ADAPTIVE POKER BOT BASED ON PLAYER-MODELLING

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Abstract

Poker is a game which have a lot of different aspects which makes it a very interesting game to implement artificial intelligence (AI) into. The game is unlike games like chess and backgammon as poker has the problem that the information is imperfect. This is also one of the reasons why poker is interesting topic in regards to artificial intelligence as it opens up for some problematics as how to handle the information we have in regards to what we do not have. Because of this hidden information there are many decision to decide from, as we have to take into account all the information that we have access to and the possible information which is hidden from us. Another thing that makes poker interesting to have a look at is that we now have opponents who has the opportunity to trick us into thinking that he is in another state than what he actually is. In this bachelor thesis we will present a way to implement a neural network in a poker game to teach the bots how to play Texas Holdem Poker. The neural network will keep evolving along the opponents to ensure that the bot has the best possible chances of winning or minimize the loses. We will test the bots against real life human players in many suitable situations and from these results we can determine how effective our neural network is at teaching our bots how to play the game.

Preface

This is a bachelor thesis consisting of 15 ETCS points. The thesis has been written exclusively by Nicolai Guldbk Holst and Bjrn Hasager Vinther, both studying *Software development* at the IT University of Copenhagen. It has been written in the spring semester 2015. Our supervisor was Kasper Sty.

Contents

Introduction

Being a good poker player requires that one are able to adapt to opponents and decide when it will be beneficial to play aggressive, defensive or fold. In order to do that one must take a lot of different inputs into consideration such as cards dealt, chips, opponents strategy etc. a lot of these inputs will be hidden and not available to the player during most of the game.

In the games of poker a perfect player will never be anything more than a theoretical term. Such a player would have to be able to know all the information about the game including the hidden information so basically read the opponents mind and the future. We think of the perfect player as an unreachable goal instead.

To overcome the challenge about the hidden information players will instead make some decisions based on qualified guesses. They will try to figure

out the opponents strategy based on prior actions and use statistics to calculate the odds of winning.

This thesis will focus on the design and implementation of artificial intelligence in poker. Our poker bot is targeted to Texas Hold'em Limit. We will make use of existing algorithms such as neural networks and Monte Carlo Simulation.