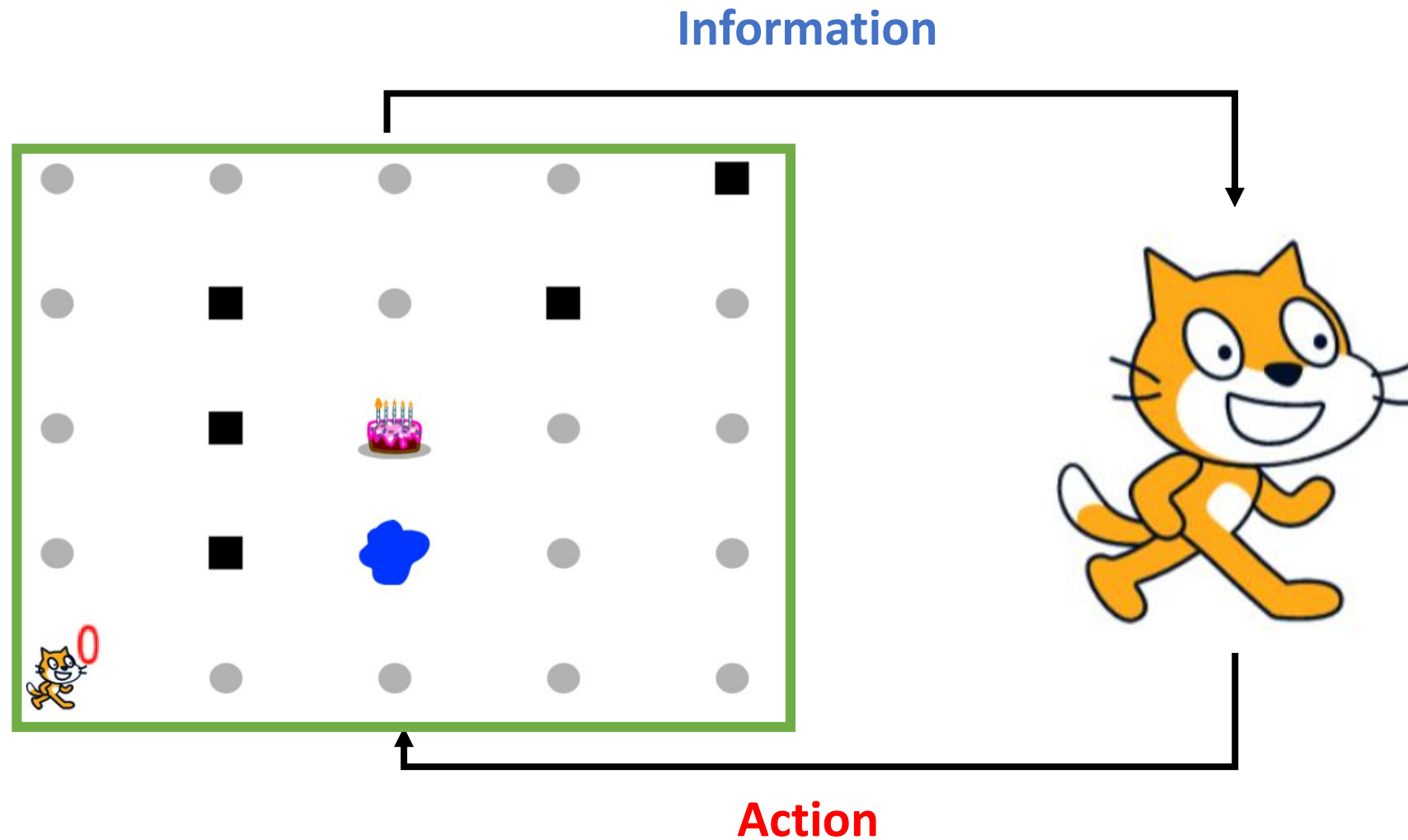
AI Pathfinding Example: Actions

Possible **Actions**:

