GAI Questions

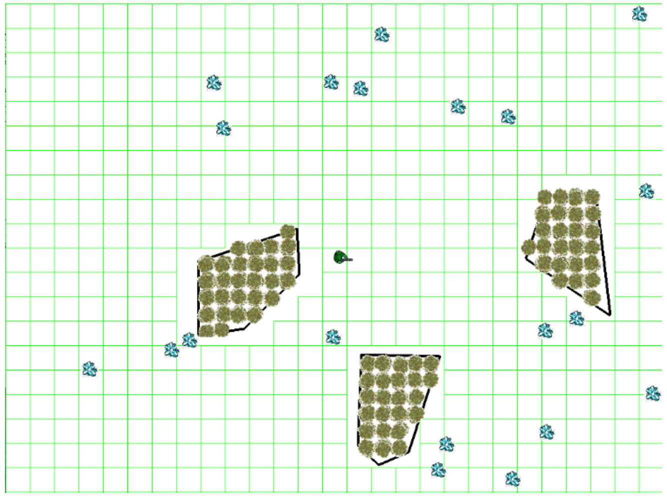
Intro

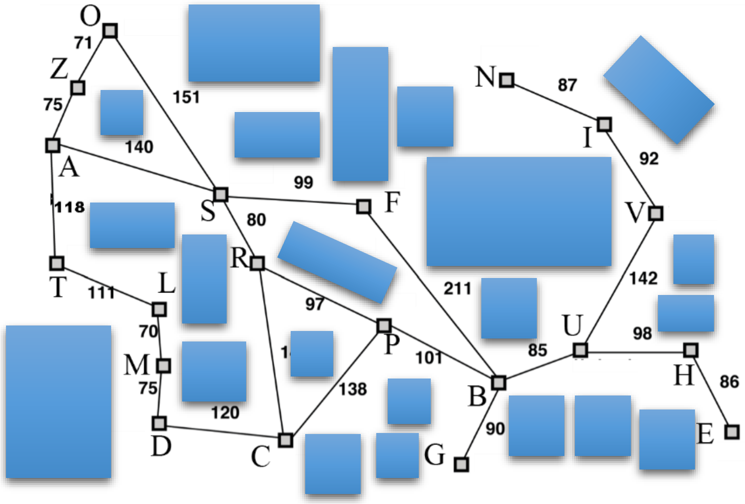
1. How would you describe AI (generally), to not us?
2. Game AI is really about
   - The I____ of I_____. Which is what?
   - Supporting the P_____ E______ which is all about… making the game more enjoyable
   - Doing all the things that a(nother) player or designer…
3. What are ways Game AI differs from Academic AI?
4. (academic) AI *in* games vs. AI *for* games. What’s that?
5. What is the complexity fallacy?
6. The essence of a game is a g__l a set of r__, and a___?
7. What are three big components of game AI in-game?
8. What is a way game AI is used out-of-game?

