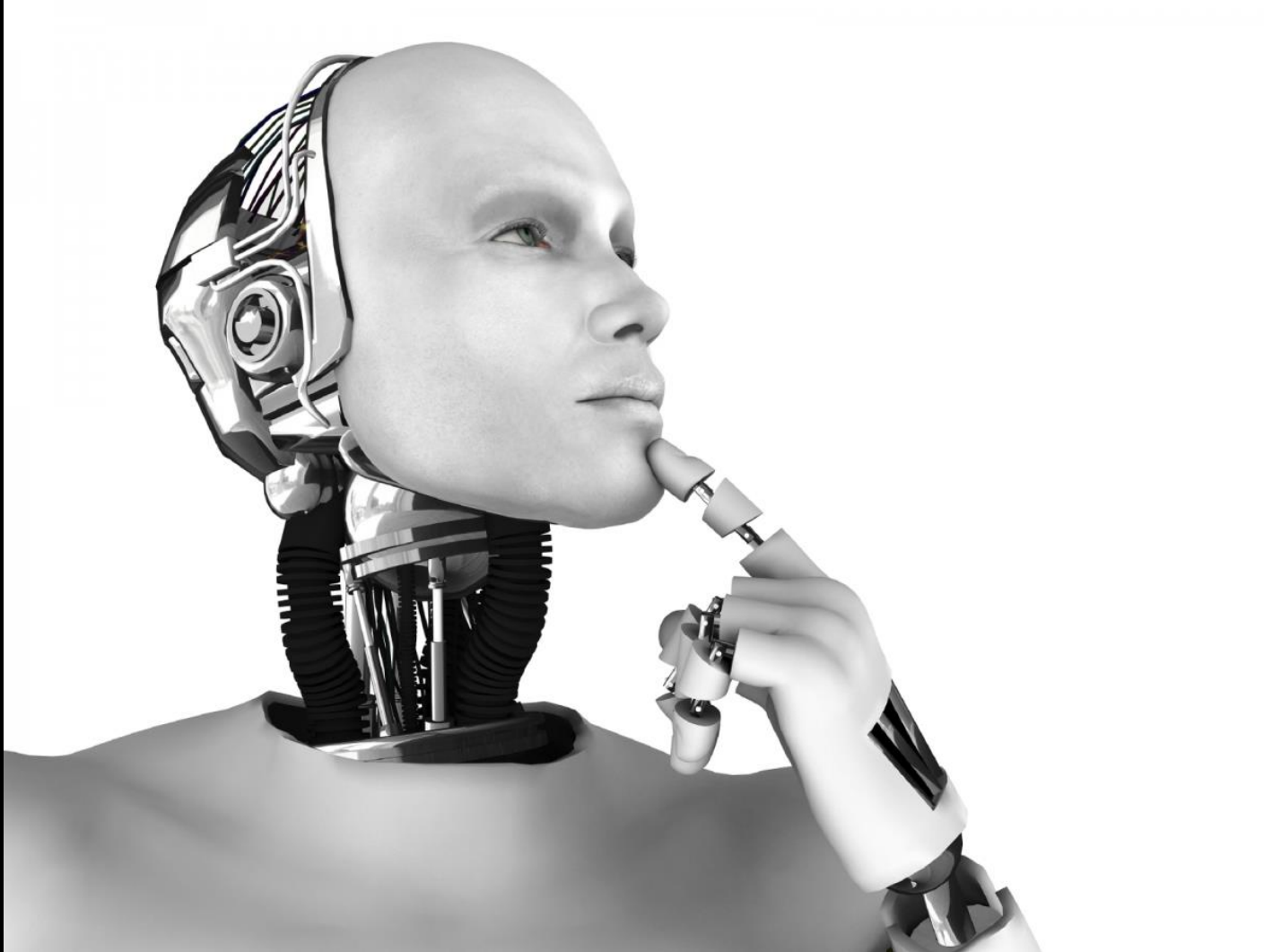


ARTIFICIAL INTELLIGENCE

By Adam Czerwinski

WHAT IS AI?



INTELLIGENCE

- We call ourselves *Homo sapiens*—man the wise—because our **intelligence** is so important to us. For thousands of years, we have tried to understand *how we think*; that is, how a mere handful of matter can perceive, understand, predict, and manipulate a world far larger and more complicated than itself.

ARTIFICIAL INTELLIGENCE

- The field of **artificial intelligence**, or AI, goes further still: it attempts not just to understand but also to *build* intelligent entities.

WHERE DO WE USE AI?

- **Virtual Personal Assistants**

- Siri, Google Now, and Cortana
- Help find useful information when you ask for it using your voice
 - “Where’s the nearest Chinese restaurant?”, “What’s on my schedule today?”, “Remind me to call Morten at eight o’clock”

WHERE DO WE USE AI?