- Move Up
- Move Down
- Move Left
- Move Right



AI Pathfinding Example: Perception-Action Loop



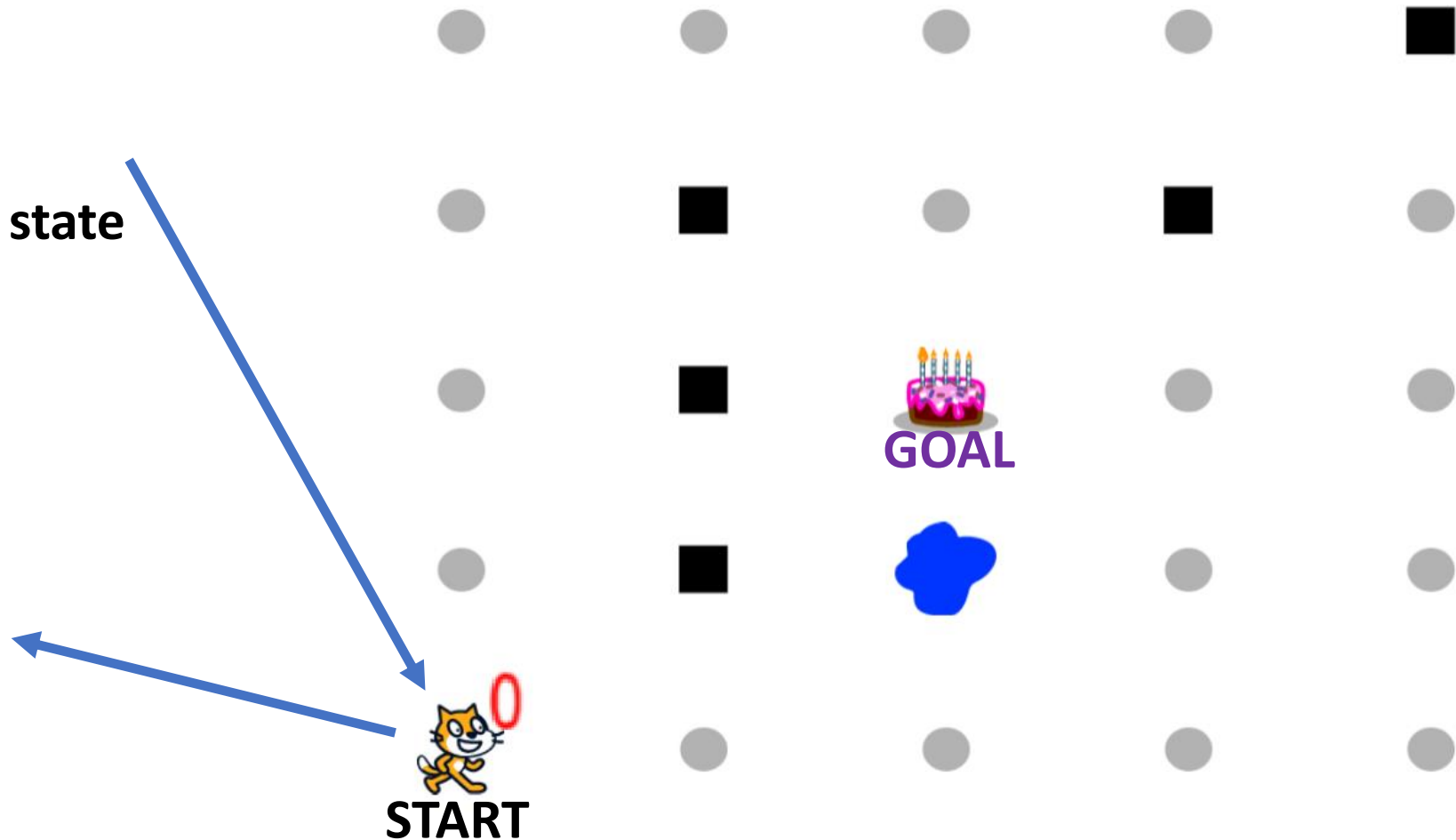
AI Pathfinding Example

Information:

- **AGENT** position
- **ENVIRONMENT** state

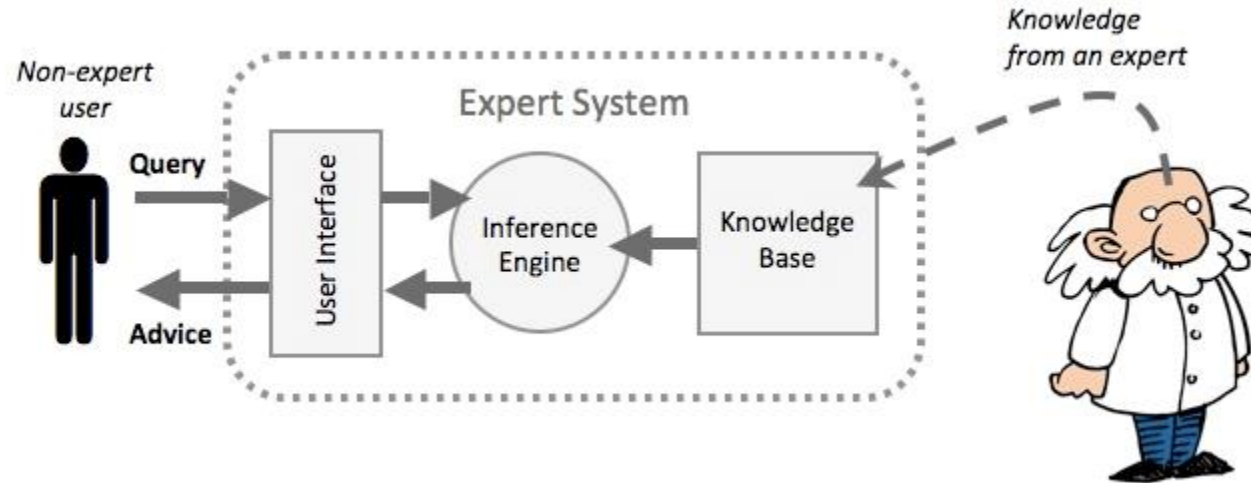
Possible **Actions**:

