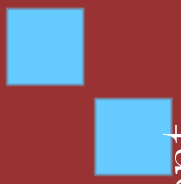

B.Sc. (Hons) in Software Development

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Atlantic Technological University

Biometric Data Analysis in Digital Game Scenario

By
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March 5, 2024

Minor Dissertation

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Background and Objective The aim of this project is to analyze the relationship between the fitness status of a gamer and their performance in a digital gaming scenario. And if such relationship could be established, to determine which features affects their performance and to what degree do they contribute to their performance. Various biometric and fitness data were considered and used fo the analysis based on their suitability for capturing relevant fitness features that correlate to on's physiological state. Heart rate variability (HRV), Average Heart Rat, maximum Heart Rate, Active Steps and quality of sleep are the features under consideration.

A test game designed to measure and capture user's performance in a first-person shooter gaming scenario was used. Three basic metrics where chosen to measure user performance. They are Fine Motor Test, Visual Test and Audio Test. The Fine motor test captures the average tracking time and accuracy for engaging targets, the Visual Test captures the average response time, average tracking time and accuracy while the Audio Test captures user's response time.

Chapter 1

Introduction

First person shooter games represents the class of games where the player views the environment through a view protocol and can perform such actions as looking around, moving around, aiming and firing of weapons. these actions are accomplished using various button or combination of button.x

PUBG: Battlegrounds (previously known as PlayerUnknownś Backgrounds) is a battle royale style player versus player shooter game developed by PUBG Studio. Players face-off with each other using various types of battlefield weapons in a last man standing deathmatch and the last person to remain alive wins. The game is available in all major platforms and as of March 2021, the mobile version of the game has accumulated more than a billion download outside of China with revenue of over $9billion while the PC and console versions have accumulated a total revenue of $4billion [**?**].

Since its first release in 2017, the game has since become one the fans favorite and has over '350,000' peak concurrent monthly users [1]. As a multiple award-winning game with proven longevity records and a large community. Interest in the game cut across diferent demography and is equally far-reaching across the globe. The game playing scenario requires players to face-off with other players and there is where some skills like 'eye-hand-coordination', 'ear-hand-coordination', 'fine-motor' skills, etc: are required to compete favorably against other players. Players have access to a varieties of weapons with different capabilities and can make in-game adjustments to their control to suite their various preferences.

This project is a continuation of research work previously done by Fourth Year Software Design Students titled 'Biometric Data Collection for Performance Optimization in a Digital Game Scenario' in collaboration with the Department of Sports & Excercise Science, Atlantic Technological University.

[1] statista

Previous Projects

The originiating project titled **'Biometric Data Collection for Performance Optimization in a Digital Game Scenario'**, posed the question 'can a playerś biometrica data be used to optimise their performance in a first-person shooter game'? And a subsequent follow up project which sought to create a Chart API capable of displaying all relevant information previously displayed on different pages on a single page.
The former research was geared towards creating a test environment where players can practice and horn their skills in a similar scenarios (Weapons, controls, user perspective, ect:) obtainable in PUBG : Battlegrounds in the form of a Unity Desktop `Application`. Collection and storage of Biometric data from an `Activity Monitor` in the form of a `Smart Watch`. With the eventual goal of finding correlation between their performance and their Biometric data.

Chapter 2

Methodology

Describe the way you went about your project. Was your approach to the problem valid? You need to discuss both your software development methodology and your research methodology.

Chapter 3

Technology Review

This chapter is the literature review part of the dissertation and should be tightly coupled to the context and objective from the introduction. A thorough Technology Review proves that you researched what you were doing!

Chapter 4

System Design

Provide a detailed explanation of the overall system architecture Use UML, system architecture diagrams, screenshots, code snippets and algorithms to illustrate your design.

4.1 Working with Images

You can embed an image in a LaTeXdocument using the technique shown below. System diagrams and images with a small numbers of colours (100s, not 1000s) should be stored in PNG format. Although LaTeXdoesn't care where you place your images, it is good practice to place them in a single sensible directory and apply some sort of hierarchy to them, e.g. the path images/chapter1 might contain all of the images for Chapter 1 of your dissertation.

Figure 4.1: System Architecture.

Note that LaTeXwill place the image wherever it deems fit. Don't bother trying to change where a table or figure is placed until your document is ready for final layout.

Chapter 5

System Evaluation

Evaluate your project against the objectives set out in the introduction. This chapter should present results if applicable and discuss the strengths and weaknesses of your system. This is a clear opportunity for you to demonstrate your critical thinking in relation to the project.

5.1 Working with Tables

Note that LaTeXwill place the table wherever it deems fit. Don't bother trying to change where a table or figure is placed until your document is ready for final layout.

Hexadecimal to Binary					
Hex	Binary 2	Hex	Binary	Hex	Binary
1	00000001	B	00001011	15	00010101
2	00000010	C	00001100	16	00010110
3	00000011	D	00001101	17	00010111
4	00000100	E	00001110	18	00011000
5	00000101	F	00001111	19	00011001
6	00000110	10	00010000	1A	00011010
7	00000111	11	00010001	1B	00011011
8	00001000	12	00010010	1C	00011100
9	00001001	13	00010011	1D	00011101
A	00001010	14	00010100	1E	00011110

Table 5.1: Conversion from Hexadecimal to Binary

Chapter 6

Conclusion

Briefly summarise your context and objectives. Remind the reader about the overall rationale and goals of the project. Highlight your findings from the System Evaluation chapter.