Gameplay vs Story? Attempting to Quantify the Constantly Evolving Medium of Video Games via Critical Reception.

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Abstract

A Research Project investigating if it is possible to analyse the critical reception of video games and their reviews, and investigate and analyse whether over the course of the past 20 years, whether the narrative focus of the gaming medium has become more prevalent, or if video games mostly focus and consist of gameplay elements. By analysing reviews, a score can be made as a fraction by comparing story to gameplay, and by plotting this score, the trend in story focus can be analysed over time, and determined to have either increased or decreased.

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Contents

Keywords

Gameplay

The entertainment experienced from playing and interacting with a video game.

Story

The narrative, story, themes, details, etc, that make up the storytelling experience of a video game.

Review

A critical review by a journalist exploring the features and personal experience with playing a video game.

Score

The score will be a fraction based off of Story and Gameplay prevalence within a review. The higher the score, the more prevalent the story is within a video game.

Introduction

I plan on researching the video game sector, specifically, I wish to focus on the narrative trait of video games. Over the course of the evolution of the video game sector, it appears that there has been a shift in focus and priority for newly developed video games. Games originally appeared to have a focus on gameplay, entertainment, and fun, however more recent trends over the last 20 or so years have seen the rise of more detailed and emotional narratives, and more creative gameplay solutions to tie into narrative. My goal is to research into the history of games, and use data science to quantify and figure out whether this narrative focus is new, or if recent advancements in technology allow for easier development of games with impactful narratives through improved accessibility, graphics, indie support, and modern technology. At this time, the video game industry remains one of the fastest growing entertainment industries in the market, and as such, analysing past trends now could prove beneficial for the future, as well as performing a retrospective on the industry could help direct the direction that the industry takes in the future by knowing how things have changed since the start of the industry.

Aims and Objectives

To research this and uncover the answer to my question, I will create a program that will allow me to plot, graph, and aid me in finding correlations between popularly reviewed games in each year for the last 20 or so years, and link them to whether they fall under a more “traditional” styled game, focused on action, arcade, and gameplay, or whether a game falls more under a more narrative, story focused branch. To do this, I will create a program in order to analyse the data on each game that I can find, and categorise each game on a scale towards story and gameplay, while considering the year, to see if the trend changes over time.

The aims therefore shall be to:

1 - Learn if the trend of narrative video games has changed over time.

2 - Create a program to aid with handling the data.

3 - The program will be able to take in data that I gather.

4 - The data I give the program can be converted to a quantitative state.

5 - This quantitative data can then be graphed using the program.

6 - The program will then analyse and draw trends in the graphed data.

7 - Using the data and the program, and the trends returned, data analysis can be performed to find an answer to my hypothesis.

Background and Hypothesis

Gaming and video games have been a part of my life for a long time, and having a interest in the medium as a whole is a factor into why I am looking into this research project and my curiosity for what the answer could be, if games have become more story driven over time or not. Gaming has evolved at an extremely fast pace in just 20 years alone; home systems used to be a rarity among households, but now video games are a multi-billion dollar market, as evidenced by news reports such as Wijman (2021) , with the industry having remained fairly stable through the Covid-19 pandemic, and forecast to exceed 200 billion dollars of worth by the end of 2023 as stated in the report. Video games are now noteworthy enough for famous actors to take notice and participate, actors such as Norman Reedus, Mads Mikkelsen, and Guillermo del Toro, all playing roles of characters in the award wining game *Death Stranding* (2019).

It is clear that the video game market has become a vastly profitable industry attracting the attention of millions of people, which further motivates me to find an answer as to potentially why and how the industry grew so much in just 20 years, and to answer questions about whether something such as the narrative focus of these video games may have prompted and affected their growth.

And I am not the first person to consider the narrative aspect of video games, and certainly not the last, plenty of articles and think pieces have been written to consider the narrative in modern games; one such piece that inspired me to undertake this research project was Stone (2019), an essay discussing narrative and its evolution within history as well as within video games. Stone's discussion of the maturing of the video game audience, and thus the industry maturing with them, as well as the technological and complexity evolution of video games, demonstrate this evolution between story and gameplay that I wish to research, and attempt to quantify via the use of critical reviews. Their discussion too of video games such as *Bloodborne* (2015), support my own thoughts of how the medium's technological evolution allow for narratives to be delivered in more ways while

maintaining the core action focused gameplay of video games. As Stone says, "This form of storytelling is something that cannot be found in another medium" Stone (2019) (Section 3.2, final paragraph), and such a unique medium must be researched and studied due to the fascinating evolution of said medium.