- **Move Up**
- ~~Move Down~~
- ~~Move Left~~
- **Move Right**



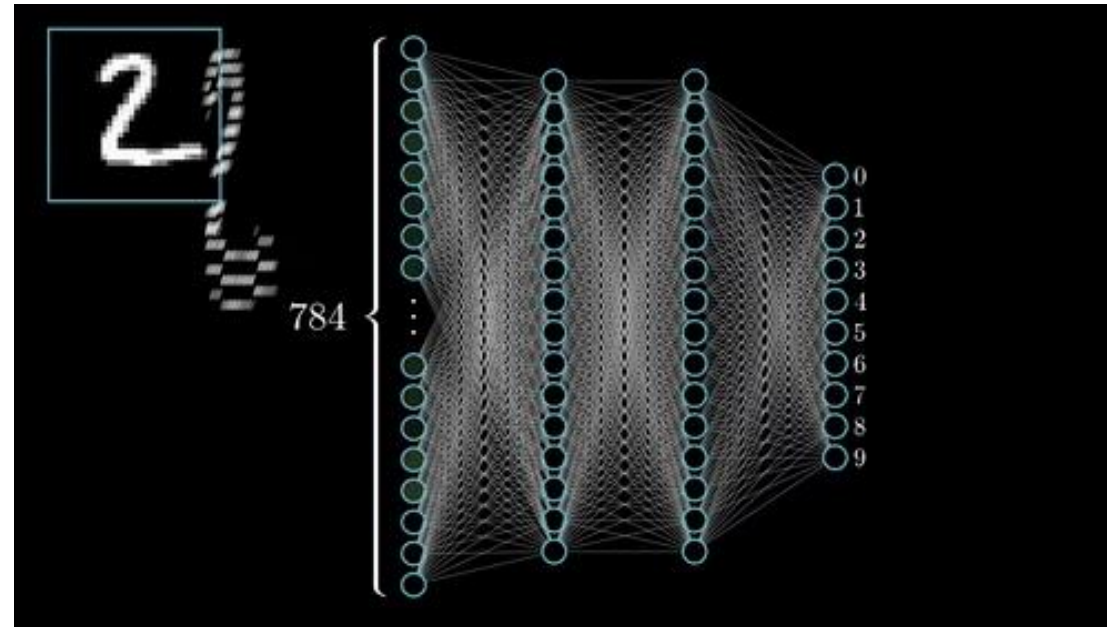
Artificial Intelligence Methods: Expert Systems

The knowledge base is created from **information** provided by **human experts**



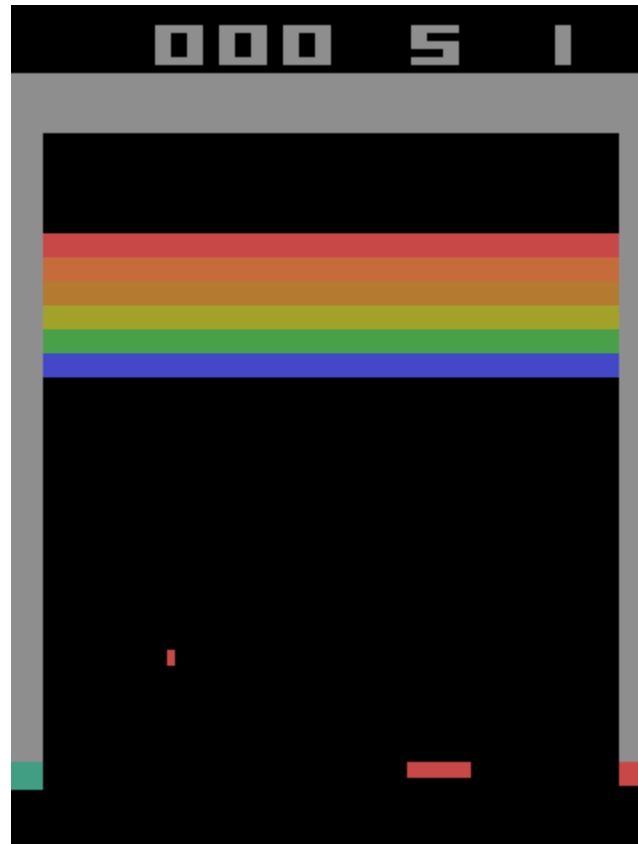
Artificial Intelligence Methods: Machine Learning

