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Interactive 3D Visualisation of Exoplanets

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Abstract

A short description of the project goes here.

Contents

Figures

Chapter 1

Introduction

This project seeks to design, implement, and evaluate an interactive 3D visualisation software system for displaying the content in the Kepler Exoplanets dataset [28].

The deliverable is

The resulting system will

1.1 Problem Statement

many planets that have been located outside of our own solar system, these are called exoplanets

1.1.1 Understanding the content in the dataset

Understanding and analysing large datasets whose size defies simplistic analysis is a known issue that many areas of research are attempting to address from datamining to discover SOMTHING HERE in the data itself to visualisations to convey the information in a visual mannor. All of these research methods involve finding and displaying important aspects of the data so that users can more efficiently use it.

The content in the dataset used for this project is made up of records of each exoplanet discovered, each of which contains 46 fields.

1.1.2 Comprehension of planatery information

Much of the information regarding planets is criptic and uninituitive, this make its understandability difficult. Visualisations attempt to address this by displaying the information in a way that conveys the information in a simplisitic way that allows easier user comprehension.

something about faster cognition times

1.1.3 Effective user interaction with visualisation

A visualisation that soley displays information without effective methods of interaction will not have the immersive qualities that keeps users engaged as would be the case with an interactive visualisation

1.2 Key issues project addresses

To summarise the above sections, this project addresses the following key issues:

1.

1.3 Contributions of this project

1.

Chapter 2

Project Methodologies

2.1 Project management approach

The project methodology followed in this project was using a spiral model. This model used included requirements analysis, design, implementation, and evaluation phases. These phases For each feature produced in the visualisation a full iteration of the spiral was com-

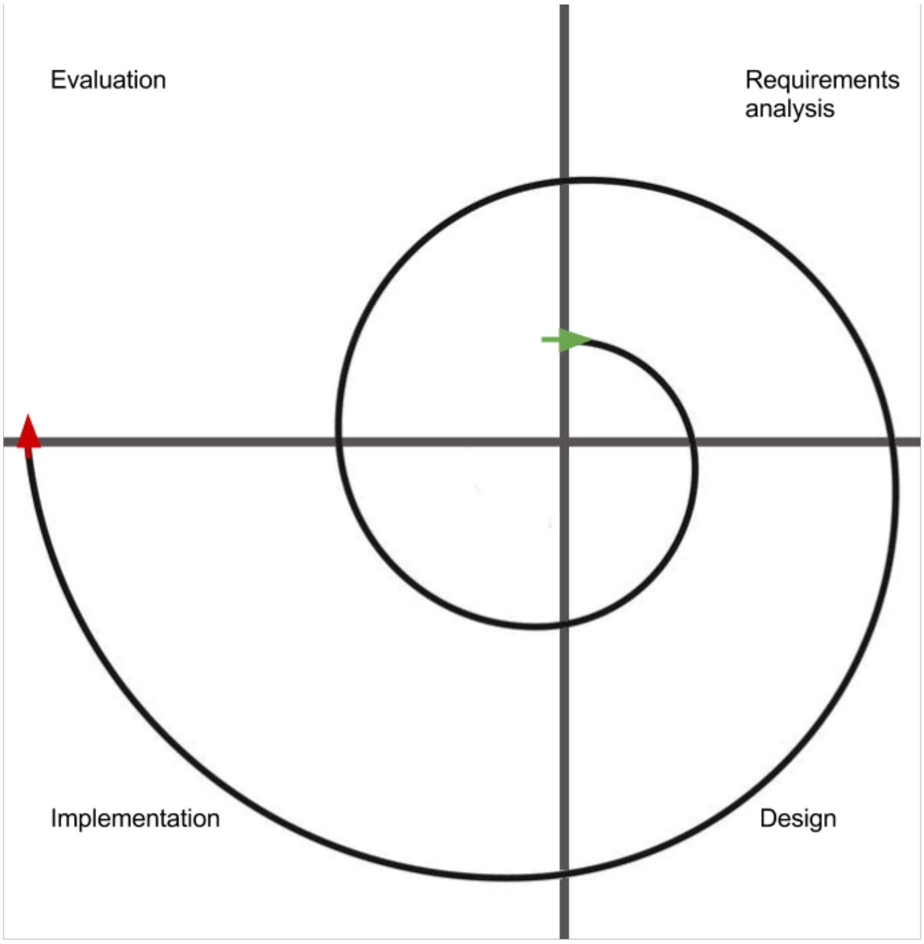

Figure 2.1: Spiral process model followed

pleted.

This project management technique supported the creation of a visualisation as

The advantages of this methodolgy over others such as stricter models such as the waterfall model or a looser agile aproach......The reason that this was effective.......

The choice of this project management apprach meant ....

Weekly meetings with the supervisor of the project, Dr Stuart Marshall, were used to provide guidance and

Using using other supporting project management techniques such as Gantt charts [APPENDIX] and work breakdown structures(WBS) [APPENDIX] allowed efficient documentation of planning and work completed in the project as well as displaying the following stages requried to complete the project.

2.2 System design approach

By choosing to expand on an already exisiting system

2.3 Key difficulties encountered

As this project builds upon a previous system much of the exisiting code and execution flow needs to be modified. This requires understanding of how the system was originally built and designed. Because this system does not have any unit or integration tests, going ahead without a comprehenive knowledge of the core functionality would be foolish.

