Game Artificial Intelligence
(CS 4731/7632)

Instructor: Stephen Lee-Urban

https://www.cc.gatech.edu/~surban6/2019fa-gameAI/

Piazza

Canvas

What's this all about?

- Industry standard approaches to employing "AI" in modern computer games
- Distinctions between Game AI as a discipline and standard AI as a discipline
- Go beyond industry standard Game AI to look at emerging techniques

About the rest

- Self+
- Teaching Philosophy
- Syllabus
- Course Trajectory & Structure
  - (see webpage)

Course Topics

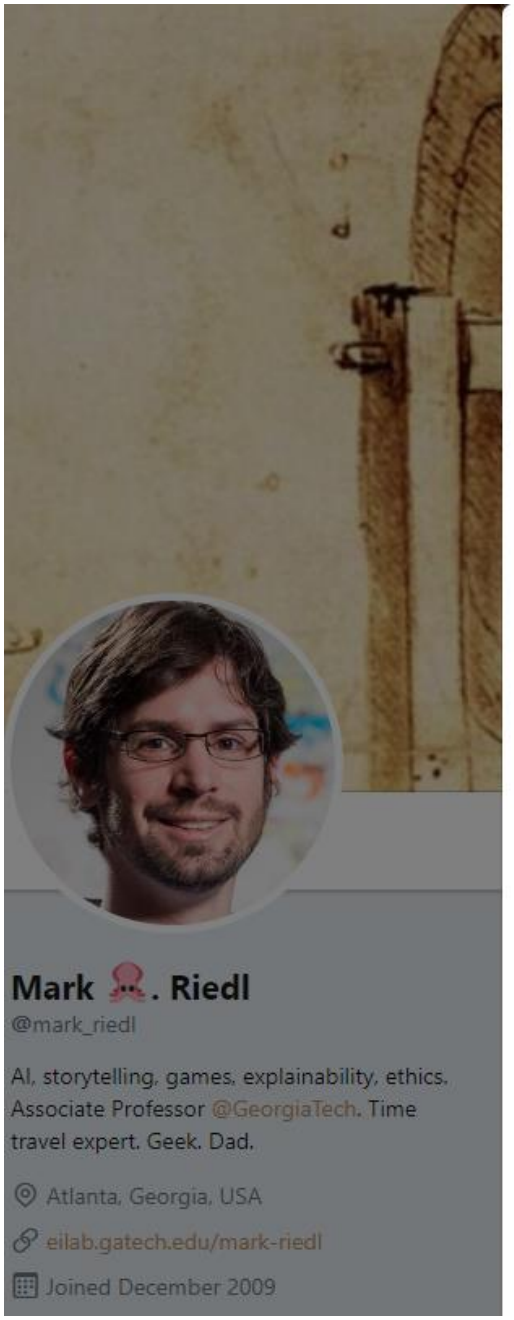
- State of the industry (standard practice)
  - Movement and path planning
  - Decision making
  - Strategy
- Procedural Content generation
- Advanced topics (/Case studies)
  - Believable characters and storytelling
  - Game analytics
  - Reinforcement learning; camera control

Prerequisites(ish)

- Intro to AI course
- Data structures
- Comfort with “no right answer”
- Python familiarity