Instead of telling the agent what to do, let it **learn** from data instead



Applications of Artificial Intelligence

Playing games



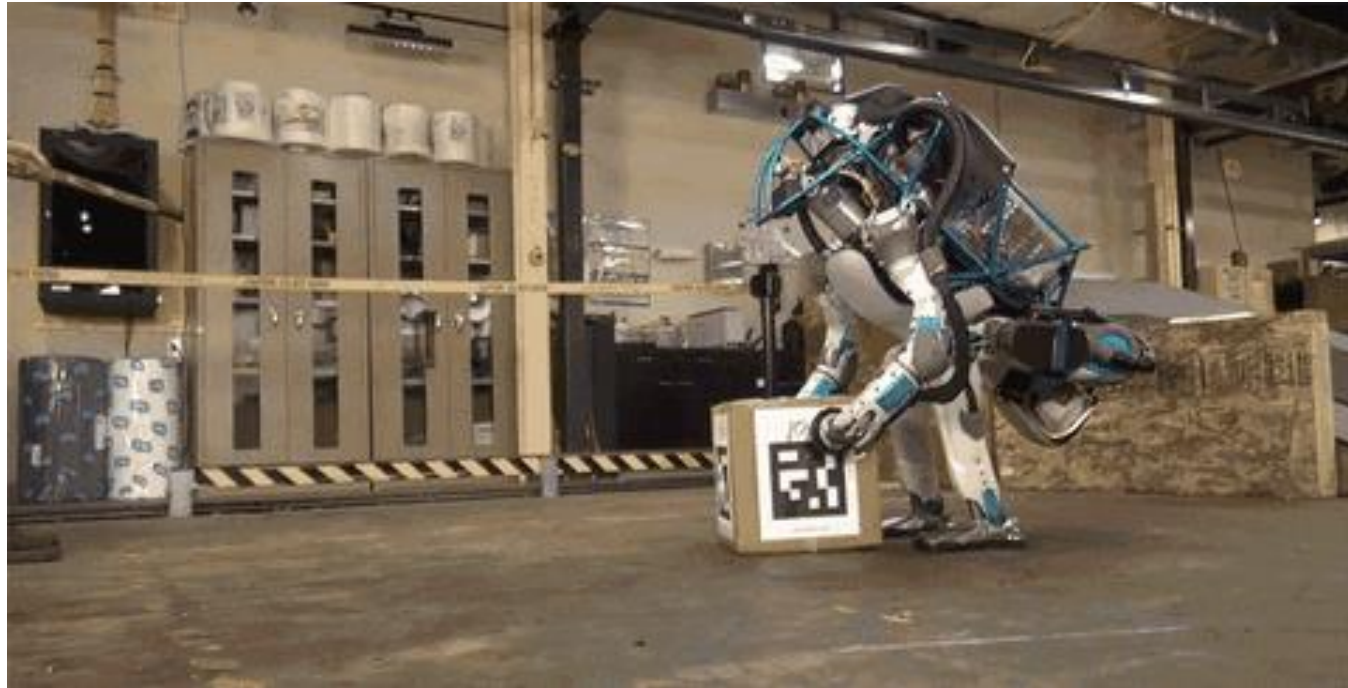
Applications of Artificial Intelligence

AlphaGo beats Lee Sedol in the game of Go



Applications of Artificial Intelligence

Robotics



Applications of Artificial Intelligence

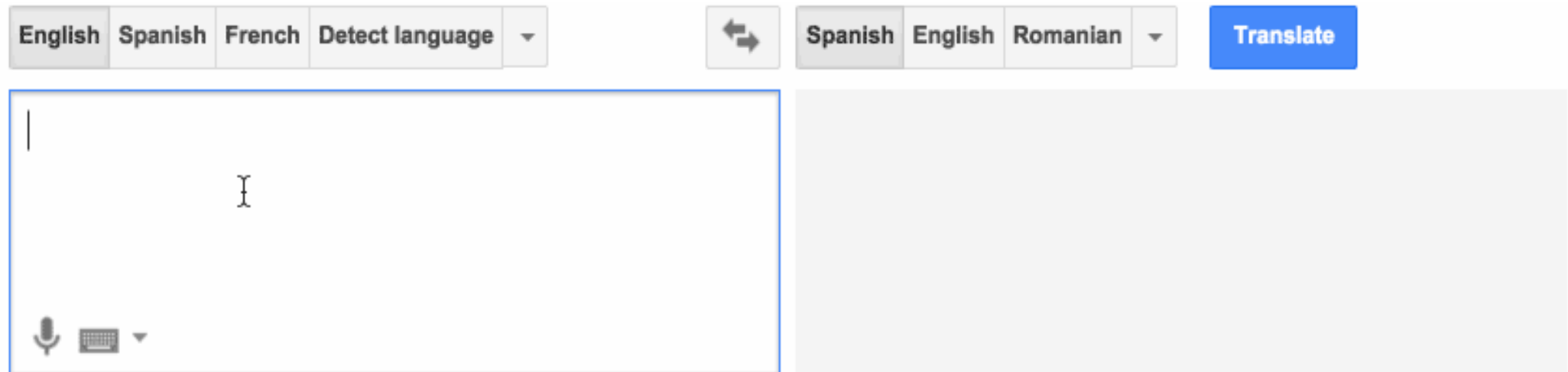
Self-driving Cars



Tesla Autopilot

Applications of Artificial Intelligence

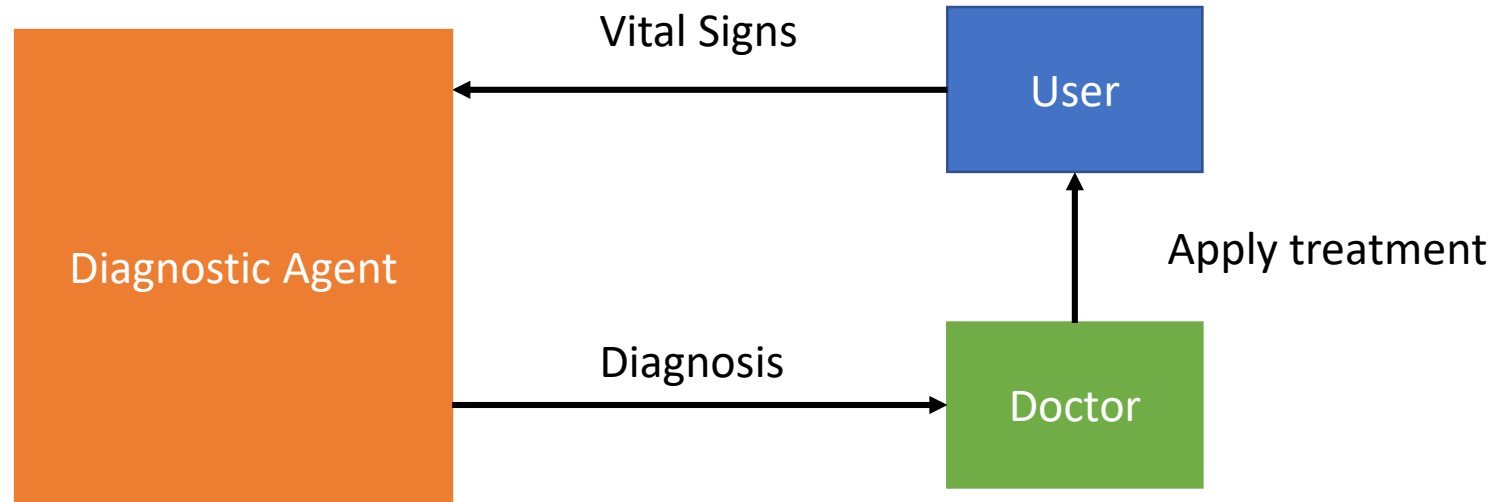
Natural Language Processing: Machine Translation



The image shows the Google Translate web interface for machine translation. At the top, there are two language selection bars. The left bar has buttons for 'English', 'Spanish', 'French', and 'Detect language', followed by a dropdown arrow. The right bar has buttons for 'Spanish', 'English', and 'Romanian', followed by a dropdown arrow. Between these bars is a double-headed arrow icon. To the right of the right bar is a blue 'Translate' button. Below the language bars is a large text input area on the left, outlined in blue, with a vertical cursor and a small 'I' icon. At the bottom left of this area are icons for voice input (microphone) and keyboard input (keyboard). To the right of the input area is a large, empty gray box for the translated text.