- **Smart Cars**

- Tesla's autopilot feature (but not so advanced, YET –but already used on the road)
- Google Car

WHERE DO WE USE AI?

- **Purchase Prediction**

- Target and Amazon
 - anticipate your needs

- Amazon's anticipatory shipping project hopes to send you items *before* you need them, completely obviating the need for a last-minute trip to the online store

WHERE DO WE USE AI?

- **Fraud Detection**

- Have you ever gotten an email or a letter asking you if you made a specific purchase on your credit card?
 - banks send these types of communications if they think there's a chance of fraud
 - Artificial intelligence is often the technology deployed to monitor for this type of fraud

How *FAST* is Credit Card Fraud Detection?



200

MILLISECONDS

GOOGLE SEARCH

185

MILLISECONDS

HELICOPTER
ROTOR ROTATION

60-80

MILLISECONDS

AIRBAG INFLATION

300

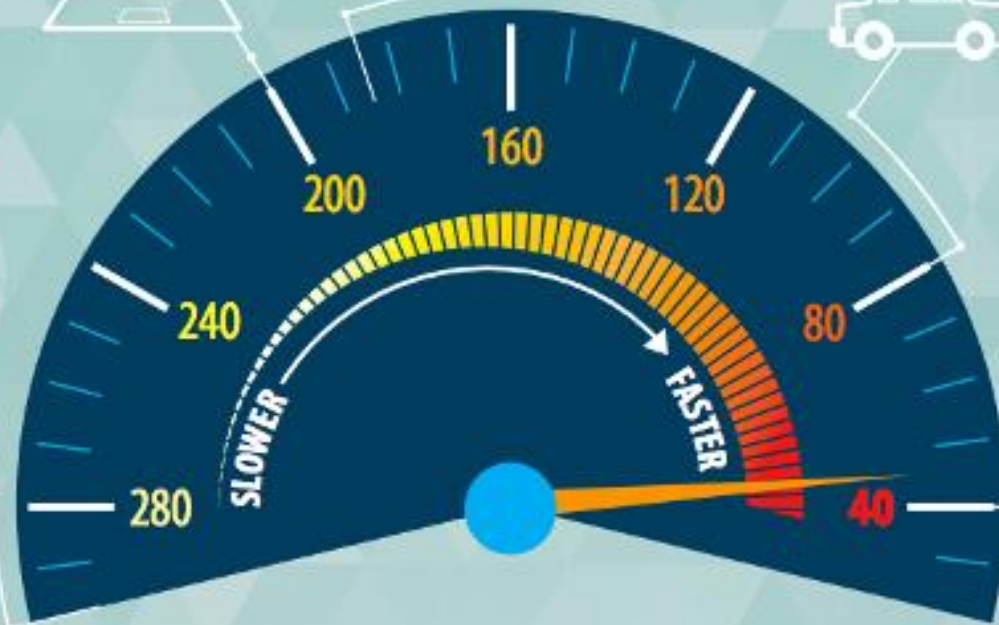
MILLISECONDS

BLINK OF AN EYE

40-60

MILLISECONDS

REAL-TIME ANALYSIS
OF FRAUD RISK



WHERE DO WE USE AI?

- **Security Surveillance**

- single person monitoring a number of video cameras isn't a very secure system
- people get bored easily
- keeping track of multiple monitors can be difficult even in the best of circumstances

- supervised training exercises, security algorithms can take input from security cameras
- determine whether there may be a threat
- alert human security officers
- currently pretty limited
- seeing flashes of color that may indicate an intruder
- someone loitering around a schoolyard etc

WHERE DO WE USE AI?

- **Virus scanning**
 - Use Heuristic rules
 - A **heuristic function**, also called simply a **heuristic**, is a function that ranks alternatives in search algorithms
 - Heuristic scanning looks for code and/or behavioral patterns indicative of a class or family of viruses
 - Different sets of rules for different viruses

WHERE DO WE USE AI?

- **Smart Home Devices**

- Many smart home devices now include the ability to learn your behavior patterns

WHERE DO WE USE AI?

- **Video Games**

- *Far Cry* and *Call of Duty*
- Since the very first video games
- But the complexity and effectiveness of that AI has increased exponentially over the past several decades
- Resulting in video game characters that learn your behaviors, respond to stimuli, and react in unpredictable ways

GOOD BEHAVIOR: THE CONCEPT OF RATIONALITY

- A **rational agent** is one that does the right thing—conceptually speaking, every entry in the table for the agent function is filled out correctly. Obviously, doing the right thing is better than doing the wrong thing, but what does it mean to do the right thing?