The market's potential for growth, as well as literary reviews into the medium as a whole, are a large factor as to why I decided to pursue this research project, to help understand the current state of video games, and determine any trends over time, and learning such information may prove beneficial to the future of the market.

Hypothesis

Based off my reading and my own knowledge, I hypothesize that video games have become more story driven, and that such story driven titles have become much larger critical hits due to the much larger expanded playerbase of video games as a whole, as the market has grown over the last 20 years to massive proportions of what it was in the 1990s and 2000s. And with the data I gather, alongside the program I create, I shall be able to prove my hypothesis, and determine if the growth aligns with that; more story driven, or if the opposite has occurred, where games have become more gameplay focused, or not shifted at all in the medium.

Methods

Having researched into possible ways to develop my program to aid in my research, I have settled on a specific approach. I will break down my approach into the quantitative score that I use to rank video games, and then I discuss in detail into how I plan to program my approach.

Finding the Score

The key piece to my research will be the score that I calculate. The score is an attempt at quantifying reviews for each game, and the simple way of doing this will be:

- Find a set amount of games from each year (for example: top 3 reviewed games per year as a test run for my prototype to begin with)

- Read a review for each game, and after reading, create a score based off of differing criteria for the game

- The more the story from a game is mentioned and praised for being innovative, the higher I will score it, and likewise the same for the gameplay

- By the end of the first stage of data collection, I will have a story and a gameplay score for each video game over the course of 22 years total (2000 to 2021)

- A fraction will be taken of Story over Gameplay, and this will be the final score; a fraction that can be plotted on a graph. Each score for story and gameplay will be on a scale of 1 to 10, meaning the minimum value for the final Score is a 0.1 (with 1 in Story and 10 in Gameplay, 1/10, this is likely to happen for earlier games I would assume), or a 10 (10 in Story, 1 in Gameplay, 10/1, much less likely to happen due to video games almost all having gameplay at least to some extent due to the medium itself)

To clarify, features such as "story" or "gameplay" are not easy to rank or determine; they are much more general descriptors for a property of a game. As such, I broke down features of each descriptor, and will list them below.

Story

- Narrative Depth
- Cinematics
- Background Lore
- Coherent Story
- Spectacle and Design
- Emotional depth
- Details and Coherency
- Immersiveness

These are just some features that can affect the storytelling and narrative delivery of a video game. As such, any time that a review goes into depth on one of these topics or features, that would raise the score of Story that I give that review and game. Likewise, the less I see of these features mentioned or discussed in a review, the lower the Story score will be for that game.

I have also performed the same breakdown for Gameplay features too, these will also be listed below.

Gameplay

- Action
- Adventure
- Responsiveness
- Mechanics
- Difficulty
- Complexity
- Potential learning curves
- Variety of gameplay scenarios

These are just some features that could affect the gameplay impact of a video game. Just like with story, any mention of these, or in depth analysis of one of these features within a review, will prompt me to raise the Gameplay score for that game. Likewise, any negative mention or lack of mention of these properties will result in a lower score.

Based off of the inherent nature of video games, it is likely that most, if not all reviews, will score highly within the Gameplay score. This would mean that my scores should all relatively be on the low end of the scale, around 0.5 I would assume. Any games that feature innovation or noteworthy mention of story elements, however, will rank highly compared to the rest, meaning that they will score closer to a 1. Any games that feature little gameplay effects but include major storytelling focuses would rank higher than those due to the nature of the fraction being used, I can see games such as those ranking above a 1 and maybe higher. If a game were to be entirely focused on Story and have little focus on Gameplay, said game would rank at a 10, however I do not expect this to be the case.

There are some potential drawbacks to this plan, firstly being that converting qualitative reviews into a quantitative score can be extremely difficult. It is of course for that reason that I am manually assigning a score to each game, however this also comes with the drawback of potential bias being included, however I will analyse all reviews under a critical lens as free from any personal bias as possible, going only off of what is present in the reviews, and nothing else that I could potentially know.

There is still the question of where I shall obtain these reviews from. Due to the age of some of the earlier games, finding long standing web pages from the early 2000s for video game reviews can be tough based off of initial research; however there is one reliable source that contains reviews from the 2000s and is still active. I will be using IGN's reviews as my source for reviews to calculate scores from. Just as an example, IGN's reviews from 2000 are still up, such as Casamassina (2000), a review from the year 2000 for the game Perfect Dark, the second highest critically acclaimed game from that year. As IGN has reliable records of reviews dating back over 20 years, they will be the source I rely upon to find

reviews to calculate my scores from. To find the top critically rated games from each year, I can simply filter by each year on Metacritic.com (2021), allowing me to see the top rated games per year, like I have here within my citation by filtering for the top rated games of 2021. Therefore, by using both IGN and Metacritic, I can find reviews for the highest rated games from each year to analyse.