Having a time constraint of 300 hours for this project over the course of a year meant that ....

Chapter 3

Requirements Analysis

The use of User Centered design in this project afforded a method of

3.1 User models

3.2 Scenarios

3.3 Requirements summary

3.4 Existing systems

Chapter 4

Solution Design: Improved Kepler Visualisation Tool

4.1 Design features

4.1.1 Visualisation Layout

Component Layout

As the majority of the interaction and movement of visualisation elements occurs in the center of the window it caused a aspect ratio that SOMETHING SOMETHING. It was BETTER to use 2 vertical columns to view and control the visualisation as it had a higher aspect ratio which allowed more of the content to be seen on the screen at once thanks to the fact that the majority of computer screens have a wide ratio.

Selection of planets Kinect for improved user interaction and immersion

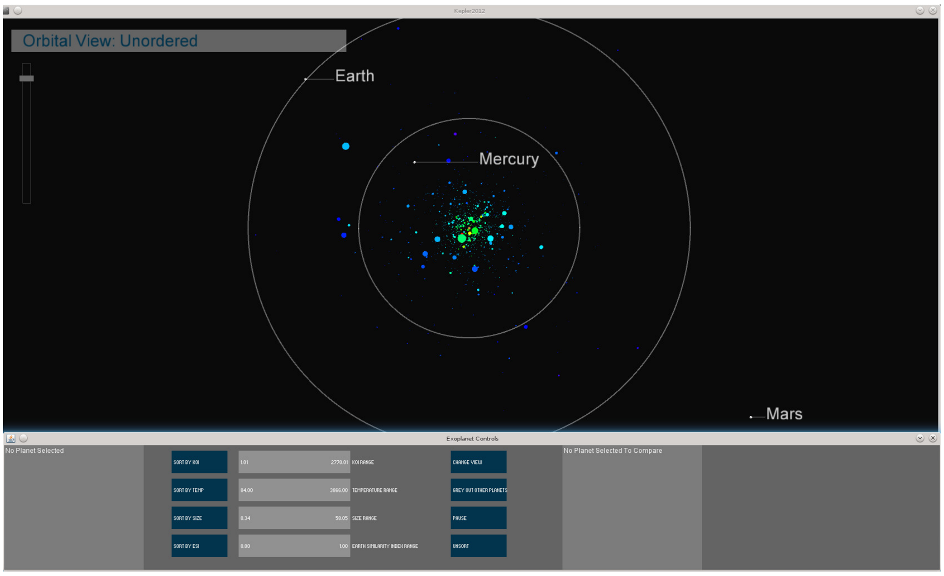

Figure 4.1: Original Horizontal Layout

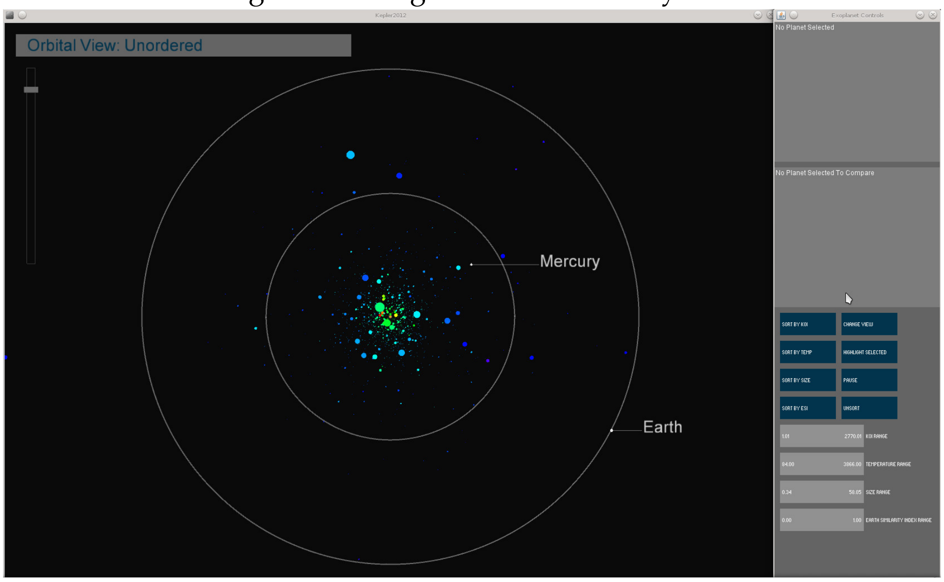

Figure 4.2: Improved Vertical Layout

Chapter 5

Visualisation implementation

5.1 Technology choice

5.1.1 System design and structure

5.1.2 Tools and artifacts used

Chapter 6

Visualisation implementation

6.1 Technology choice

6.1.1 System design and structure

6.1.2 Tools and artifacts used

Chapter 7

Conclusions

7.1 Future Work

The work from this project can be taken further in many different ways depending on how it is intended to be used. There is the option of using the system as a terminal that users would use at an observatory or attraction where prior knowledge of the system is limmited and amount of time users would spend on the system would be small. In this case further expanding the user experience and improved Kinect interaction would be benificial as immersion would be the decider on its success. Another option for the system would be for a standalone desktop system that users would use multiple times and so prior knowledge of how to use the system could be expected. This would mean that more complex functionality could be introduced witht he expectation that it could be used by users. The systems current state could me modified to fit into either of these two options.

Bibliography