Game Artificial Intelligence Introduction

Matthew Guzdial

guzdial@ualberta.ca

Who am I?
Matthew Guzdial (he/him)

VICE

This Algorithm Makes Its Own Video Games

To Matthew Guzdial, a PhD student at GIT's School of Interactive Computing, ... Riedl and Guzdial fed a machine learning algorithm video of ...

Sep. 12, 2018

VICE

Nvidia Says Its AI Created a 'Fully Functional' Version of Pac-Man

Computer scientists Matthew Guzdial and Mark Riedl even created an ... Guzdial, who is now an AI researcher and assistant professor at the ...

Nov. 3, 2016

NS New Scientist

AI makes new video games by watching people play Super Mario and Kirby

Matthew Guzdial and Mark Riedl at the Georgia Institute of Technology in Atlanta have created a machine-learning system that has taught ...

Oct. 24, 2018

zynga®

Unity

Introducing Game AI

AAA Game AI

Indie Game AI

Academic Game AI

AAA Game AI

Two Major Tasks

1. Fake “believable” behavior (cheaply)
2. Data Science

AAA: Fake Believable Behavior

- Enemy/Companion AI
  - Path planning, dialogue, actions/tasks
- Cheaply because of the “tyranny of graphics”
  - Believable behavior with minimal computation makes these techniques useful outside games
  - AI typically only gets 10% of runtime computation in AAA games.
- *These techniques will take up the majority of homework assignments*

AAA: Data Science

- Due to player base sizes, companies rely on statistical machine learning to understand the health of a game
  - Clustering techniques
  - Classification techniques

- *There will be one homework assignment on these topics.*

AAA: Outliers

Indie Game AI

Beyond replicating the tasks of AAA, Indie Game AI uses…

- AI to make up for lack of resources
- AI to create novel experiences

Indie: Lack of Resources

Procedural Content Generation

– Allows for the algorithmic generation of levels, creatures, and more

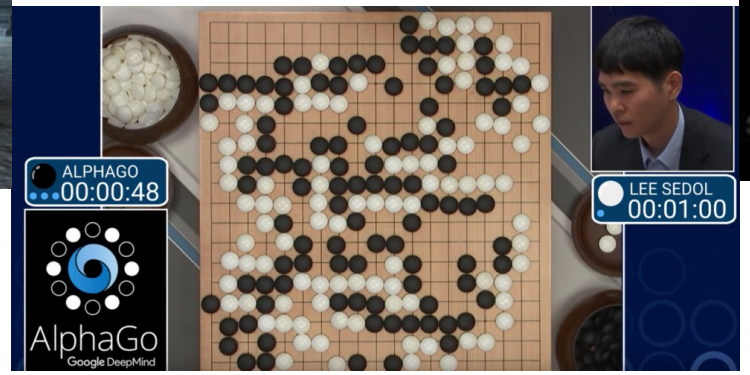
Indie: Novel Game Experiences

Without all/most computation power going to graphics, indie games can use much “stronger” AI.

Academic Game AI

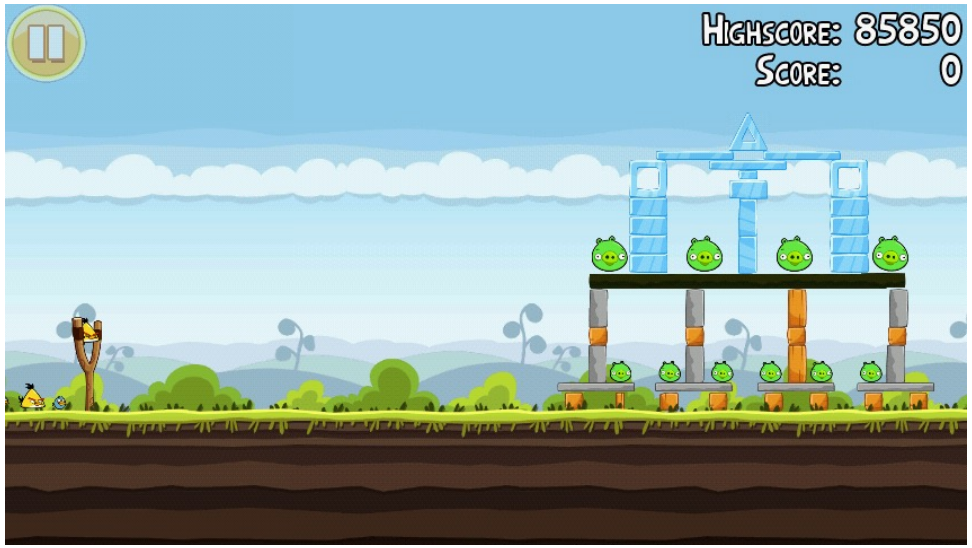
Three main uses:

1. As a stepping stone to real-world applications
2. Aide game developers
3. Push the boundaries of video games



Academic: Stepping Stones

Figure 1: Screen shots from five Atari 2600 Games: (*Left-to-right*) Pong, Breakout, Space Invaders, Seaquest, Beam Rider