Programming

My choice on how to go about programming this software to aid in graphing my scores was based on a few factors as well as some research. Using my own past knowledge, I know that *Python* (Version 3.10) is a reliable high level coding language that can be used in data analysis and graphing to plot results, and is relatively easy to work with as code, and so this was my first choice to look into researching how to apply Python to my research. To determine if I made the right choice, I proceeded to research and discern what other coding languages could also be suited to my program. One such article I discovered while researching was from BoostLabs.com (2019), detailing "powerful programming languages for data visualization". While Python is listed as the fourth choice under the article, the reasons mentioned that further convinced me to choose Python is that Python has "a host of top-notch graphing libraries", especially important for my intended use case, as well as the article stating "Python is the language of choice when we develop most of our data visualization software". This, and the extensive third party libraries, alongside past experience with the language and the ease of use with its code, reinforced my decision to use Python.

Now knowing which language to use, I then set about determining which libraries would assist me in making the visualization of my scores as I desired. While researching libraries and plots in Python, I stumbled across Taylor-Morgan (2020), an article discussing different libraries for plotting graphs. Using this article, I determined that *Seaborn* (Version 0.11.2) would be the ideal library for my graphing. As said in Taylor-Morgan

(2020), "Seaborn is an abstraction layer on top of Matplotlib", which is a well known plotting library for Python, however Seaborn simplifies it further, making it easier for me to work with it. It requires Matplotlib to be installed to work however, so I also have *Matplotlib* (Version 3.5.0) installed alongside it. Furthermore, to ensure that my data can be converted to work with the Seaborn library, I also have *Pandas* (1.3.4) installed, which allows me to convert data from a CSV file (Comma Separated Values file, can be edited in spreadsheet programs such as Excel) into a dataframe, which can then be plotted on a graph such as a Seaborn graph.

With my libraries selected, I now needed to decide on an IDE (Integrated Development Environment) to program my project within that allowed for easy installation and linking between my libraries. Having developed with Python before, I chose to use *Jetbrains PyCharm* (2021.2.3) as my IDE of choice, due to my familiarity with it, as well as the ease of installing libraries and programming within it.

Then, with the data provided and the program ready, the program will take the scores from the provided CSV file, and create two dataframes. One will be a dataframe holding every score, so that the graph, being a scatter graph, will display all the data, but then the program will calculate the average scores for each year, and that will be plotted on the same axis as a Regression plot, so a trend line can be fitted to the average scores to analyse the trend over time.

In order to make the running of the program straightforward and simple, my idea is to make the Python script be compressed into an executable file, so that the program can be run as long as the .exe file is within the same directory as Scores.csv, and Scores.csv matches the same formatting within the file. To do this conversion of my Python files into a single executable, I settled upon using *PyInstaller* (Version 5.0.1), a simple command line application, which is able to bundle a Python project into a single executable file. That way, instead of providing multiple files, and confusing methods of running my program, my program will instead be runnable with a single file, as long as the CSV file I use to hold the

scores is within the same folder.

To summarise my research methods then, I will begin with reading reviews for each game, and creating a score based off of the amount of innovation and mentions of story and gameplay for each game. These scores will be calculated as the Story score divided by the gameplay score, and saved to a CSV file. I will then be programming in Python within the PyCharm IDE, where I will be using the Pandas and Seaborn libraries to convert the data from a CSV spreadsheet into a graph for my first iteration. My first iteration to ensure this project is feasible, as well as if the data supports continuing my research, will simply take the data from the CSV file, which will be converted to scores by hand, and then plot this data on a Scatter Graph, alongside an average calculated from each year by the program, which will be plotted on a Regression plot, allowing a trend line to be plotted on the graph to analyse the trend over the years. Once development of a major milestone is complete, I will use PyInstaller to create a functioning .exe of the program to test how it runs, and then proceed to the next stage of development.

