|  |
| --- |
| Drexel University Graduate Thesis |
| Intent Recognition Engine (IRE) |
| Software Requirements Specification |

|  |
| --- |
| Michael Kozak  3-5-2018 |

Contents

[Common Terms 1](#_Toc508059197)

[Overview 2](#_Toc508059198)

[Purpose of this Document 2](#_Toc508059199)

[Software Requirements 2](#_Toc508059200)

[Top-Level Requirements 2](#_Toc508059201)

[Requirements Breakdown 3](#_Toc508059202)

[Testing 3](#_Toc508059203)

[Target Test Metrics 3](#_Toc508059204)

[Test Plan 4](#_Toc508059205)

# Common Terms

|  |  |
| --- | --- |
| Term | Definition |
| Blueforce | Player or Allied army |
| Redforce | Hostile player |
| Capability | Unit, building, or upgrade |
| Research | Upgrades of unit or building capabilities purchased through an already built building |
| Strategy | A discrete collection of Capabilities in particular ratios designed to gain dominance over an opposing player with a bias towards land, hybrid, or air combat |

# Overview

The Intent Recognition Engine (IRE) is a new component in the NOVA StarCraft AI. IRE enhances NOVA’s current capabilities by reasoning on partial observability of enemy capabilities in order to infer likely strategies. These inferences are then passed to the NOVA strategy manager for preparing effective counter-strategies prior to a full-scale attack.

# Purpose of this Document

The purpose of this document is to provide background information as to the design decisions made within IRE by detailing the top-level requirements that form the objectives for the program, which are then decomposed into functional and operational requirements. In addition, details of the target metrics and test procedures to be used in validating and verifying the system against these requirements are provided below.

# Software Requirements

StarCraft Brood War v1161

Nova Master GIT pull

BWAPI v4.20

BWTA v2.2

Visual Studio 2017 (v141)

Boost v1.66.0

Apr

Apr-util

Geometry-develop

Log4cxx for Visual Studios 2010 (v100)

# Top-Level Requirements

|  |  |  |
| --- | --- | --- |
| ID | Requirement | Test Method |
| 01 | *The system shall represent the relationships and dependencies between units, buildings, and upgrades* | Visual |
| 02 | *The system shall, given a Capability, determine what must be built or researched and what could be built or researched relative to other units, buildings, and upgrades* | Automated |
| 03 | *The system shall, given a partial view of an enemy base, determine what must be built or researched and what could be built or researched relative to other units, buildings, and upgrades* | Automated |
| 04 | *The system shall maintain a set of coarse strategies based on common play styles* | *Visual* |
| 05 | *The system, given a representation of redforce Capabilities, suggest a strategy that the redforce is using* | *Automated* |
| 06 | *The system shall, given multiple of a Capability detected, adjust the probability of each possible strategy* | *Automated* |
| 07 | *The system shall, given ground truth and a predicted strategy, update the probabilities for the strategy based on Capability overlap* | *Automated* |

# Requirements Breakdown

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Requirement | Test Method | Target |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Testing

## Target Test Metrics

Metric 1: Win Ratio

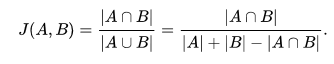
* Compare win/loss ratio of base NOVA and inference NOVA

Metric 2: Race-Specific Win Ratio

* Split AI into each strategy and generate W/L ratio on a per-strategy basis

Metric 3: Prediction Accuracy

* Measure **Jaccard index** of the system:
  + Where A = number of accurate predictions
  + And B = number of total predictions



## Test Plan

Validate:

* For each unit type, generate research trees and validate
* For each building type, generate research trees and validate
* For each upgrade type, generate research trees and validate
* For each pair of unit and building, generate research trees and validate

Verify:

* 1000 Matches with and without inference engine (enemy team set to random)