

UNIVERSITY OF ST ANDREWS

CS4099

SH PROJECT REPORT

An online card-based game to explore human response to predefined scenarios

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Abstract

There are many situations in which it is desirable to know the opinions of a population. Aside from standard opinion surveys, little to no research has been done into alternative methods of gathering the public opinion.

This project was undertaken in collaboration with the St Andrews Centre for Exoplanet Science[1], in an attempt to develop a software artifact capable of capturing user decisions in a game interface. This project focuses on the framework through which these games may be created, played and visualised, with the end goal of analysing these responses and inferring user's opinions on certain subject matters through their choices. The framework is designed to be highly flexible, allowing all aspects of a game's story and development to be decided by an administrator.

Declaration

I declare that the material submitted for assessment is my own work except where credit is explicitly given to others by citation or acknowledgement. This work was performed during the current academic year except where otherwise stated.

The main text of this project report is

Add word count

NN,NNN* words long, including project specification and plan.

In submitting this project report to the University of St Andrews, I give permission for it to be made available for use in accordance with the regulations of the University Library. I also give permission for the title and abstract to be published and for copies of the report to be made and supplied at cost to any bona fide library or research worker, and to be made available on the World Wide Web. I retain the copyright in this work.

Introduction

This project was kickstarted by researchers Anne Smith (Biology) and Christine Helling (Astronomy), with the aim of using the completed system to determine how the population would react to the discovery of alien life. This would be done through use of the system in some experimental context, however the details on what form this would take remain unclear.

2.1 Objectives

As part of my Description, Objectives, Ethics and Resources (DOER) document I described the objectives of this project:

2.1.1 Primary Objectives

- Devise and implement a game that presents the player with scenarios and allows them to choose from potential responses
- Devise and implement a flexible infrastructure to model and constrain scenarios and their impacts
- In collaboration with Anne Smith and Christine Helling, devise a sample set of appropriate scenarios with impacts and populate the game.
- Devise and implement an infrastructure for capturing and recording player responses
- Implement basic visualisation of responses

2.1.2 Secondary Objectives

- Devise and implement an admin centre to allow easy creation of new game content
- Carry out an experiment to assess the effectiveness of the game as a tool to assess people's real world views
- Create more advanced visualisation and analysis tools

2.1.3 Tertiary Objectives

- Perform a wider user experiment

Context Survey

Here I will review the existing software and literature on the different aspects of this project. I will briefly look at the psychological and gamification aspects

finish

3.1 Opinion of First Contact?

As this project has been undertaken in collaboration with the Exoplanet Research Society, it is worth briefly reviewing the literature on the target question - how would humans react to the discovery of alien life? There has been some research[2, 3, 4] into this area, but it is certainly not extensive and very little of it is systematic. The topic is vast with many variations:

- How has extra-terrestrial life been discovered?
- What is the nature of the life, is it intelligent?
- Is alien life on our doorstep, or far enough away that it could never reach or harm us?

Anne Smith and Christine Helling believe it could be beneficial to create a game capable of collecting this information, in order to reduce the burden on participants answering such an extensive library of questions and improve engagement.

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3.2 Similar Software

fill

3.3 Survey Gamification

An emerging trend in modern business practice, gamification consists of ‘using game mechanics and game design elements to measure, influence and reward user behaviors.’ [5]. There has been some research into gamification as a tool to improve the quality of responses from and engagement with surveys. The results of this research has been summarised by Briana Brownell, Jared Cechanowicz, and Carl Gutwin as follows: ‘In most cases, their results show that the addition of these game elements increases the length and quantity of responses, and respondents typically prefer the gamified version to the standard survey version. However, their research does not compare the effectiveness of game elements in gamified surveys. They have also found that that some gamified survey designs can lead to compromised respondent data (Puleston & Sleep, 2011).’ [6]. This indicates that there is promise in the notion of gamifying surveys. As noted by Brownell et al, however, gamification can result

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Typically, the experiments discussed in the papers referenced only go as far as to change the wording of survey questions, show imagery or

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A 2011 paper found that while participants’ enjoyment of the survey sees a great increase, there are three main effects that gamification has on the ‘character of the data’ [7]:

1. Effects caused by changes to the question and how it is interpreted

2. Effects caused by changing the attitude and mindset of respondents
3. Effects caused by changes to the design and layout of question

These are things I kept in mind while making design decisions, as if the software is to be used in an experiment, it's imperative that there is no bias inherent in the framework.