Prototype Results

Having performed the initial data research, I have found the games for each year, here are the scores for each game I found (The titles for each game will also be bundled alongside this report within the spreadsheet labeled Scores):

Date	Score 1	Score 2	Score 3
2000	0.20	0.44	0.10
2001	0.20	0.50	0.56
2002	0.38	0.50	0.50
2003	0.38	0.10	1.00
2004	1.00	1.00	0.57
2005	0.67	0.33	0.25
2006	0.88	0.50	0.86
2007	0.38	0.88	0.44
2008	0.78	0.56	1.13
2009	0.88	0.71	0.44
2010	0.40	1.29	1.00
2011	0.88	1.50	1.67
2012	1.43	1.29	2.50
2013	1.13	1.50	1.00
2014	0.25	0.43	0.75
2015	1.00	0.60	0.78
2016	1.43	1.00	0.25
2017	1.00	0.60	2.00
2018	1.25	1.43	1.43
2019	1.00	0.78	1.67
2020	1.25	0.80	1.11
2021	1.67	0.78	0.33

Figure 1: The spreadsheet of scores that I have collected for my prototype.

With these results, a graph was plotted of these scores, as well as an average for each year, which you can see below:

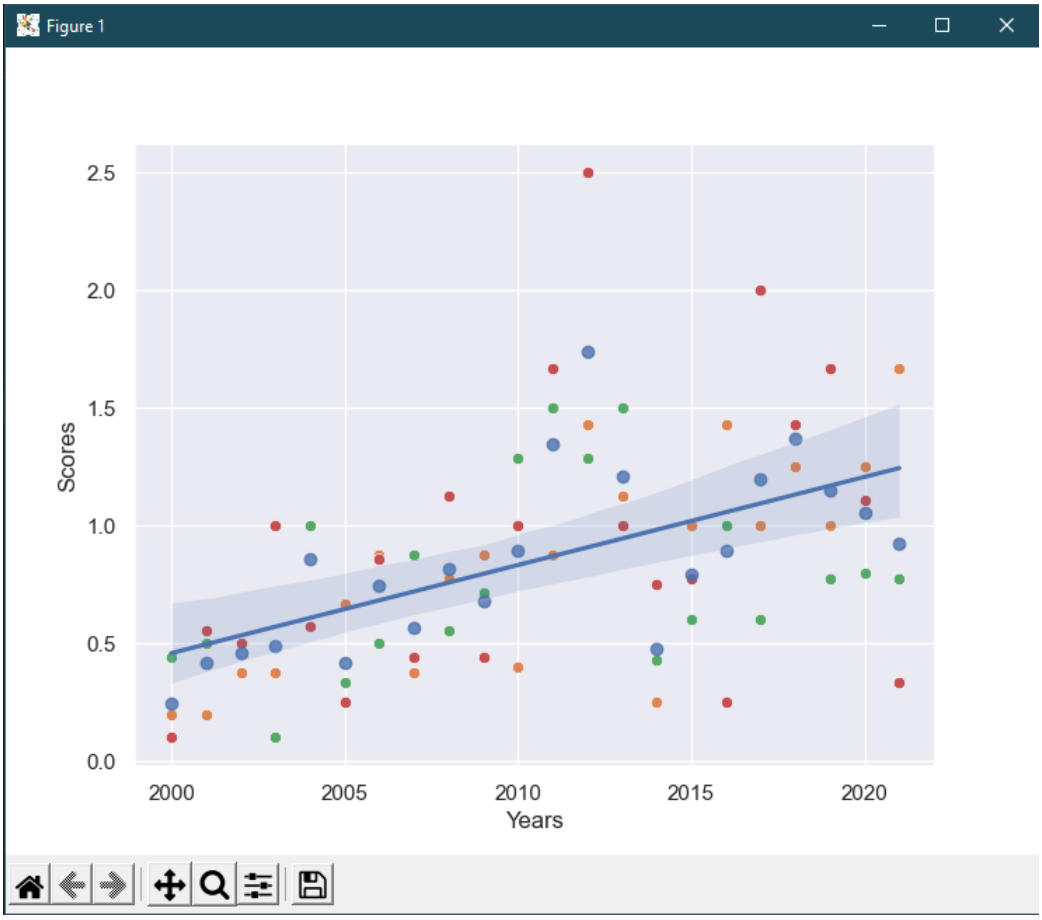


Figure 2: The graph outputted by the program detailing the data so far.

The Blue plots and line of best fit represent the average, while the Orange, Green, and Red scatter points represent the first, second and third scores respectively in that order.

Prototype Discussion

As can be seen from my results, it is clear that there is sufficient evidence to prove that there is a trend displayed within the data, therefore supporting the fact that this form of research is possible. The trend is a positive one, which also supports my hypothesis and thoughts that story driven narratives have become more prevalent over time, and this data also supports the reading I did into video game narratives becoming more innovative and detailed as suggested in Stone (2019). These results therefore can be seen as a success;

while there is some large variance in the data, a large sample for my final set will provide a more accurate trend, and these results suggest that it is worth pursuing further research and development into my program and into collecting more data to paint as accurate a picture as possible. To summarise the results, they support my hypothesis, and support the broader reading I have investigated into the field, providing a good sign to show this research is feasible, and worth continuing.

