



What is AI?

It is the science and engineering
of making intelligent machines.



What is Intelligence?

Intelligence is the *computational* part of the ability to achieve goals in some world.

There are many other definitions of intelligence,
here we adopt the computational viewpoint.



Side Note – Turing Test

- Alan Turing defined artificial intelligence through the Turing Test
 - If a human communicates with an entity over an opaque channel (that is, the human cannot see the entity) and the human cannot distinguish the entity from another human, then the entity is considered intelligent.
- This is a restrictive definition of AI, since it does not admit other goal-oriented behavior such as insect behavior as intelligence.



Observations

- Various degrees of intelligence occur in people, many animals, and some machines.
- AI does not have to confine itself to biologically observable methods – we can invent new, artificial techniques to make machines intelligent.



Programs vs. Agents

- We all have encountered intelligent programs:
 - Programs that find patterns in data (data mining).
 - Programs that learn how to understand spoken words (e.g., cell phones).
 - Recommendation engines (e.g., Amazon).
 - etc.
- However, we expect more from agents, we expect that they
 - Operate under autonomous control.
 - Perceive their environment (whatever that might be, consider the webbot, its environment are a bunch of connected computers).
 - Communicate.
 - Persist over prolonged periods of time.
 - Adapt to change.



AI & Game Design

- Traditional game design is based on scripting → fragile:
 - When the game changes, all scripts need to be updated manually.
 - The script developer has to foresee all possible situations that might occur → bug prone.
 - Rote scripting can lead to dull and predictable character behavior in the game.



AI & Game Design

- AI is ideally suited for games that have NPCs (non-character players – autonomous game entities not under the control of a human player).
- NPCs can be considered agents:
 - They operate under autonomous control.
 - They perceive their environment.
 - They persist for prolonged time periods.
 - They adapt to change.
- Because agents can adapt they solve two difficult problems in games:
 - No longer dependent of fragile game scripts.
 - Exciting, unpredictable behavior.



The NPC as an Agent

- Agents exist in cyberspace and consequently are not bound by real-world constraints.
- In games that means that agents
 - Can look through walls
 - Move instantaneously from one position to another without expending energy.
 - Shoot without ever missing a target.
 - etc.
- From a human player perspective this does not make an exciting game.

☞ Therefore we will limit the capabilities of agents by placing them in synthetic bodies that are governed by the same laws of the virtual world that constrain the human player
→ embodied agents or animats



The NPC as an Animat

- The constraints of the virtual world make the embodied agent behave much more believably.
- In addition, the better the AI the more believable the character.

Stewart Wilson coined the term animat in his 1991 paper “The Animat Path to Intelligence”.



Our Goal in this Course

- Make the behavior of our animats as believable and realistic as possible using a variety of AI techniques.