Homework Assignments

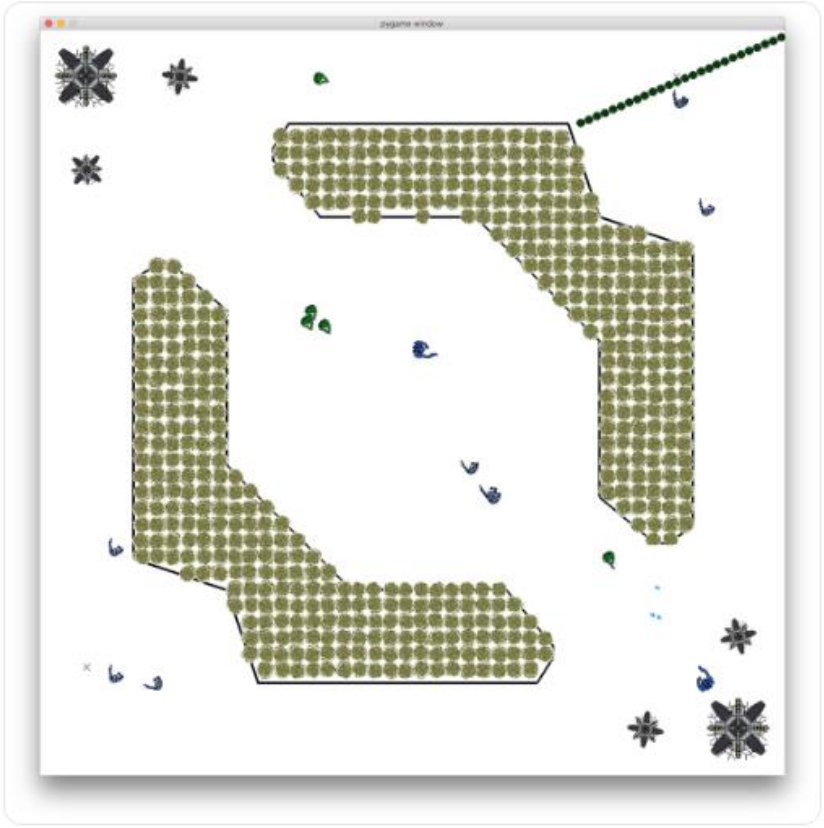
- Custom game engine
- Homeworks progressively build on each other
- Concludes with an AI that can play a Multiplayer Online Battle Arena (MOBA)
- Approximately every 1-2 weeks
- First homework due next week



Mark . Riedl
@mark_riedl

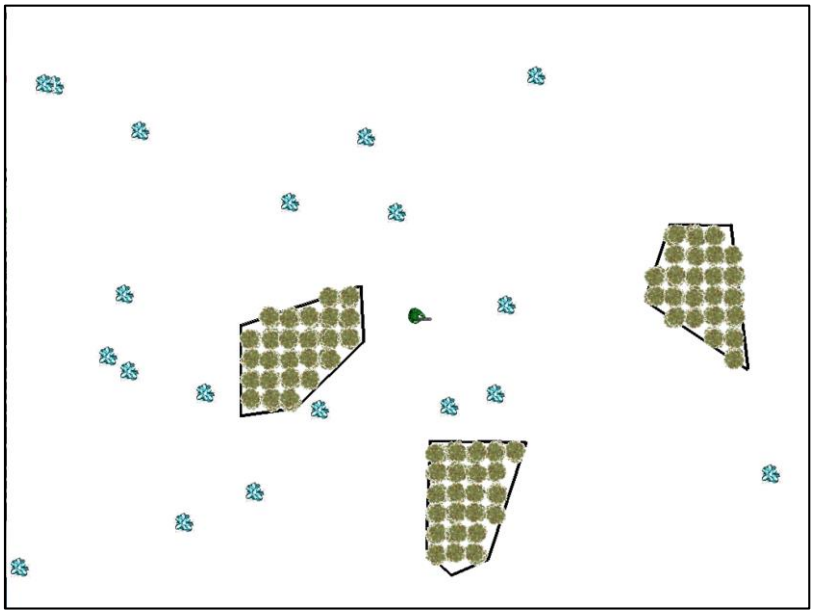
Follow

Hi everyone. I've moved my Game AI course projects to GitHub github.com/markriedl/gaige Includes a custom python game engine, Super Mario Bros. level generation, and some reinforcement learning.