3.4 Game Model

3.4.1 Reigns

When proposing the format of the artifact, I based my framework on an existing game, Reigns [8]. In Reigns, the player takes the role of a medieval ruler, and makes binary decisions to solve problems their subjects approach them with. These decisions affect further scenarios that may appear, as well as changing how the ruler is perceived by various factions, such as their population, army and church. The player's success is measured by how many decisions they can make without falling out of favour with any of the factions.

As of 2019-03-01, this is a well reviewed game, with a rating of 4.7/5 on the Google Play store [9]. Given this, in addition to the simplicity of recording and analysing the choices, I believe the framework of Reigns could provide a good starting point for gathering player opinions.

Requirements

Below are the requirements that I specified early on in the project.

4.1 Functional Requirements

- A user can
 - enter a unique id
 - choose a game to play
 - while playing a game,
 - * read a card
 - * view pillar levels
 - * choose a response
- An administrator can
 - while authoring or editing a game,
 - * add, edit and remove cards
 - * add, edit and remove pillars
 - * view a contextual game summary
 - * save the game to a database
 - * switch to editing another game
 - while visualising results,
 - * select cards to visualise
 - * filter cards by game state
 - * export data to file
 - * view visualisations showing users' interactions with the game

4.2 Non-Functional Requirements

- All interfaces are clear and intuitive
- The game interface is responsive to input - there should be minimal delay between an input action and the outcome
- The game interface does not influence the user's choice in a way that is not customisable
- User data should be stored securely

Software Engineering Process

As the majority of the work put into this project was in developing the software artifact, I was focused from the beginning on following an effective software engineering process.

5.1 Process

5.2 Tools

With this in mind, one of the first tools I employed was Git[10]. Considering the length of the project, it was reasonable to suspect that there may come a time when I would have to revert my project to a previous point if something was broken. Version control software was the obvious solution, and Git is the one I have the most experience with. To complement this, I set up a master GitHub[11] repository to serve as a backup.

In addition to serving as a backup, GitHub provides a good set of project tracking features. I considered other tools often used to track projects, such as Trello[12], but in the end decided that GitHub's ability to reference aspects of the code (due to them being stored together) made it better suited for my needs. I will outline which features I used here:

Issues These are the core element of GitHub. Any task that needs completing is documented as an issue. I kept my issues fairly high-level, as I have found previously that too much detail in issues results in spending excessive amounts of time managing them, and outdated aspects become too common. Figure 5.1 shows an example issue.

Projects Issues alone can become unorganised, so I made use of GitHub's projects feature. I split my work into four parts - game, game maker, visualisation and backend then made a project for each of these. This allowed me to keep issues relating to different parts of the project separate, making it easier to focus on one section at a time.

Each project has its own kanban-style board, used to track its progress. An example can be seen in figure 5.3. Issues assigned to a project start in the **todo** column. When being worked on, I would move them into **In progress**, and finally when closed they are automatically moved to **Done**.

The number of issues in each column defines the project overview, so this can provide a reasonably accurate depiction of the progress of each section.

Milestones The first step I took in tracking my project was to set my Milestones. These are an aspect of a GitHub project that serve as a deadline, to which issues can be added. Completing and closing these issues then automatically provides a visualisation of progress towards a milestone, as can be seen in figures 5.4 and 5.5. These made for a helpful overview, which was useful both for myself, and for sharing my progress with my supervisor.

I decided on these milestones early on by estimating the dates by which I could complete core parts of the project. As this was done in advance I was not able to be precise with demo dates, however I completed the vast majority of work for each milestone before the deadline, so I consider this a successful element of my planning.

Implement game validation #11

Edit

New issue

Closed

CamerAllan opened this issue on 10 Oct 2018 · 0 comments



CamerAllan commented on 10 Oct 2018 • edited ▾

+ 🗨️ ...