Prototype Evaluation and Progress from Here

While the work I have put in so far has led to very promising results, there still is a number of ways to improve and to obtain even better and accurate results.

To begin with, the current data set that I used for this included the top 3 critically acclaimed releases per year. To get a better understanding of the trend and to improve further, this can be changed to the top 5 critically acclaimed releases per year, as a large sample would improve accuracy and be more representative of the population of games released that year. As well as this, I would store my data as separate Story and Gameplay scores within my .csv file, as this would allow for my decisions on scoring to be laid bare so that people can cross reference my given Story and Gameplay scores to the games and their reviews, allowing for people to see and discern whether I have been biased in my scoring or not, enabling transparency and reproducible results. As such, I will simply include my CSV file for every game I looked at, allowing people to look at my list, and find the reviews on IGN.

Aside from data collection, another aspect of my research that I can improve upon is the program itself. Calculating the scores by hand is a long process, and adds even more time consumption to the process of data gathering. Rather, if I could instead input my rating for Story and Gameplay instead, and allow the program to calculate the final score instead, then that would greatly speed up data processing and handling time. Not only this, but adding a user interface could be beneficial in helping users run the program. Some ideas for

a basic GUI could be features such as allowing users to specify a specific set of data to output, or to command the program to only show the averages for each year, instead of the full graph.

All in all however, the fundamentals of my program are complete; there are just some tweaks and adjustments to be made to the data set and the program itself before I can deem it complete, but in its current state, I am happy with its success and confident in this research project going forward. With my Prototype results as evidence that I can continue the project from here, I will continue working on my program and my data set until my next major milestone, being the presentation. By the presentation, I aim to complete my next set of milestones, listed in the next section.

Progress Since Prototype

With the Prototype done, I would begin work on improving my program somewhat more in preparation for the presentation. The work and milestones done here would be the foundations for progressing into the final stage of my program, where I could go further and beyond with my program's functionality.

At present, the current milestones that I had reached with my Prototype were:

- 3 games per year.
- Read the IGN review for each game.
- Determine a Score for Gameplay and Story.
- Calculate the ratio Score by hand.
- Save these to a Spreadsheet file, which would then be converted to a CSV file.
- The program I develop would be able to read this Scores, and plot them onto a Graph.

As mentioned previously, these milestones were hit with my prototype, and I was ready to continue progressing. As such, my next set of milestones are:

- Add functionality to the program to calculate Scores automatically.
- The provided CSV file can be of any size (previously, I had hard-coded my program to take only 3 scores).
- Add a very minor user interface to my program (simple command prompt on execution).

At this stage of development, before my presentation, I can say that these milestones have been completed, paving the way for my program to be completed. The major goals at this stage were to unlink the program from the CSV's size, and to calculate the scores automatically. This is because now, any person or group of researchers could perform their own data search and sampling, and create a spreadsheet of results much larger than mine, and still be able to use my program without needing to edit the code at all. For a much larger data set, calculating the Score and the averages per year is tedious at best, and unrealistic at worst, therefore by implementing this functionality into my program, alongside the unrestricted CSV size, my program has become much more accessible for any

user to use, without knowledge of Python or programming at all. All a user needs to do now is save their results as Scores.csv, place the file into the same directory as the exe, and run the program, which would result in the graph being created for them.

Also while at this stage of development, while working on my program, I begun to realise that by making my program less specialised to a specific data set, and flexible enough to accept any data set in the correct format of the Date, followed by two scores, that theoretically this program would work not just for analysing scores for video games, but scores for any piece of media out there, with any criteria. As long as a user provides a spread sheet with dates, and two factors with scores for each, my program would be able to run, and plot their results onto the graph. This means that, outside of my own use, my program has become flexible enough to work with other criteria involved in this form of ranking system. For example, someone could now use my program to evaluate qualitative data from reviews, but with vastly different criteria, such as the ratio of cinematography to sound design discussed within movie reviews over the years. Any data set that involves the ranking of two qualitative scores, and calculating a ratio of them to plot across time, my program can now work to plot that, regardless of what it is. As such, I see this as a successful design victory for my program, by making it more accessible to more users, and functioning within other use cases similar to mine.

Results Since Prototype

As nothing has changed within the dataset yet for the program, as I plan to perform my data search in due time for my final stage in progress, the graph the program outputs itself has not changed. However, the user interface has changed somewhat, with the introduction of a simple output on the command line whenever the program is run, which you can see in the image below.