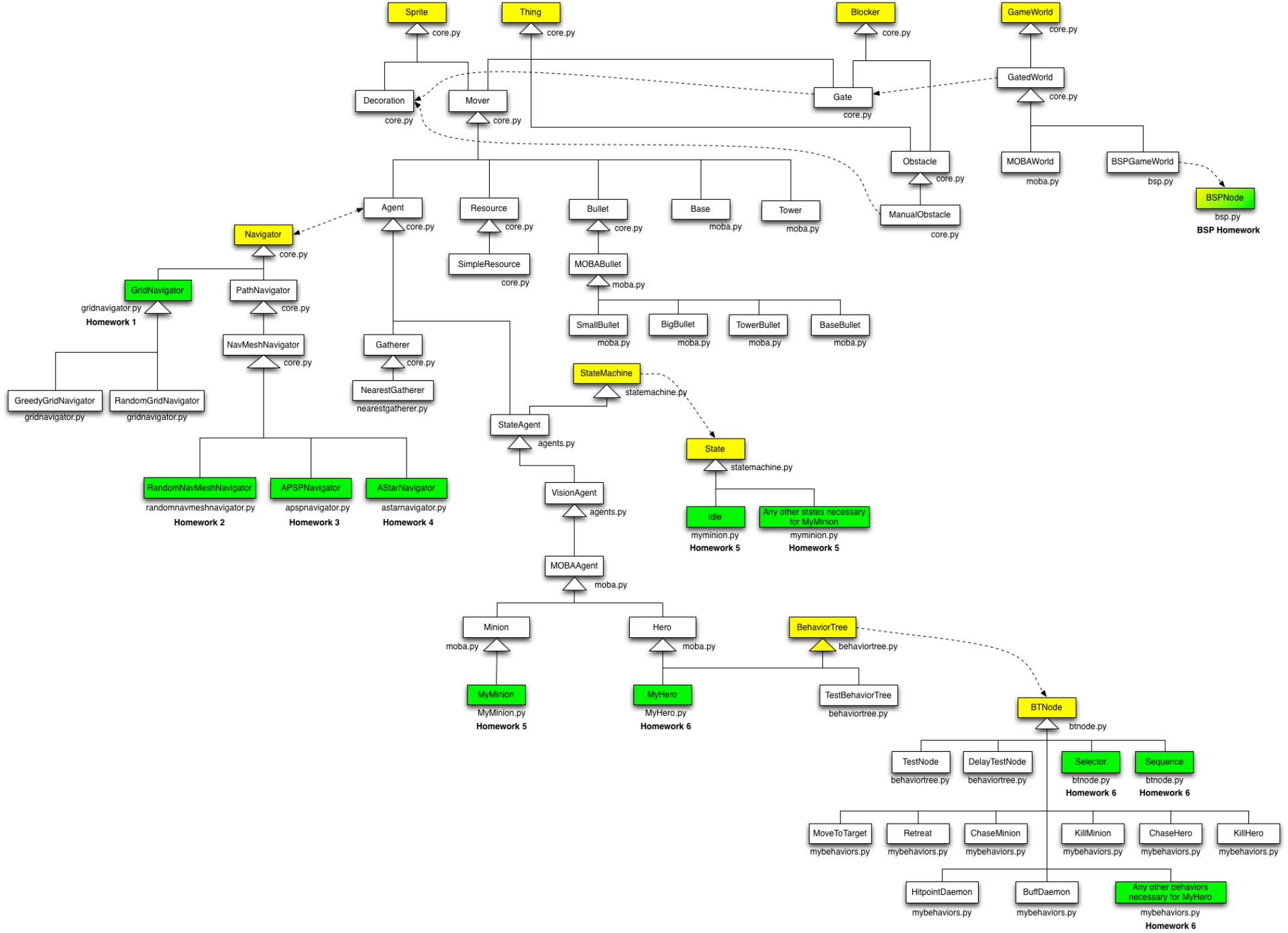


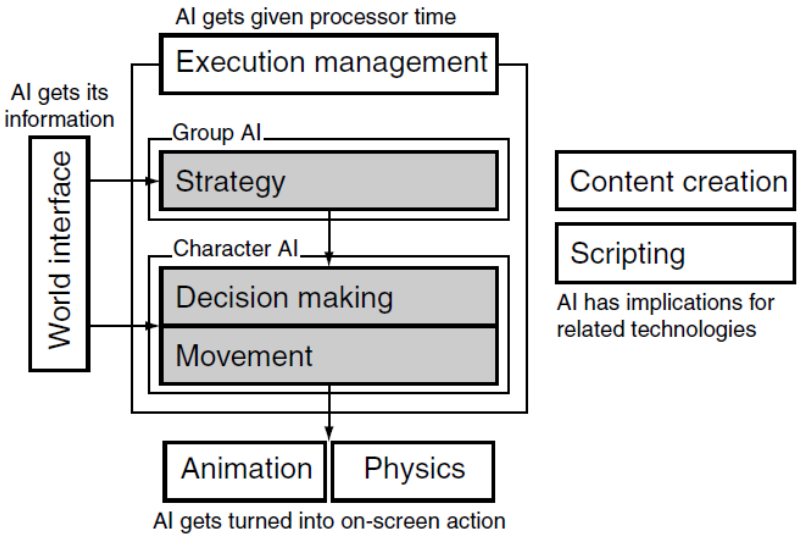
http://eilab.gatech.edu/mark-riedl

Assignments & Grading



- Homework sequence (70%):
  - 1 Grid navigation
  - 2 Path network navigation
  - 3 Nav mesh generation
  - 4 A* pathfinding
  - 5 Minion Agents
  - 6 Hero Agents
  - 7 SMB level generation
  - 8 RL (7k), Squad (4k)
- Exams (15% each)
- Participation and Quizzes (-10%)

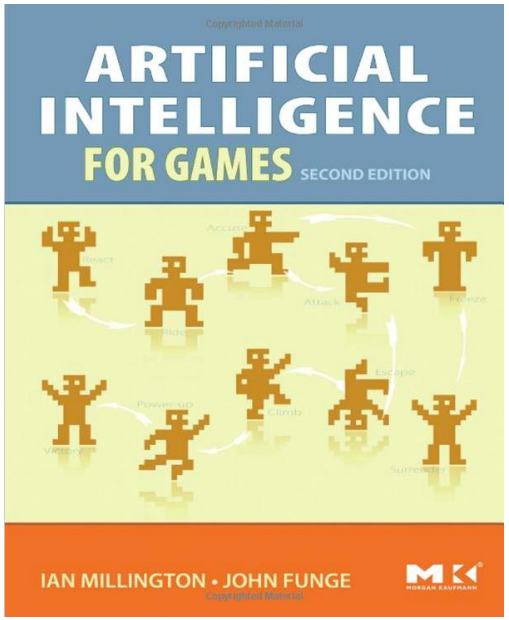

Sprite
core.py
Thing
core.py
Blocker
core.py
GameWorld
core.py
GatedWorld
core.py
Decoration
core.py
Mover
core.py
Gate
core.py
Obstacle
core.py
MOBAWorld
moba.py
BSPGameWorld
bsp.py
BSPNode
bsp.py
BSP Homework
ManualObstacle
core.py
Agent
core.py
Resource
core.py
Bullet
core.py
Base
moba.py
Tower
moba.py
Navigator
core.py
SimpleResource
core.py
MOBABullet
moba.py
GridNavigator
gridnavigator.py
Homework 1
PathNavigator
core.py
SmallBullet
moba.py
BigBullet
moba.py
TowerBullet
moba.py
BaseBullet
moba.py
NavMeshNavigator
core.py
Gatherer
core.py