The following should hold:

- ☒ Not too many or too few pillars
- ☒ All card references exist as cards in the game
- ☒ All pillar references exist as pillars in the game
- ☒ No card is impossible to reach based on starting deck

CamerAllan added this to **To do** in **Game Maker Tool** via **automation** on 10 Oct 2018CamerAllan added this to the **Game Maker Demo** milestone on 10 Oct 2018CamerAllan moved this from **To do** to **Done** in **Game Maker Tool** 25 days ago

CamerAllan closed this 25 days ago

Assignees



No one—assign yourself

Labels



None yet

Projects



Done in Game Maker Tool

Milestone



Game Maker Demo

Notifications

Unsubscribe

You're receiving notifications because you modified the open/close state.

Figure 5.1: An example of an issue, note the assigned description, project, and milestone.

5 Open ✓ 0 Closed			Sort ▾
Game UI Private	Everything to do with the game's user interface.	...	
🕒 Updated an hour ago			
Data Storage Private	Everything to do with storage of user data and player responses.	...	
🕒 Updated an hour ago			
Game Maker Tool Private	Everything to do with the creation of the game maker tool.	...	
🕒 Updated 25 days ago			
Data Visualisation Private	Everything to do with visualisation of user's responses.	...	
🕒 Updated 18 days ago			
SH Project Private	Macro view of project progress.	...	
🕒 Updated 36 minutes ago			

Figure 5.2: Project overview page.

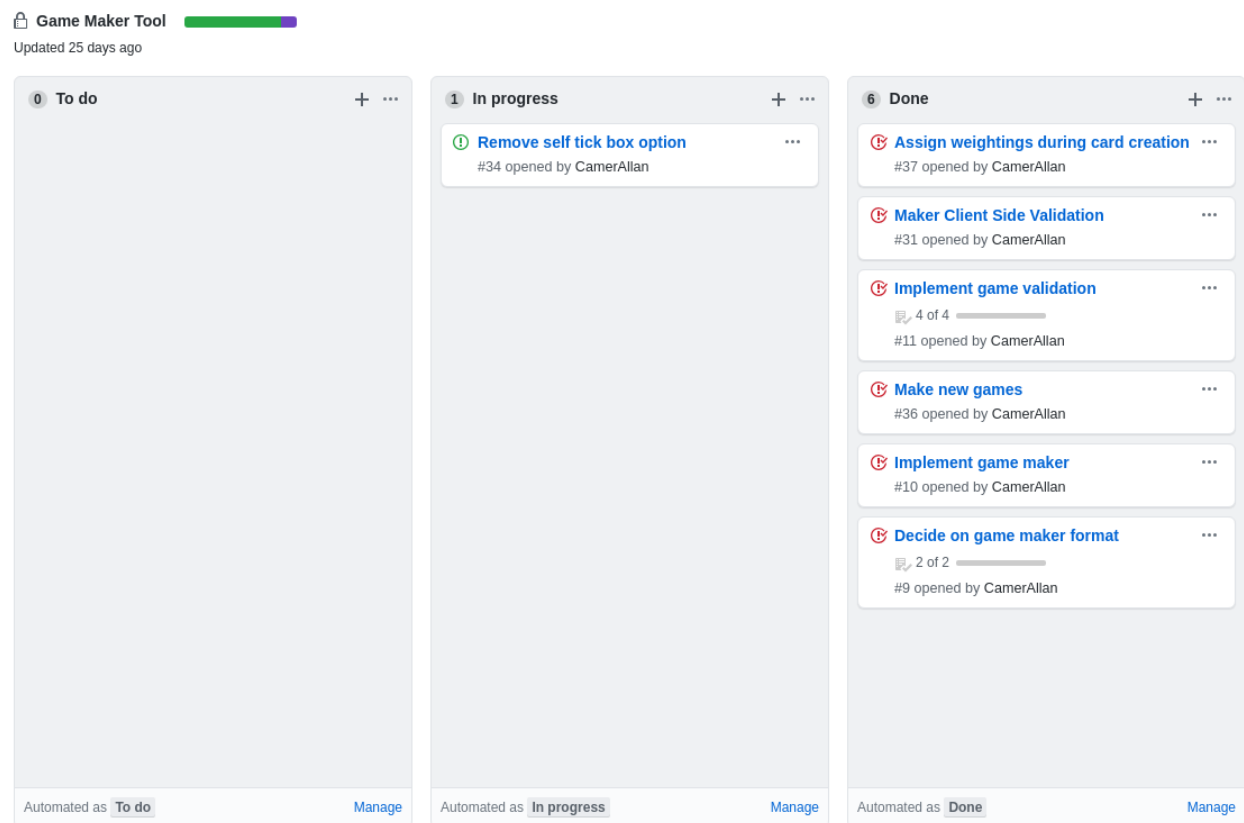


Figure 5.3: Example project board towards the end of the project.