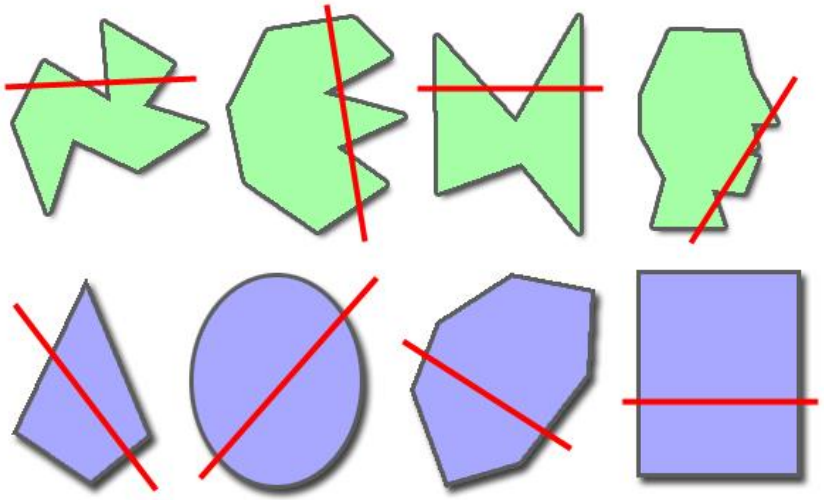
Intro, Graph and Search

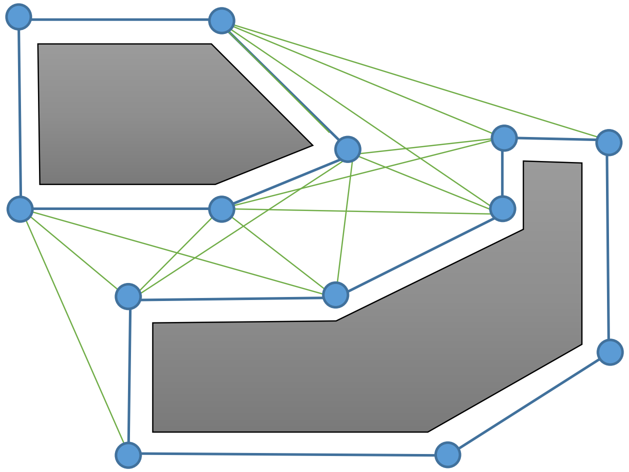
1. How do intentional mistakes help games?
2. What defines a graph?
3. What defines graph search?
4. Name 3 uniformed graphs search algorithms.
5. Name an informed graph search algorithm?
6. What is a heuristic?
7. Admissible heuristics never ___estimate
8. Examples of using graphs for games

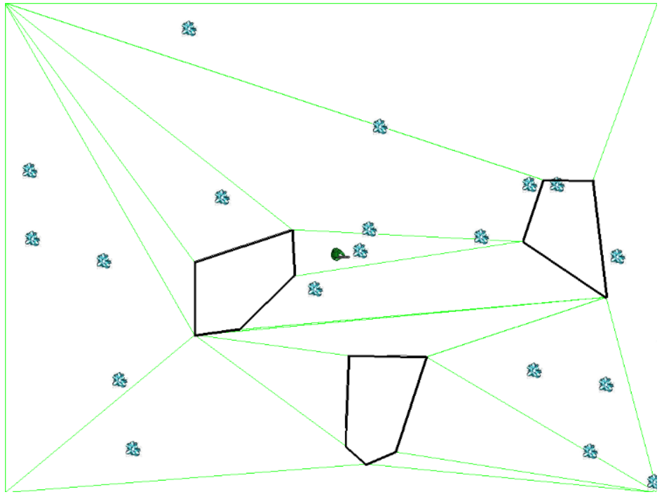
Path Planning and Obstacle Avoidance

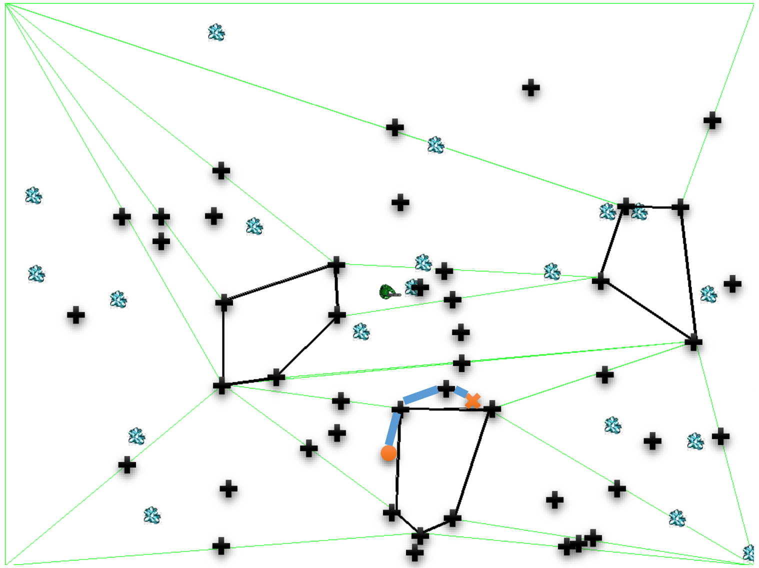












Navigation (1)

