Building predictors for the game mia

Anonymous ACL submission

Abstract

This term paper deals with the topic of predicting different artificial intelligence approaches based on the game mia. It starts with an short introduction to artificial intelligence. Then, the description of the game mia on which the project is based on. Afterwards, the strategies of the different implemented artificial intelligences (AI) are explained. It follows an explanation of our approach predicting the behavior of the different AIs. Finally, the results of the experiments are discussed.

1 Introduction

Artificial intelligence has become an increasingly important field in computer science and other areas such as automotive (self-driving cars) or security (face-detection). In computer games artificial intelligence reaches new stages of success (Google bot AlphaGo for the game go). In this term paper we now want to answer the question if it is possible to predict different artificial intelligence approaches based on the game mia. The main achievement would be the accuracy of correct predictions if a player (AI) will to lie or tells the correct value. If the actual value is lesser or greater seems not as important as prediction liars properly.

2 The Game

Mia is a simple dice game that is played with two dices and a flat bottomed container (or a dice cup). At the beginning each player has a certain amount of lives (e.g. five). The first player rolls the dices but keeps their values hidden from the other players. He then can decide if he wants to tell the truth to the next player and announce a value that was was actually rolled. Alternatively he can lie and announce a greater or lesser value than the rolled one. But each player has to announce a greater value than the previous player.

The next player (who still has not seen the actual values) can now believe the passer, call the passer a liar and look on the dice or pass the dice to the next player (still without looking) announcing a higher value.

A player looses a life if he called the previous one a liar and looked on the values to find out that they are what the previous player has announced or even higher. Otherwise the previous player looses a life.

The higher value of the roll is multiplied by then and then added to the other die (a 4 and a 2 is 42). The **scoring** is from highest to lowest: 21 (Mia), 11, 22, 33, 44, 55, 66, 65, 64, 63, 62, 61, 54, 53, 52, 51, 43, 42, 41, 32, 31.

If a player announces mia the next player either believes him, give up (without looking at the dices) and looses one life. Or he may look at the dice. If it was actually mia then he looses two lifes if it was not, the previous player looses a life. (For further information see (mia, 2016).)

3 The Strategies

3.1 Statistic Approach

3.2 Approach with certain degree of randomness

3.3 A SVM learning approach

4 The predictor

To predict the different strategical approaches we used a support vector machine (SVM) predictor with radial basis functions. A linear predictor would not have been sufficient due to the complexity of data, but with the SVM-predictor adequate results could be expected. By using SVM we are interested in separating two (or more) classes by a separating hyperplane with maximal margin. The margin is defined with respect to the training points as the minimal distance between the hyperplane and a training point.(See (von Luxburg, 2016) and (Schoellkopf and Smola, 2002, 187–227).)