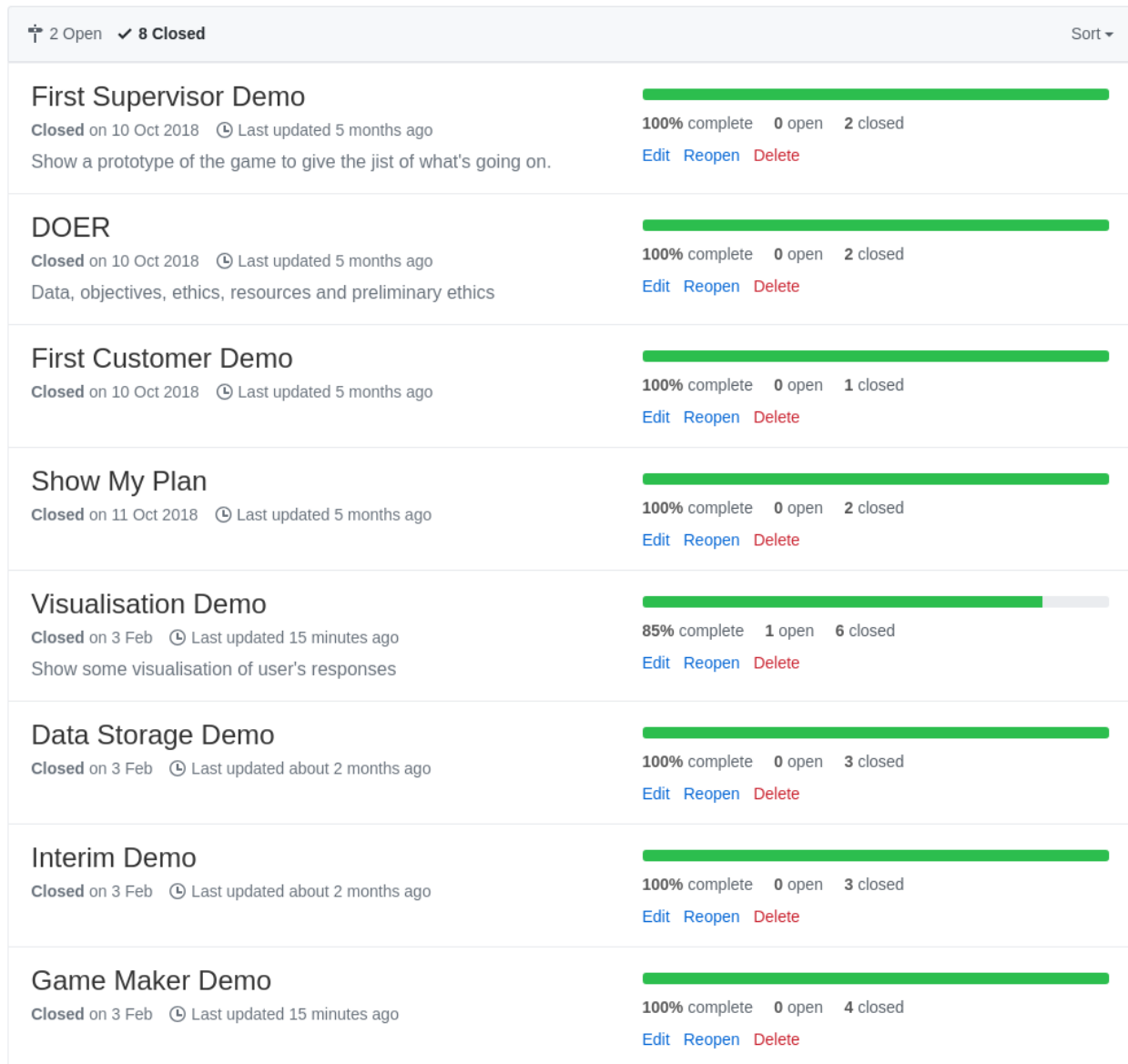


Figure 5.4: Overview of closed (completed) milestones towards the end of the project