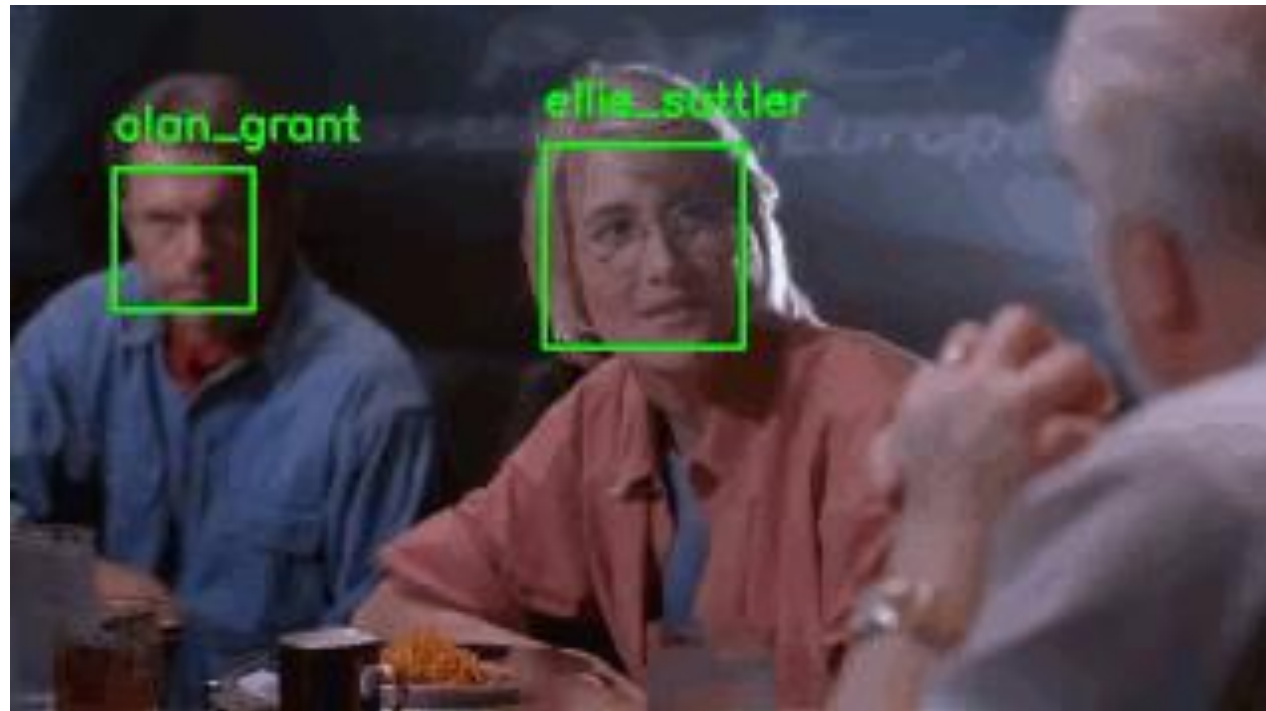
Applications of Artificial Intelligence

Medicine



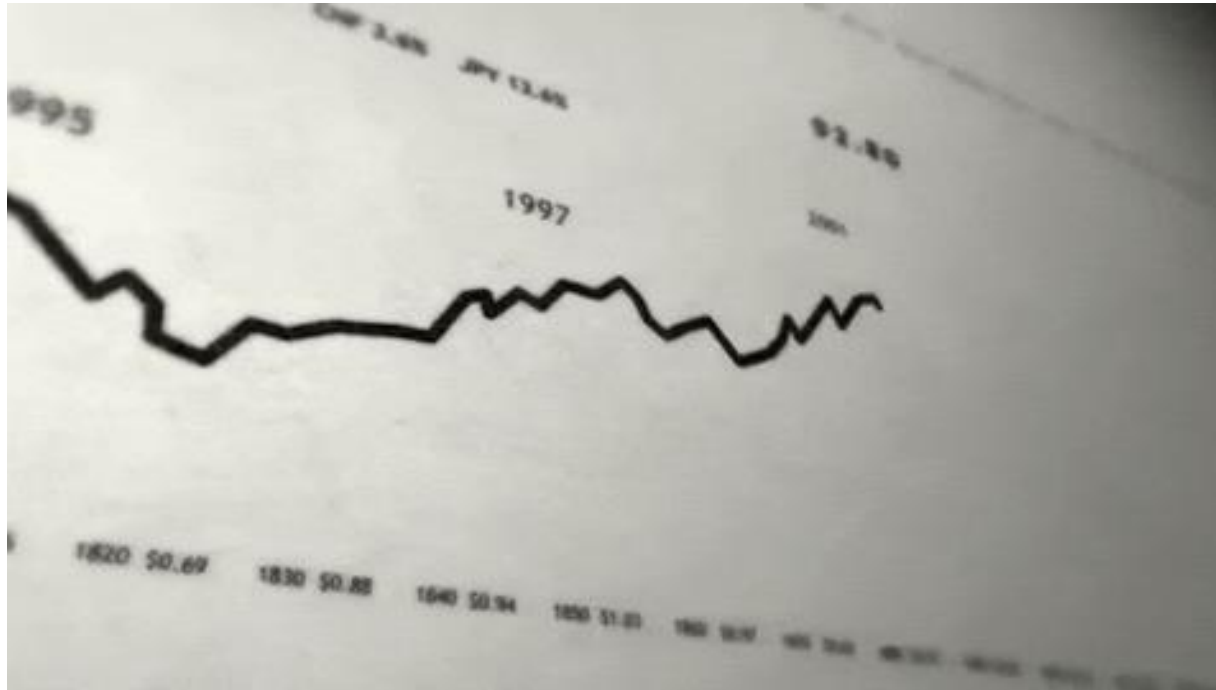
Applications of Artificial Intelligence

Computer Vision: Facial Recognition

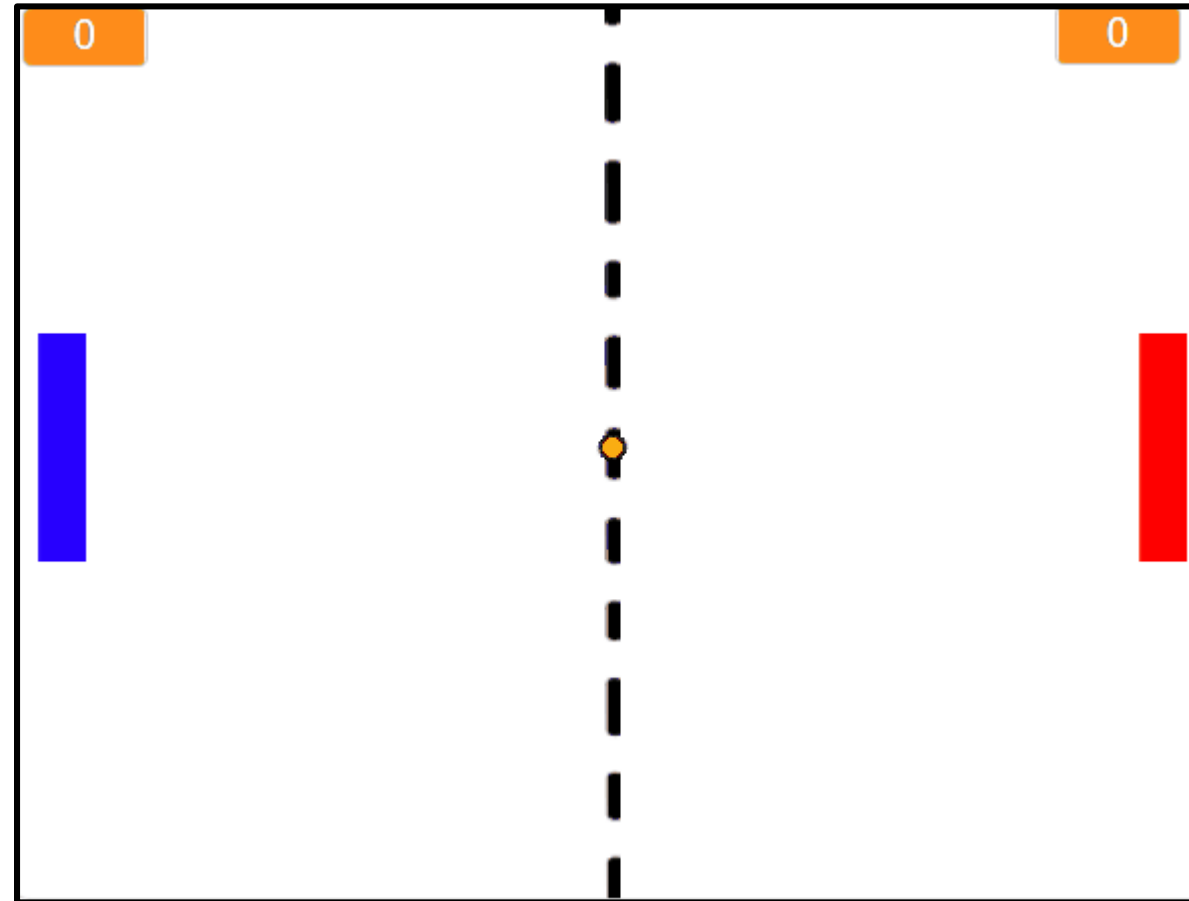


Applications of Artificial Intelligence

Trading Agent: Predicting stock prices and making trading decisions