5 Discussion of results

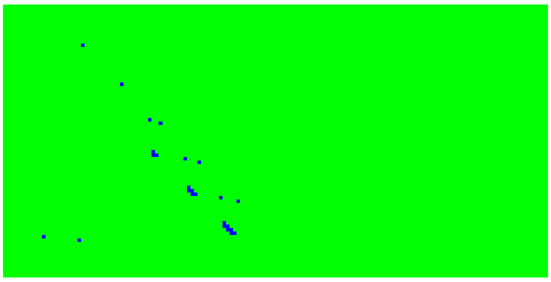

Figure 1: caption svm1

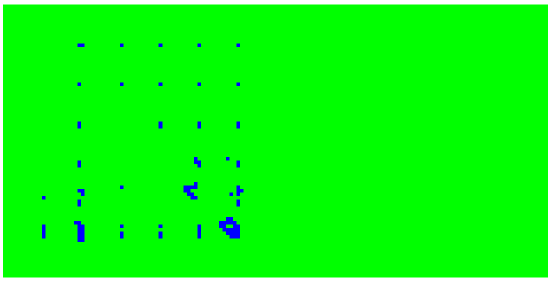

Figure 2: caption svm2

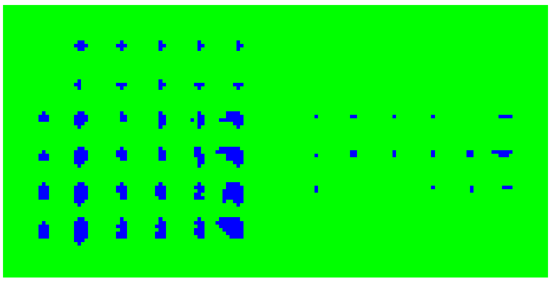

Figure 3: caption svm3

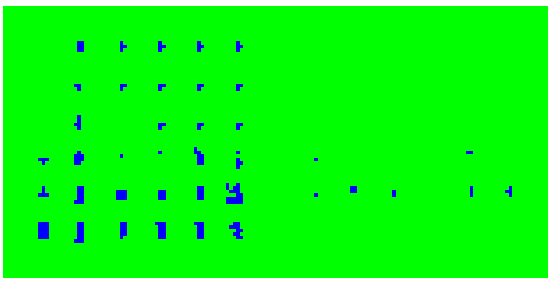

Figure 4: caption svm4

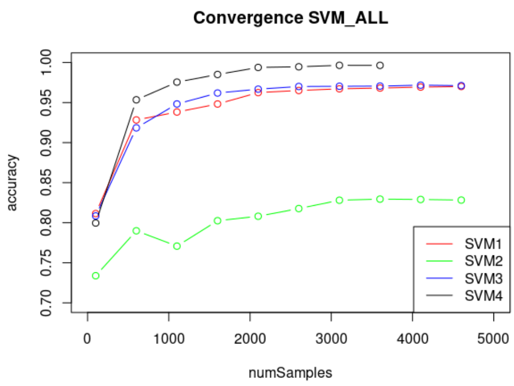

Figure 5: caption convergence all

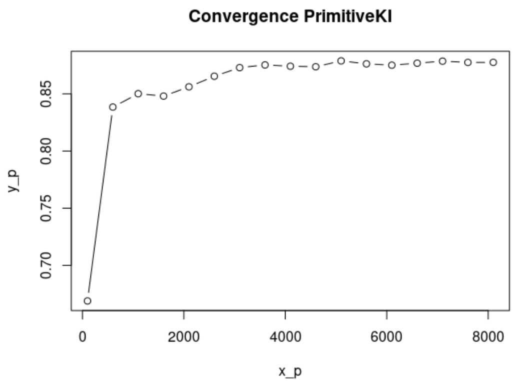

Figure 6: caption convergence all

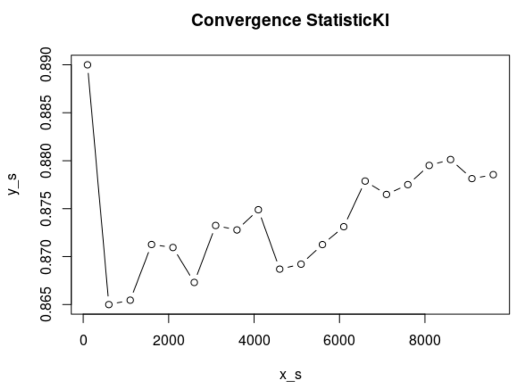

Figure 7: caption convergence all

Acknowledgments

The acknowledgments should go immediately before the references. Do not number the acknowledgments section. Do not include this section when submitting your paper for review.

References

[mia2016] 2016. Mia (game). `https://en.wikipedia.org/wiki/Mia_(game)`.

[Schoellkopf and Smola2002] Bernhard Schoellkopf and Alexander J. Smola. 2002. *Learning with Kernels*. Massachusetts Institute of Technology, Cambridge, Massachusetts, London, England.

[von Luxburg2016] Ulrike von Luxburg. 2016. Machine learning: Algorithms and theory. Scriptum for the lecture.

A Supplemental Material