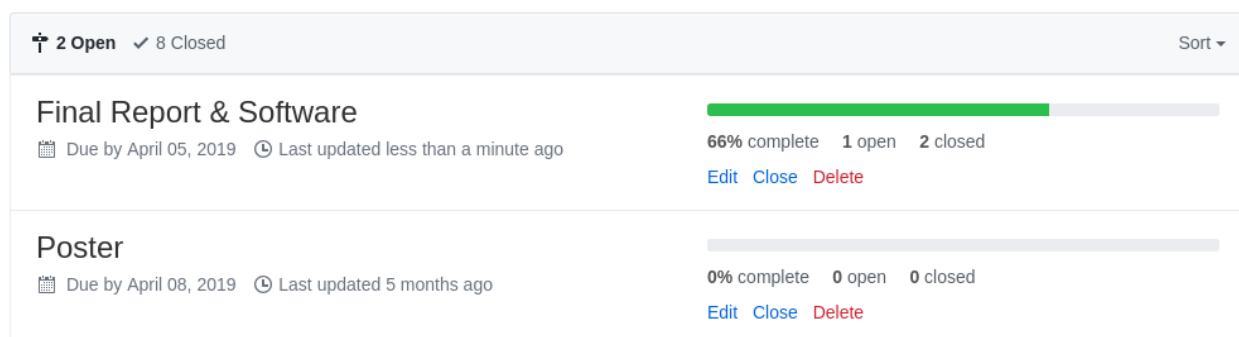


Figure 5.5: Overview of open milestones towards the end of the project

Design

6.1 Gameplay Overview

Maybe draw an example as this is a bit confusing

The game provides a fairly straightforward experience from the user's point of view. Conceptually, it is a card game, so I will describe it as such. The game consists of three decks which I dub 'in play', 'out of play' and 'reserve'. In addition to this, there are n 'pillars' - these are attributes of importance within the game story's context. Each of these has a minimum, maximum and current value. The 'in play' deck has a defined starting set of cards, with the 'reserve deck' containing all others - 'out of play' starts empty. Both decks are shuffled at the start of the game, and each pillar has a predefined starting value.

The player draws and reads a card from the play deck, each one showing the following information:

- Title
- Description
- Choice #1 ('accept')
- Choice #2 ('reject')
- Requirements to draw

Each choice on a card consists of text detailing the response, and the effects of the response. Effects are made up of two parts - pillar changes, and cards added/removed. Pillar changes specify amounts to add or remove from one or more pillars. Cards added/removed defines which cards should be moved between 'out of play' and 'reserve'. Requirements to draw consists of conditions that the current pillar levels must satisfy in order for this card to be drawn.

After each choice made (turn), any cards in 'out of play' that meet the current pillar requirements are moved to 'in play', and any 'in play' that do not are moved to 'out of play'.

The game ends when any of the pillars fall to their minimum value.

6.2 UI

6.2.1 Game

As described above, the game sounds like a lot of effort on behalf of the player, having to sort and shuffle cards. Fortunately, this effort can be removed completely through work done by the computer. This leaves a simple game from the user perspective; users are presented with a card, make a choice, and get the next card.

This meant that the design for the game UI would also be simple. Figure 6.1 shows my first design for this UI. Initially, I wasn't sure whether the pillars should be visible to the user, however after some testing it was clear that they were needed to provide the player with feedback throughout the game, so they were later added to the top of the screen.

