Use of Bayesian Optimisation to maximise player engagement in video games

Candidate number 074936

***Abstract*—Video game development has been on a consistent rise over the decades. Starting from a gameplay with ASCII-coded characters through to heavily-graphical, realistic-looking visuals, video games have evolved to a whole new level. One factor is common in any nature or genre of video games: maximising player engagement. This study adopts Bayesian Optimisation in exploring how player engagement could be maximised by distributing game assets, such as coins and enemies, within a maze. As experiences differ from player to player, there are three player profiles considered in this study: Greedy, Neutral, and Aggressive. The results.**

I. Introduction

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II. Background

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A. Bayesian Optimisation

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B. Player profiling

Various literature sources have distinct approaches to player profiles - some have taken surveys on player experience, whereas some have measured player performance during gameplay, and tracking their facial expressions and heartbeat. Whilst it may be argued that the former approach is time-consuming and may yield to inaccuracies in aligning to players in real-time, the latter approach has yielded to promising results with extensive preliminary data available for further analysis. Considering the timeframe of this study, a simpler approach is followed on player profiling, wherein, there are three player types -

- **Greedy:** A greedy player is interested in collecting as many coins as possible and is not interested in defeating enemies, before it ultimately reaches the end goal.
- **Neutral:** A neutral player is interested in both collecting coins and defeating enemies before it reaches the end goal.
- **Aggressive:** An aggressive player is interested in defeating as many enemies as possible, ignoring collecting coins, before it ultimately reaches the end goal.

III. Methodology

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A. Maze design

B. Player profiling

C. Bayesian modelling

D. Experimental setup

E. Project Management

IV. Results

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V. Conclusion

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