StateMachine
statemachine.py
GreedyGridNavigator
gridnavigator.py
RandomGridNavigator
gridnavigator.py
NearestGatherer
nearestgatherer.py
StateAgent
agents.py
State
statemachine.py
RandomNavMeshNavigator
randomnavmeshnavigator.py
Homework 2
APSPNavigator
apspnavigator.py
Homework 3
AStarNavigator
astarnavigator.py
Homework 4
VisionAgent
agents.py
Idle
myminion.py
Homework 5
Any other states necessary for MyMinion
myminion.py
Homework 5
MOBAAgent
moba.py
Minion
moba.py
Hero
moba.py
BehaviorTree
behaviortree.py
MyMinion
MyMinion.py
Homework 5
MyHero
MyHero.py
Homework 6
TestBehaviorTree
behaviortree.py
BTNode
btnode.py
TestNode
behaviortree.py
DelayTestNode
behaviortree.py
Selector
btnode.py
Homework 6
Sequence
btnode.py
Homework 6
MoveToTarget
mybehaviors.py
Retreat
mybehaviors.py
ChaseMinion
mybehaviors.py
KillMinion
mybehaviors.py
ChaseHero
mybehaviors.py
KillHero
mybehaviors.py
HitpointDaemon
mybehaviors.py
BuffDaemon
mybehaviors.py
Any other behaviors necessary for MyHero
mybehaviors.py
Homework 6