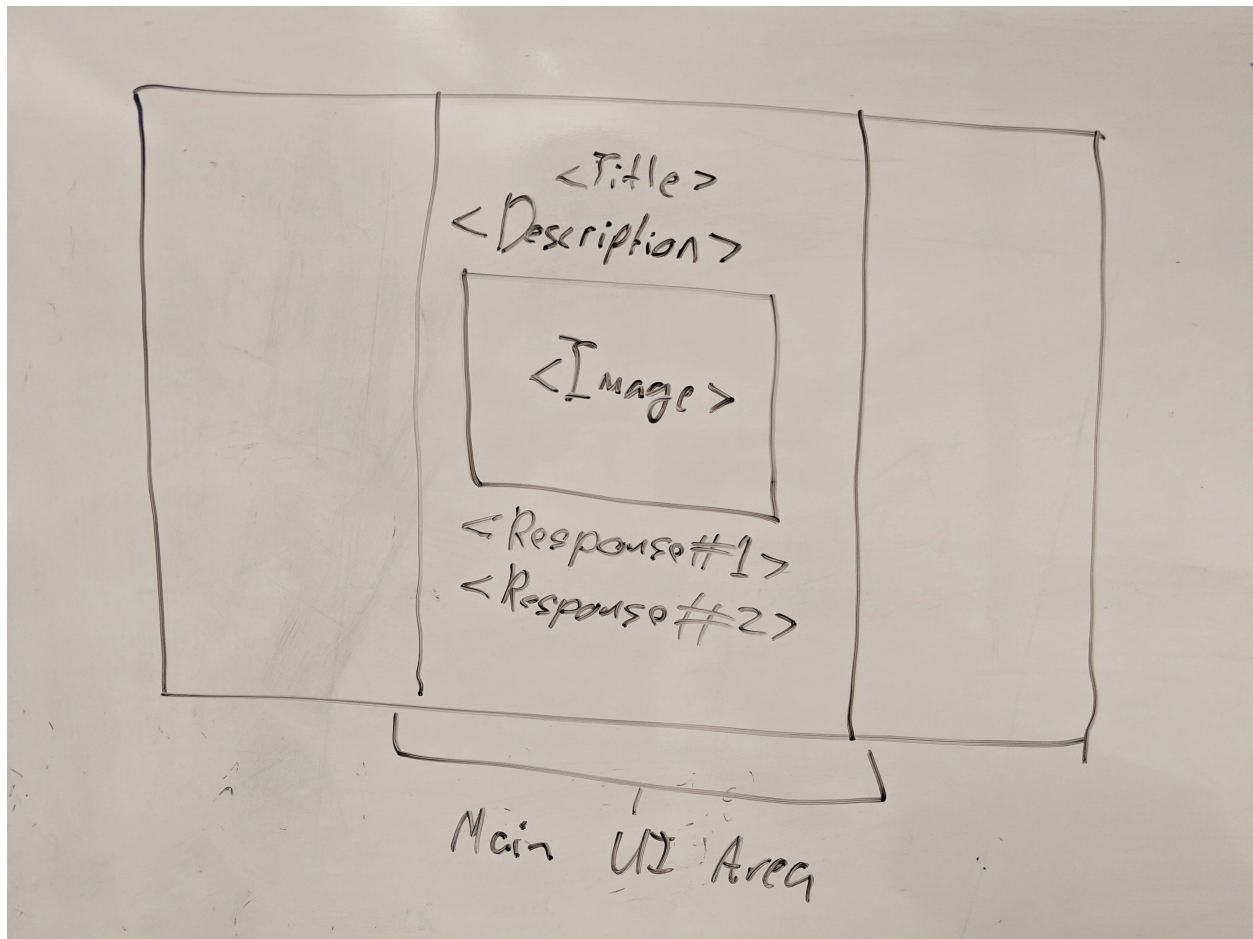


Figure 6.1: Initial design for game screen

6.2.2 Admin tools

Game Maker

The game maker interface was the most difficult to design, as I wanted the user to be able to maintain a high-level overview of the game while adding and editing pillars and cards. After thinking this through, I initially settled on the design depicted in figure 6.2. The idea here is that editing is done in the left panel, while the right side continues to show an interactive view of the game, including a visualisation of the relationships between cards. The final design ended up being roughly the same, however the card view is not as complex - connections between cards are not visualised, as after more consideration of the relationships involved, I could think of no clear way of showing this. Instead in the final design the cards are merely displayed in a grid.