GOOD BEHAVIOR: THE CONCEPT OF RATIONALITY

- A **rational agent** is one that does the right thing—conceptually speaking, every entry in the table for the agent function is filled out correctly. Obviously, doing the right thing is better than doing the wrong thing, but what does it mean to do the right thing?
- considering the *consequences* of the agent's behavior.
- When an agent is plunked down in an environment, it generates a sequence of actions according to the percepts it receives. This sequence of actions causes the environment to go through a sequence of states. If the sequence is desirable, then the agent has performed well. This notion of desirability is captured by a **performance measure** that evaluates any given sequence of environment states.

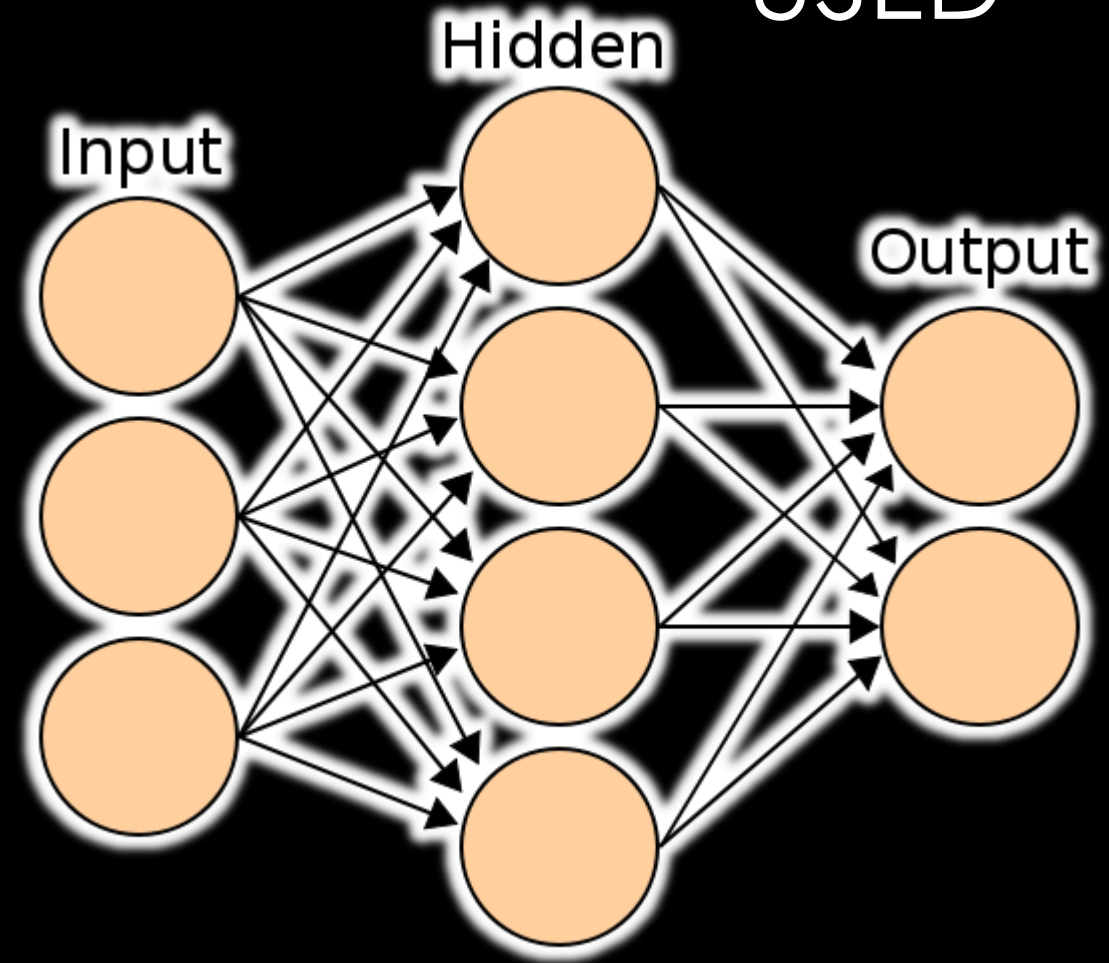
RATIONALITY

What is rational at any given time depends on four things:

- The performance measure that defines the criterion of success
- The agent's prior knowledge of the environment
- The actions that the agent can perform
- The agent's percept sequence to date

TYPES OF AI AGENTS COMMONLY USED

- Decision tree based agent
 - Minimax
- Reinforcement learning agent
 - Q-learning
- Neural Networks
 - ANNs (Artificial Neural Networks)



WORKSHOP

- LUDO game AI
- Goto: <https://github.com/reaverDK/LUDO-AI.git>
- Download repo
- Use Eclipse (or something else) for Java development
- There are two .pdfs for installation guidiness

WORKSHOP

- I have created a SemiSmartLUDOPlayer, BUT
 - It is not very smart a the moment
 - It lacks some heuristics
 - Find the `//*****Add more code here *****/////`
 - Line 46-ish
 - Make some more heuristics 😊