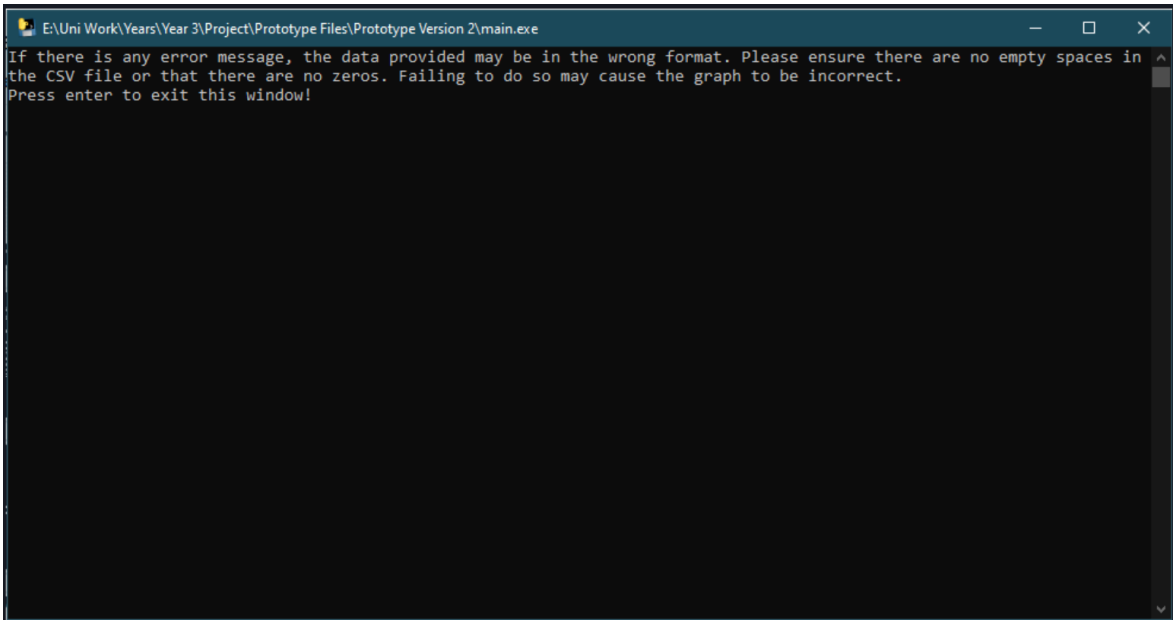


Figure 3: The basic GUI line that I have created, which will be expanded upon in the future.

As visible above, the command line now shows this simple warning whenever run, to allow users to be aware if any errors have occurred. The command line also needs a simple blank line input in order to be closed, as otherwise, without expecting an input, the command line closes automatically. The reason I have added this simple line now is that in my final version of my program, this will be expanded into a functioning, text based GUI via the command line, which will only exit if the user wishes to, and will allow the user to enter commands to perform different actions.

Progress Discussion

As mentioned before, with the current state of my program, I have developed it away from a specific niche use case program, and made it slightly more general use, so that anyone tackling the same area of research that I am can also benefit from my program. In terms of progress, there is still more to do, however the end is in sight for development of my program. I am, so far, on track to completing my program and finishing my data collection in time before the deadline, so no compromises need to be made so far to development, and no targets as of right now have been missed. So far, I have demonstrated via the prototype

that this project and development is feasible, and with this current step in development, I have demonstrated that this program can be used for similar data analysis, and can be improved upon further when it comes to user experience. As such, my next milestones are simply to add more user interaction within the program via the GUI, and to potentially diversify the types of graphs that can be made, allowing for more detailed analysis of data.

Final Version

Moving into the final phase of development, I shall create a new set of milestones heading into this final stage, these milestones being targets that I aim to reach before I am out of time to develop my program further. These milestones are:

- Create a more detailed GUI.
- Make the program more user-friendly.
- Create a command based system for the GUI so that users can run commands from a premade list.
- Create a help command to list these commands.
- Create a command to run the graphing functions again.
- Create a command to run the graphing function for the data set alone.
- Create a command to run the graphing function for the average scores per year alone.
- Create a command that allows the user to select a specific sample from every year to graph.
- Create a command that outputs the calculated scores and full data set for each year
- Create an exit command allowing users to exit out of the program when done.
- A final, full data set, containing 5 games per year, for a total of 110 games

Of these goals, I can confidently say that I was able to hit all of these milestones as much as possible, to the best of my ability. The major focus at this late stage of development was mainly on the Graphical User Interface; to make the program as accessible and usable for the end user as possible, regardless of if that user is experienced in coding or not. With this progress done, any user could now use my program, provide a spreadsheet CSV file of their data set of scores, and expect the program to convert their values into ratio scores, plot them on a graph, and allow them to analyse the data by each set, or expect an output of the dataset by the program in the end. My program is aesthetically cleaned up, which aids the user experience, making the GUI easier to understand, and the graphing system still allows users to save their figures, and interact with the graph.