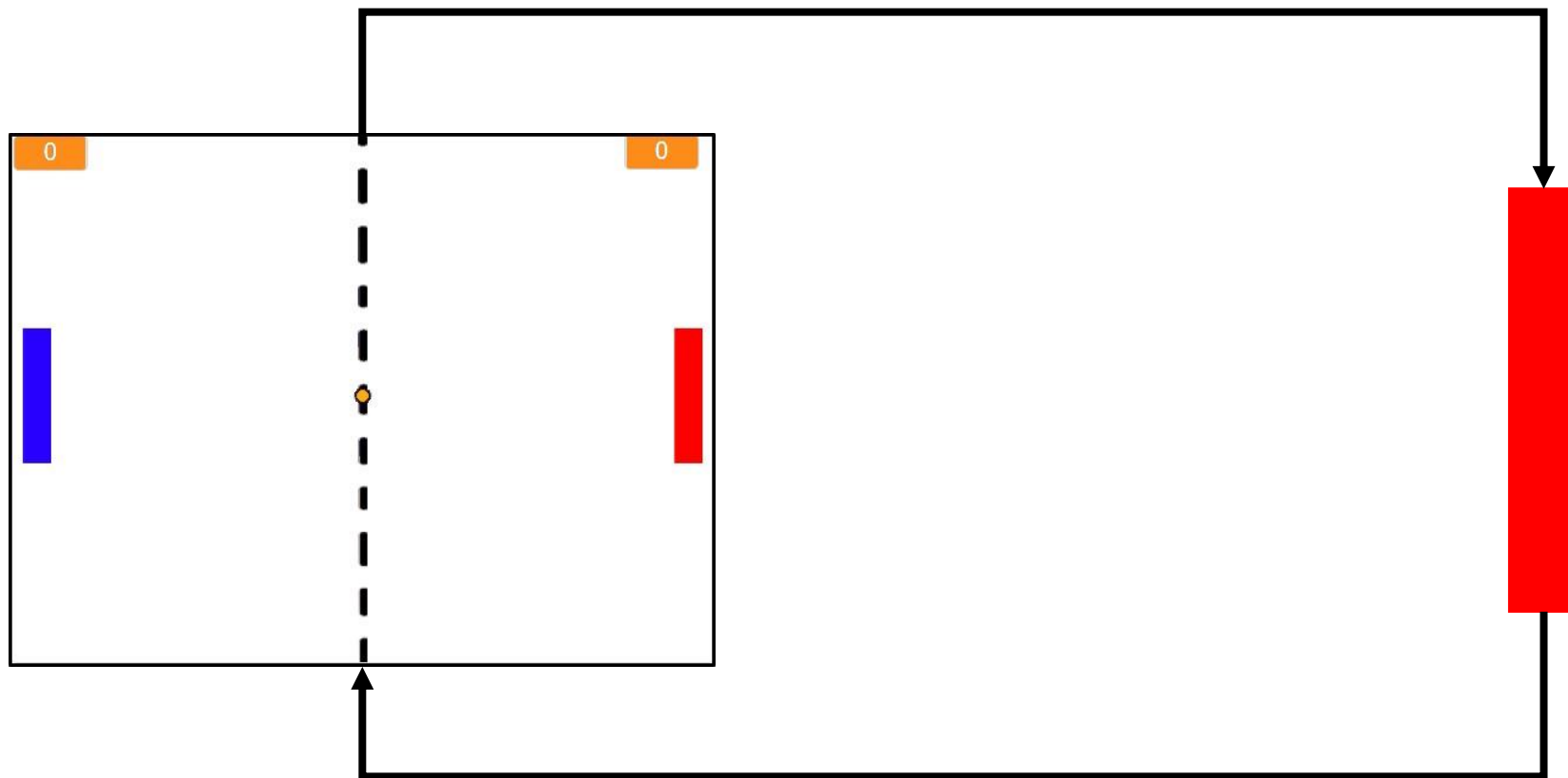
Simple Game AI: Pong



Simple Game AI: Pong

Information

Ball Position, Ball Velocity, Paddle Position

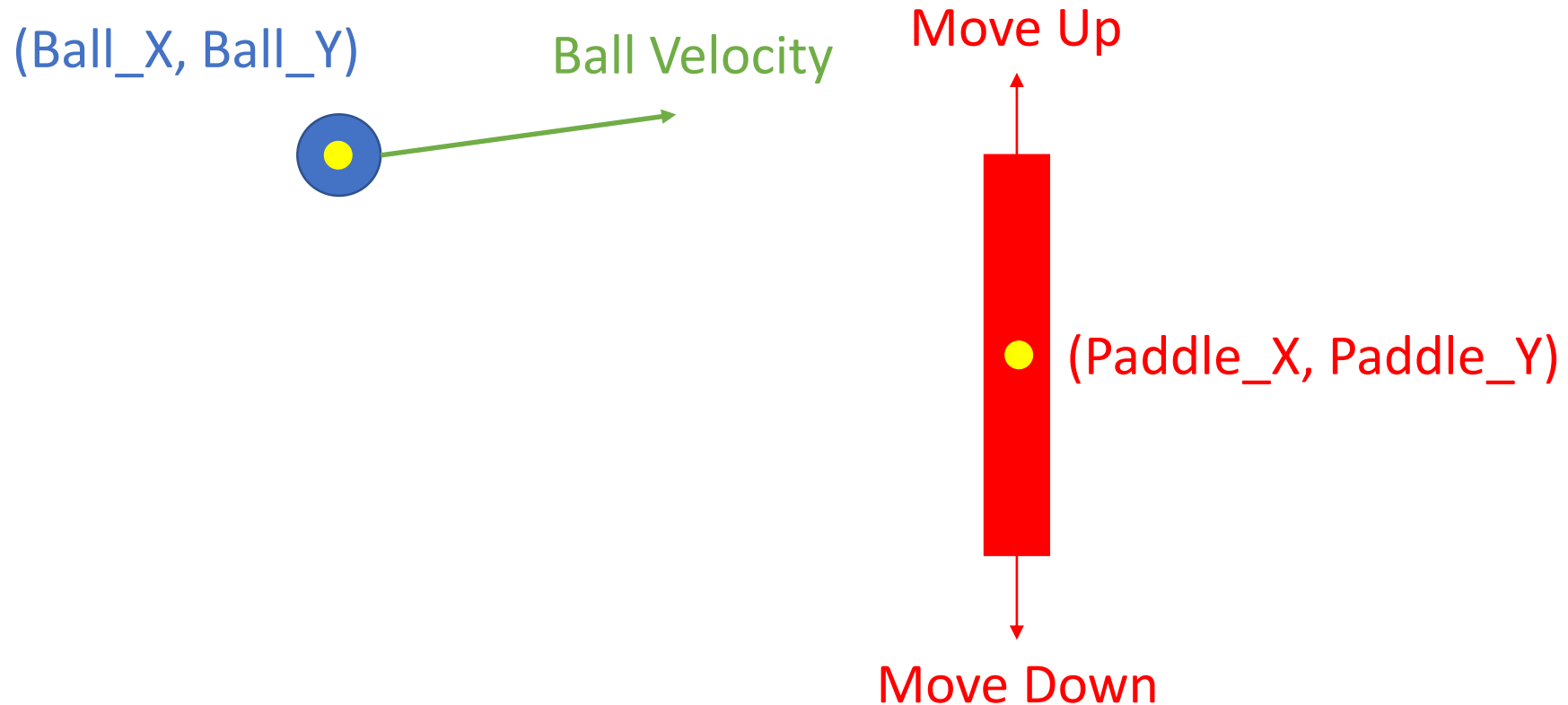


Action

Move Up, Move Down

Simple Game AI: Pong

What action should the paddle take?



Simple Game AI: Pong

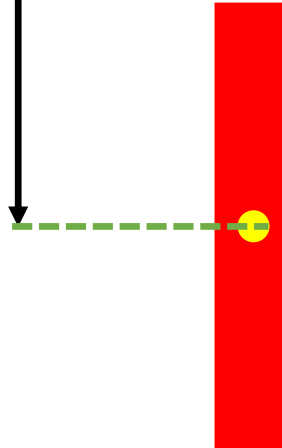
What action should the paddle take?

(Ball_X, Ball_Y)



$$d = \text{Ball_Y} - \text{Paddle_Y}$$

d



(Paddle_X, Paddle_Y)

Simple Game AI: Pong

What action should the paddle take?

(Ball_X, Ball_Y)



d

$$d = \text{Ball_Y} - \text{Paddle_Y}$$

Move Up if $d > \text{Threshold}$

(Paddle_X, Paddle_Y)



Simple Game AI: Pong

What action should the paddle take?