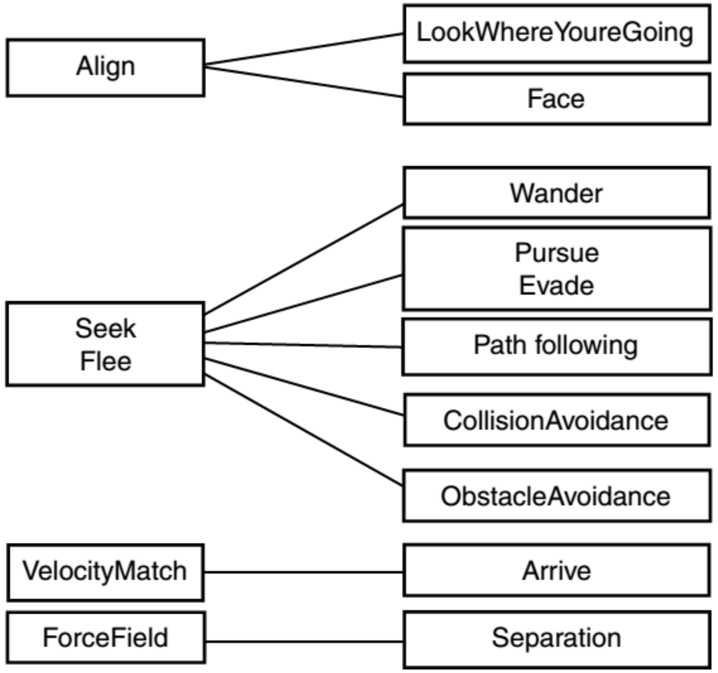
1. What are some benefits of path networks?
2. Cons of path networks?
3. What is the flood fill algorithm?
4. What is a simple approach to using path navigation nodes?
5. What is a navigation table?
6. How does the expanded geometry model work? Does it work with map gen features?
7. What are the major wins of a Nav Mesh?
8. Would you calculate an optimal nav-mesh?

Navigation (2)

1. When might you precompute paths?
2. This is a single-source, multi-target shortest path algorithm for arbitrary directed graphs with non-negative weights. Question?
3. This is a all-pairs shortest path algorithm.
4. How can a designer allow static paths in a dynamic environment?
5. When will we typically use heuristic search?
6. What is an admissible heuristic?
7. When/Why might we use hierarchical pathing?
8. Does path smoothing work with hierarchical?
9. How might we combat fog-of-war?

Steering

1. Steering vs flocking?
2. Steering Family Tree
3. How might we combine behaviors?
4. What three steering mechanisms enable flocking?



Align

LookWhereYoureGoing

Face

Wander

Pursue
Evade

Seek
Flee

Path following

CollisionAvoidance

ObstacleAvoidance

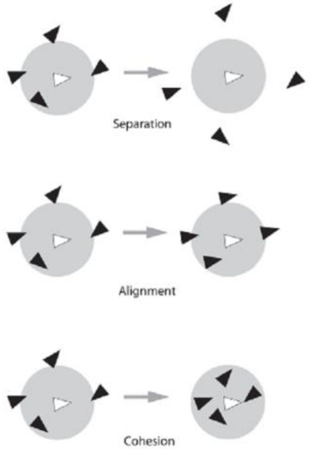
VelocityMatch

Arrive

ForceField

Separation

Millington Fig 3.29



Buckland Fig 3.16

Decision Making (1)

1. How can we describe decision making?
2. What makes FSMs so attractive? What is difficult to do with them?
3. Two drawbacks of FSMs and how to fix?
4. What are the dimensions we tend to assess?
5. FSMs/Btrees: ____ :: Planning : _____
6. For the 2nd blank, we need m_____s.
7. When is reactive appropriate? Deliberative?
8. What is the ‘hot-potato’ passed around (KE)?
9. H______ have helped in most approaches.
10. Which approach should you use?