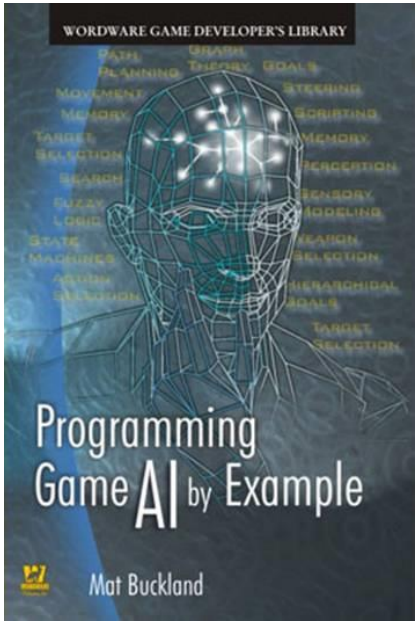

AI gets given processor time
Execution management
AI gets its information
World interface
Group AI
Strategy
Character AI
Decision making
Movement
Content creation
Scripting
AI has implications for related technologies
Animation
Physics
AI gets turned into on-screen action

M&F Fig 1.1

Optional Textbooks

- Millington and Funge, *Artificial Intelligence for Games 2nd ed.*
- Buckland, *Programming Game AI by Example*





M&F

However, throughout this book we've tried to resist the temptation to pass off how we think it should be done as how it is done. Our aim has been to tell it like it is (or for those next-generation technologies, to tell you how most people agree it will be).

The meat of this book covers a wide range of techniques for game AI. Some of them are barely techniques, more like a general approach or development style. Some are full-blown algorithms and others are shallow introductions to huge fields well beyond the scope of this book. In these cases we've tried to give enough technique to understand how and why an approach may be useful (or not).

(legacy) https://github.com/idmillington/aicore

Buckland

"Programming Game AI by Example stands out from the pack by providing industrial-strength solutions to difficult problems, like steering and goal-oriented behavior. Mat guides the reader toward building a foundation robust enough for real games. This book is a must-have for anyone new to the field, and has tips for the seasoned professional as well. I wish I had read it eight years ago!"

---Jeff Orkin, AI architect, Monolith Productions, No One Lives Forever 2 and F.E.A.R

Important Dates

- August 23, Registration Schedule Change Deadline
  - Last day to register, make schedule changes, and/or drop courses without a "W" grade for Fall Semester 2019 by 4:00 pm ET. No changes to audit mode permitted after the registration/schedule change deadline.
- September 2, Official School Holiday - Labor Day
- September 9
  - Verification of Student Participation in Class - Faculty Only
- October 14-15, Fall Recess
- October 26, Withdrawal Deadline
  - Last day to withdraw from a single course or from school with "W" grades for Fall Semester 2019 by 4:00 pm Eastern Time. Students must withdraw from all classes in order to receive a refund.
- October 26, Grade Mode Deadline
  - Deadline to change grade mode from Letter/Grade to Pass/Fail (and vice verse). No changes to Audit mode permitted after the last day of registration. Completed forms, including advisor signature, accepted Monday, October 28, 2019 by 4:00 pm Eastern Time.
- November 27-9, Official School Holiday - Thanksgiving Break.
- December 3, Final Instructional Class Day
- December 5-12, Final Exams
- December 14, End of Term
- December 16, Grade Submission Deadline

What is AI?