AI IN STRATEGY GAMES

TJ PARSONS
REAL-TIME STRATEGY (RTS)

• Aspects
  • Resource management
  • Decision making under uncertainty
  • Spatial and temporal reasoning
  • Collaboration
• Micromangement vs. Macromanagement
• Starcraft
AI PARAMETERS

- A set of *basic* actions that can be used
- A set of *sensors* to obtain information about world state
- A set of *goals*
CASE-BASED REASONING (CBR)

- Abstract the state space and use it for reasoning about goals
- Solving new problems based off of past experiences
- Currently used in games like checkers, chess, and Othello
- Learn based off of player replay logs
THE CBR MODEL

• Game play states = Constructed buildings, military, money/resources
• Tactics = Evaluating next construction
  1. Evaluate buildings, units, and technologies of both players
  2. Get the corresponding strategies associated with current state
  3. If there is a strategy that is ranked higher than the current, change strategies
ADVANTAGES OF CBR MODEL

- Despite nearly infinite gameplay states, players only use between 3-5 strategies at any given time.
- Only 10-30% of gameplay states are ever seen in real gameplay.
- Since players use limited strategies, the AI can predict future gameplay states relatively accurately.
DISADVANTAGES OF CBR MODEL

• Entirely reliant on gameplay replays to allow the AI to learn
  • Difficult to get complete game replay logs from a strategy game in a form that is easily digestible by an AI
• When unknown or illogical strategies are used, AI cannot react
• Difficult to represent a “strategy”
REACTIVE PLANNER

• Split gameplay into isolated sub-problems and solve them independently
• Provides individual managers, or agents, to handle each sub-problem
  • **Problem:** How to handle competition for limited resources between managers?
  • **Solution:** Interact with external case-based reasoning system
EISBOT

- **Strategy manager**: responsible for the strategy selection and attack timings
- **Income manager**: handles resource units, workers, and expanding
- **Construction manager**: responsible for requests to build structures
- **Tactics manager**: responsible for combat tasks and micromanagement
- **Recon manager**: scouting behaviors
- All of these managers share a **working memory**
CONCLUSION

• AI still requires a large amount of hand-authoring behaviors
• Current AI level is above novice players and about on par with amateur competitive players
• For EISBOT, win rate was 32% against players, and a 78% win rate against built-in AI