Decision Making (2)

1. How many outcomes does a d-tree produce?
2. What are advantages of D-Trees?
3. Discuss the effects of tree balance.
4. Must d-trees be a tree?
5. Can d-trees translate into rules? If so how?
6. How can we use d-trees for prediction?
7. What is the notion of overfitting?

Decision Making (3)

1. What are two methods we discussed to learn about changes in the world state?
2. What are the 2 most “complex” decision making techniques we’ve seen?
3. What are their strengths? Weaknesses?
4. What is the key (insight) to their success?
5. What is typically necessary to support this insight (hint: used in Planning + RBS)?
6. What does Planning have that (forward chaining) RBS do not?
7. When do we need a communication mechanism?

Decision Making (4)

1. Cooperative problem solving / distributed expertise is using h___ to d__ problems into smaller parts.
2. R__ experts rarely communicate/collaborate.
3. Three types of communication are…
4. The three main parts of a Blackboard are…
5. An Arbiter can be used to…

Decision Making – Fuzzy Logic

1. Fuzzy Logic : D.O._. to model V__
   :: Probability theory: Model N_-D___
2. Three steps in fuzzy rule-based inference…
3. Example membership functions (Triangular…)
4. What is the vertical line rule?

PCG

1. PCG can be used to p____ or a____ game aspects
2. Why does industry care about PCG?
3. What are some risks of PCG?
4. Major concerns involving PCG include…
5. What is a player model? What does it allow?
6. What are ways to get a player model?
7. Bartle’s 4-part feature vector: <k,a,e,s>
8. Design-time vs run-time PCG?

PCG as Local Search

1. What “search” is happening? Do we seek a path to goal?
2. What is the state space? How many states do we save?
3. How memory efficient is this search?
4. Hill climbing: (PCG as parameter search part 1)
    1. L____ search
    2. What is the “landscape”?
    3. Need a function that maps p____ to f_____
5. GAs: (PCG as parameter search part 2)
    1. Good in ______ domains, where _D.K.__ is scarce or hard to encode
    2. Can also be used for ____ search
    3. Also needs a f_____ function (maps c____ to f_____)
6. Other local search techniques
    1. Gradient Descent
    2. Simulated annealing
    3. Local beam
    4. Tabu
    5. Ant Colony Optimization

PCG and GAs

1. Create a random set of *n* chromosomes (**population**)
2. Assign a fitness score to each chromosome (**fitness function**)
3. Remove the *m%* (*m* < 100) worst chromosomes
4. Cycle through remaining pairs of chromosomes and *cross-over* (with some probability)
5. Randomly mutate (during?) cross-over (with some probability)
6. Reduce new population to size *n*
7. Repeat steps 2-6 until [stepwise improvement diminishes || one individual is fit enough || # generations reached]

- Tuning parameters
  - Population size
  - Number of generations
  - Fitness function
  - Representation
  - Mutation rate
  - Crossover operations
  - Selection procedure
  - Number of solutions to keep

Prediction

1. N-grams: Increasing the window size helps initially, but hurts later. Why?
2. What is a hierarchical N-gram and what does it do?
3. What are the 4 processes, each beginning with an "R", commonly used to describe the CBR methodology?
4. The ______ metric is used to find the problem/solution pair in the casebase most related to the new problem, by comparing the relatedness of the features of the new problem to the features of known problems in the casebase.
5. What are some advantages of CBR? Disadvantages?
6. A foundational assumption in CBR is that "Similar problems have _________ __________".