

Adaptive Game Difficulty

By

Jon Vegard Jansen, Robin Tollisen

Supervisor: Sondre Glimsdal

Project report for IKT411 in Spring 2013

Faculty of Engineering and Science
University of Agder
Grimstad, 7th of June

Status: Final

Keywords: Learning systems, unsupervised online learning, stochastic hill climbing, tower defence, maximize fun, video games

Abstract:

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[1]

Preface

Kanskje droppe dette kapitlet

1 Introduction

This chapter contains the background for why and where we believe that this project is relevant, as well as outlining a proposed solution @("Ikke ref, men kanskje annerledes wording?)

[2]

1.1 Background

In the world of video games (henceforth: 'games'), the quality of a game is dependant on its entertainment value, or in layman's terms, the level of 'fun' perceived among its players. [3] Since games appeal to a wide variety of players, the perceived level of fun may often vary among its players, due to personal preferences. In order to accomodate for such varying preferences, traditional games have often implemented several chosen levels of difficulty, as well as providing the player with several settings or options for how they want the game to behave. [4] When it comes to difficulty, other work has already been done on how to scale and adapt this to the level of player, in order to make even games [5], but in order to make a game fun, we believe that more than difficulty needs to adapt to individual preferences, thus more aspects of a game should be able to change on the fly. In this project we research whether such a game can be made. [6]

1.2 Problem Statement

Our project is to undergo research towards whether it is possible to create a game, that uses an unsupervised online learning algorithm, which will adapt the game to the user's preferences based on minimal user feedback. [7]

1.3 Problem Solution

We have chosen to create game using the tower defence genre, as this requires somewhat less work and graphics than many other genres, as well as having a lot of possible parameters that can be tweaked in order to adapt the contents of the game (henceforth: gameplay). The game uses a modified stochastic hill climbing algorithm together with some user feedback after each game, to adapt itself towards the individual player.

2 Game Description

This chapter gives some pictures and a short description of our game, as well as some general information about the game genre, namely tower defence.

2.1 Genre

- Om TD generelt

2.2 Our game

Our game is very similar to classic tower defence games, in that the player has to stop different kinds of enemies from reaching the destination on their path, by using different kinds of towers. Our game differs from other tower defence games on the following:

- There are no scripted or static levels, since each game is a step closer towards the player's 'ideal game', that is, the game that is perceived as the most fun.
- Other than that the game learns after each level, the player has nothing that is carried over to the next game, such as tower access, special items or game progress in general. The player simply plays successive games until he or she quits.
- Modular towers and enemies. This is not necessarily new to the tower defence genre, as not all tower defence games may have pre-defined enemies and towers, but this is something that can be used in order to adapt the game towards personal preferences.
- (Guided) Randomly generated maps. Not necessarily new to the genre either, but is another useful technology that can be used to adapt the game to the player. Note that our game did not use this for game adaption, only to make the game seem less static.

3 System

Vi har følgende:

- Sensors --> PlayerLevel
- Feedback --> Metric for jump
- Parameters: What changes the game
- Relations: How parameters are changed i forhold til hverandre

3.1 Sensors

Dette er våre sensorer

- APS
- Lives left
- Variety

Til sammen gir dette playerlevel som vi bruker til å endre vanskelighetsgrad.

3.2 Feedback

Vi tar imot input fra brukeren slik. Se bildet.

Happy og GoodDifficulty.

Metrikk regnes ut slik og slik.

3.3 Parameters

Vi endrer på parameterene våre i forhold til om de skal endre vanskelighetsgrad eller kun endre gameplay.

- Difficulty: Global HP
- Gameplay only: The rest.

Dette er parameterene våre som vi endrer på, inkludert formler.

- Global HP: $\text{Metric} \cdot f + 0 \cdot \text{das} \cdot f + \text{dsaf}43o$
- Global Speed: $2x + 54 \cdot \text{ifjd} + \text{gfd}3$

- - - - -

- Etc

3.4 Relations

Våre relasjoner er enten: Dvs. at om den ene endres, må den andre også endres.

- Inverse proportional
- Proportional

De har også en impact factor, som bestemmer hvor mye de skal påvirke hverandre.

Vi burde cappe (HUSK HUSK)

Inverse

Global HP - Global Speed

Proportional

Build cost - Sell value

4 Jumping

4.1 General jump algorithm (Name)

This is how such an algorithm jumps in two dimensions. Se bildet.

4.2 Vår algoritme

If else when then so do stuff and dont sit there.

5 Testing

Vi testet spillet på 5 forskj. brukere som er ulike. Disse syntes spillet vårt var ca 1000 gøy, noe som er med på å bygge under at dette var en stor suksess. De nevnte en del mangler med spillet, men det er litt irrelevant, fordi det var ikke nettopp det vi har lagt vekt på i problem statement.

6 Discussion

Gode ting er nettopp at det hele funket.

Dårlige ting er at vi ikke kunne lage et godt nok spill, som kanskje kan ha noe å si, ettersom vår research bit er kun én del av hva som gjør et spill gøy.

TD er kanskje ikke beste sjangeren.

7 Conclusion

Dette kan bli bra i fremtiden, om vi kan ta det videre. Vi vil nok bruke det i en annen spillsjanger, hvor vi ser mer forskjell.

8 References

- [1] Husk class='notoc'
- [2] Generelt spørsmål til Sondre: Er det ok å gjøre det slik, at toppoverskrifter har kun info om rapporten i seg selv, og la underoverskrifter ta seg av det mer konkrete?
- [3] Referere til noe?
- [4] Referere til noe2?
- [5] Referere til vårt Research Seminar paper
- [6] OK wording?
- [7] is it in the problem to create a game itself, or is that just something we do to prove it?