I have also at this stage completed the full data collection that I aimed to do after the prototype and before the end of the project, meaning that compared to the 66 data values I had previously, I now have 5 data values per year from 2000 until 2021, resulting in 22 years' worth of data, and a total data count of 110, almost double the original data set. This improved and expanded data set will allow me to make more accurate conclusions, as well as potentially expand theories and conclusions on a year-by-year basis, if possible. Due to the coding changes I made after the prototype but before this version, no work had to be done to my program to accept the new data set; I have created the program to work seamlessly with any sized data set, as intended, proving that my goal of making this program accessible for other research projects involving score ratios of values a success.

Final Results

With my newly completed data set and graphical user interface developed, the following below will be screenshots of my program in action, demonstrating the new graph of values, as well as my GUI at work. These results will begin from the next page onwards:

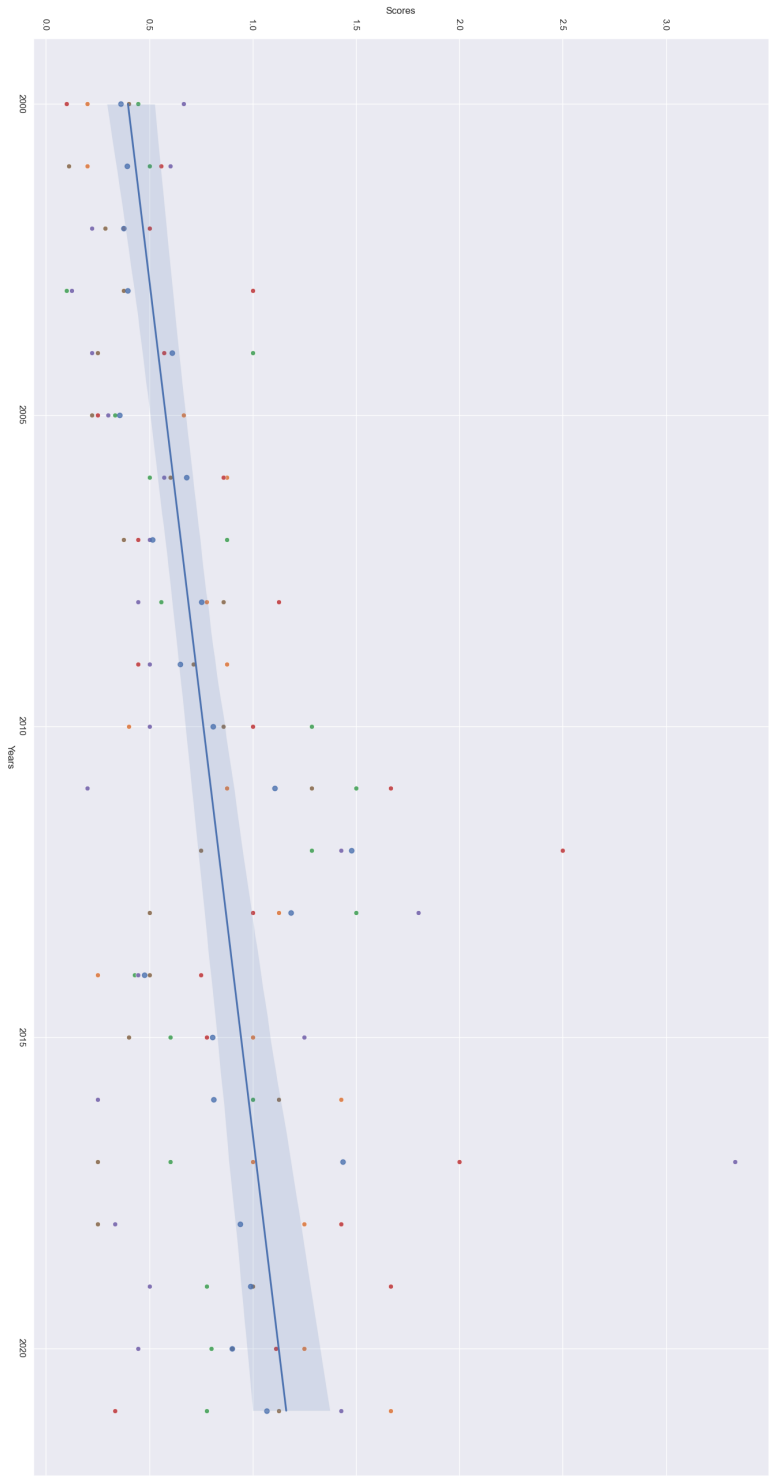


Figure 4: The final graph of all the results that I have collected.

