# Introduction

## What/Purpose/Continuity

* One of the most important parts as **goals** are introduced, **motivation** is presented, and **structure** is described

## How/Literature cove

* Introduction – broad introduction to area of ai, rts and sc, recent successes
* Motivation – what is current problem in our point of view vs. [1] (surveyed more in 3rd section) – creating bot requires many domain knowledge (which many creators of bots do not have because game is 20 years old). It is hard to employ domain knowledge (most of it is hardcoded). IRL can be a viable option given correct search space decomposition and can be seen as fresh way how to get some expert level knowledge in alignment with [3]. Also one can not concentrate on one technique at hand to solve problem – due to No Free Lunch Theorems [9], multiagent-system seems like nice way how to put things together [1], [2], [3].
* Goal, Objectives + guideline – we want to create bot learning domain knowledge employing replays, we will use IRL. To be able to integrate IRL with agent we need to reduce search space. This is done by decomposition using MAS which should be able to integrate other techniques for solving other problems which can now bots do better compare to human
* Outline – how does it works with objectives/guideline, how they are met

## Notes

## Body

The main goal of artificial intelligence (AI) is to make intelligent entities. As intelligence is relevant to any intellectual task, this makes AI very exciting universal field. One of the most popular ways how to study intelligence of our built intelligent entities is by playing computer games. In fact, many successful advancements in AI capabilities are demonstrated this way. Most profound recent examples are AlphaGo mastering game of Go [1] or even more exciting DeepStack [2] expert level AI playing No-Limit Poker – game of imperfect information. Those demonstrations are quite impressive, but there is still more challenging test-benches to overcome – real-time strategy (RTS) video games focused on defeating opponents in a military scenario. In those games, AI systems still lack behind human players.

This thesis concentrates on the development of framework and means to employ examples of individual human play in building an agent for playing RTS Starcraft: Brood War. This game was a massive success when it was released in 1998 and established itself on competitive RTS gaming scene. Despite its fame which can be counted mainly to its deep strategic space and fun and reliable mechanics, is also interesting for many other reasons. There are many competitions for AI bots (organized by AIIDE, CIG, and SSCAI [3]) so one can see easily how his agent is doing against other. On top of that, almost after 20 years after its release, the game is still played by humans so one can let agent play versus human which make from the Starcraft interesting benchmark. Given competitions and popularity, much effort was put into studies of the subject. Also, huge data set of examples of individual human play demonstrations is available.

### Motivation

Nature of the Starcraft to some extent reach the complexity of the real world. Playing the game requires a lot of cognitive capabilities as the player usually has to manage many different tasks at once in real time to achieve the high-level objective to defeat the opponent. Defeating opponent involves much decision-making in a dynamic environment of imperfect information. Those classify Starcraft as a multi-scale AI problem as suggested in [4]. Viewing problem in this way motivate heterogeneous architecture where the task can be formulated on a different level of abstraction and independent of others to find the solution easier.