Predicting events in computer games with machine learning

Artem Vasenin

April 14, 2017

Proforma

Name Artem Vasenin

College Clare College

Title Predicting arbitrary events in competitive computer team games

Examination

Year 2017

Word Count

Project Originator Artem Vasenin (av429)

Project Supervisor Yingzhen Li (yl494)

Aim

Work done

Special Difficulties

Declaration of Originality

I, Artem Vasenin of Clare College, being a candidate for Part II of the Computer Science Tripos, hereby declare that this dissertation and the work described in it are my own work, unaided except as may be specified below, and that the dissertation does not contain material that has already been used to any substantial extent for a comparable purpose.

Signed

Date: April 14, 2017

Contents

Chapter 1

Introduction

1.1 Motivation

Multiplayer computer games are becoming very popular, game's success often rests on how enjoyable it is. Current method of improving player experience is to make sure that all players have equal chance of winning in a game. For that purpose their skill has to be tracked and teams have to be arranged such that they are of equal strength.

In many popular games several roles have to be filled on each team for optimum performance. Current algorithms, such as TrueSkill [1], only track player's overall skill and do not consider what roles the player prefers and how good they are at each one. This often leads teams being composed of players all wanting to play in the same role, which either leads to team under-performing or some players not enjoying the game as much as they could. Moreover, I believe that the events that happen in game are more important to many player's experience than the actual outcome.

In addition, I believe that the system can improve overall prediction accuracy since tracking only overall player skill means that games with non-transitive strategies cannot be predicted properly. For example, imagine three naive players playing the game of *rock-paper-scissors*. Player R always plays *rock*, player P always plays *paper* and player S always plays *scissors*. When two of them play against each other, it is clear to us who will win, but a rating that only tracks overall skill can not predict the outcome properly.

To solve the above problems I wanted to make a system which would be able to predict different events that happen in game by tracking player skill in multiple areas.

1.2 Related Work

Chapter 2

Preparation

Since I decided to use machine learning in my project I had to get some background in the area. Unfortunately, computer science course is in Lent term, therefore I attended a similar course in Engineering department in Michaelmas term, before beginning work on the theory.

2.1 Requirement Analysis

Chapter 3

Implementation

Chapter 4

Evaluation

Chapter 5

Conclusions

Bibliography

[1] Ralf Herbrich, Tom Minka, and Thore Graepel. "TrueSkill(TM): A Bayesian Skill Rating System". In: MIT Press, Jan. 2007, pp. 569–576. URL: https://www.microsoft.com/en-us/research/publication/trueskilltm-a-bayesian-skill-rating-system/.