Visualisation

The visualisation screen took a similar shape to the game maker, with data selection and filtering happening in a left panel while the visualisations are updated on the right. It is possible to filter results to be visualised by pillar values. This limits the data shown only to cards that appeared while pillar values match the specified criteria. The visualisations I chose to show are as follows:

- Accept - Reject balance

This is a horizontal bar chart showing the proportion of players that choose one option over the other

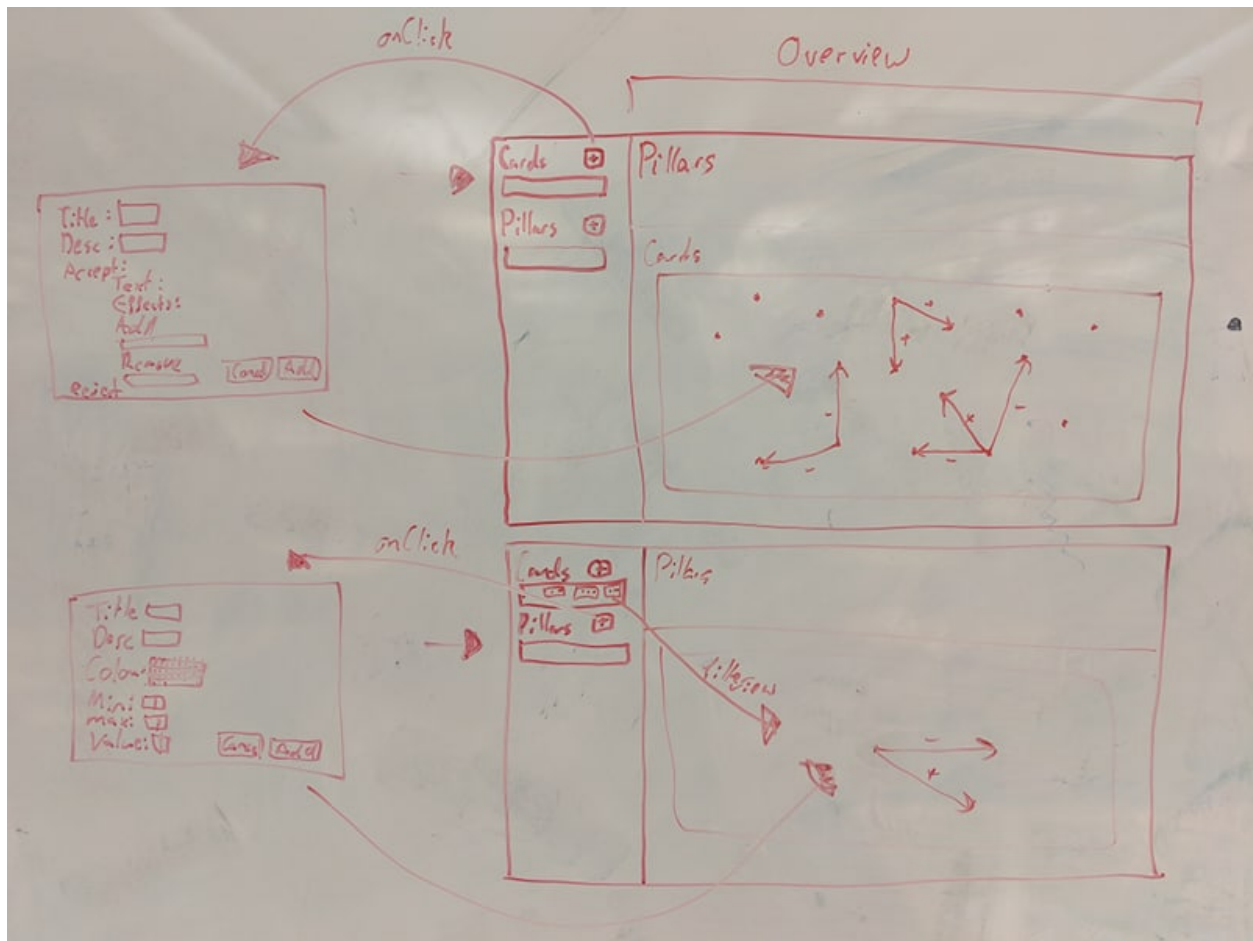


Figure 6.2: Initial design for game maker

for a given set of cards. Each card has a value between -1 and 1, where -1 indicates that players choose the reject option every time, while 1 indicates accept is chosen every time.

- Total times drawn

This is a vertical bar chart showing the total number of times each card has been drawn and responded to.

- Pillar average

This shows the average pillar levels over all turns.

'consider adding hidden columns which could affect the game but couldn't be seen by the user' 'only two answers per question?' 'subdecks - response can swap the whole deck eg when finding aliens' -can be done technically but easier 'Add/remove all UI element'

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