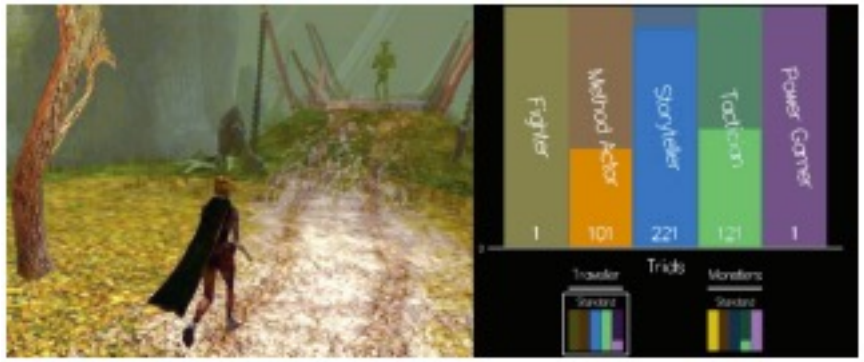


State 1: The old bridge
You are standing very close to the bridge's eastern foundation. If you go east you will be back on solid ground ... The bridge sways in the wind.

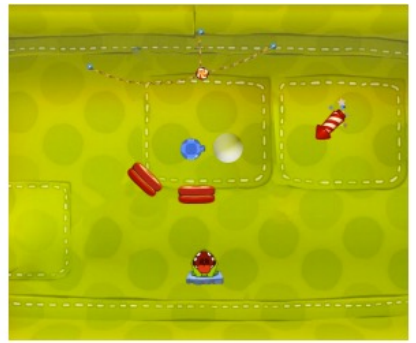
Command: **Go east**

State 2: Ruined gatehouse
The old gatehouse is near collapse. Part of its northern wall has already fallen down ... East of the gatehouse leads out to a small open area surrounded by the remains of the castle. There is also a standing archway offering passage to a path along the old southern inner wall.
Exits: Standing archway, castle corner, Bridge over the abyss

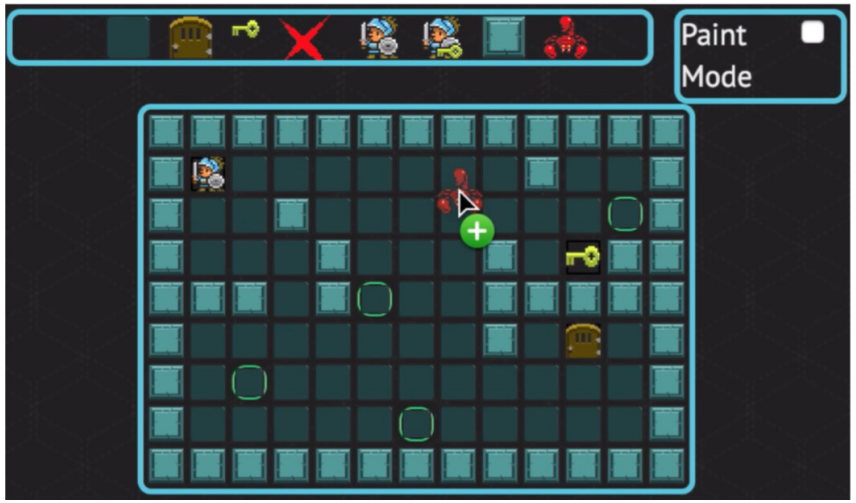
Academic: Aide Developers

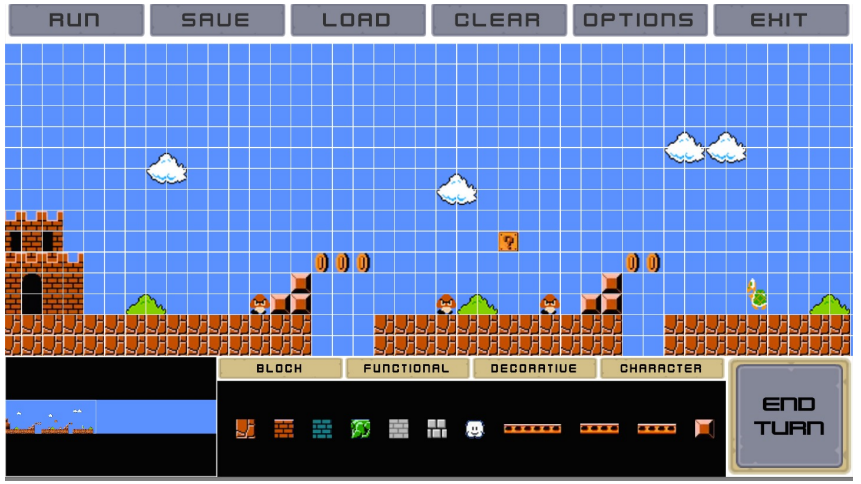


(a)



(b)





Academic: Push Boundaries

Participation Question 1:
What do you hope to learn from this course?

https://tinyurl.com/guz-pq1

Note: You'll need to be logged into Google with your University of Alberta email to access the Form.

What will you get from this class

- Knowledge and first-hand experience implementing common techniques from industry Game AI (pathing, behavior, etc)
- Knowledge and limited hands on experience with indie techniques (PCG)
- Knowledge and on experience with academic techniques
- Knowledge of how these techniques can be applied to a variety of interactive experiences

What you will not get from this Class

- The ability to design games
- The ability to develop games
- Many other things honestly, but those are the two most common misunderstandings

Syllabus Time