Creating an intelligent agent for StarCraft: Brood War

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Professional Focus
Introduction

* Computers
  * Why artificial intelligence (AI)?

* Video games
  * Why real-time strategy (RTS) games?
Chapter I

StarCraft: Brood War
History

- Developed by Blizzard Entertainment, Inc. and released in 1998

- Proved successful as it continues to drive popular video game leagues even 10 years after its release, especially in South Korea
* 3 races (Terran, Zerg and Protoss)
  * different (but balanced!) with unique abilities and characterized by a distinct play style

* Rich resource mechanics
  * minerals, gas, supplies (reclaimable)

* Lots of units with many attributes
Interface

- Resource panel (overlay) [1]
- Command panel [2]
- Portrait [3]
- Unit information [4]
- Mini-map [5]
Chapter II
Agent Design
Design Overview

Orders travel from the strategy manager down to individual units. They start as abstract orders and are processed by the intermediate managers, eventually translating into concrete unit commands.
Strategy Manager

- Simplified game state
- Trigger-based decisions
Production Manager

- Build order management
- Worker assignment
Combat Manager

- Combat flags
- Military unit assignment
- Squad deployment
Military Squads

- Target selection
- Formation and behavior
Work Squads

- Resource gathering
- Building construction
Order Processing

Production Order
- Train 8 marines
- Build barracks
- Acquire resources
- Gather minerals

Combat Order
- Attack
- Create 2 squads
- Destroy outpost
- Kill a patrol unit
Chapter III

Implementation
StarCraft is not open source!

- The Brood War Application Programming Interface (BWAPI) is an open source C++ “hacker” framework and provides hooks to access the game state and issue commands.
- BWAPI add-ons: BWSAL, BWTA, etc.
- BWAPI is not perfect!
How does it work?

Normal flow:
- Draw screen
- Take user commands
- Compute next frame
- Draw screen

Altered flow:
- Draw screen
- Agent processing
- Compute next frame
- Take agent commands
Chapter IV

Results
Final Words

* The project was successful!
  * Primary objective met
  * Very useful for the years to come
The End

Thanks for listening!