Here, you can see every data point calculated, with the blue points and line being the Average score per year, while the other points represent the specific data values from each year. A .png of this and every graph will be bundled with the report.

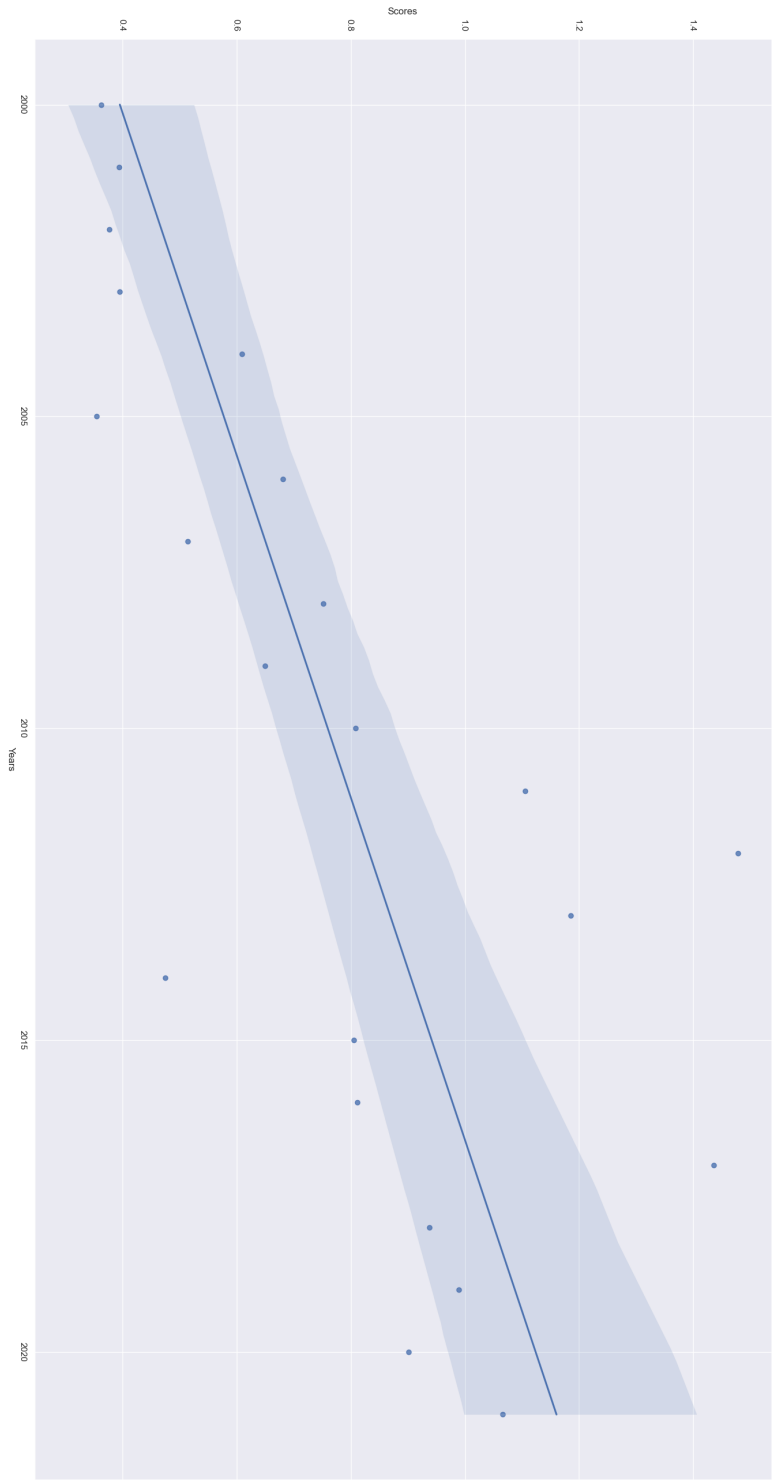


Figure 5: The averages from each year plotted onto a graph.

These results show that compared to the prototype graph originally created, there has been a slight shift in the data. The positive trend has decreased slightly, and the data itself appears to have become more diverse, as expected of a larger sample.

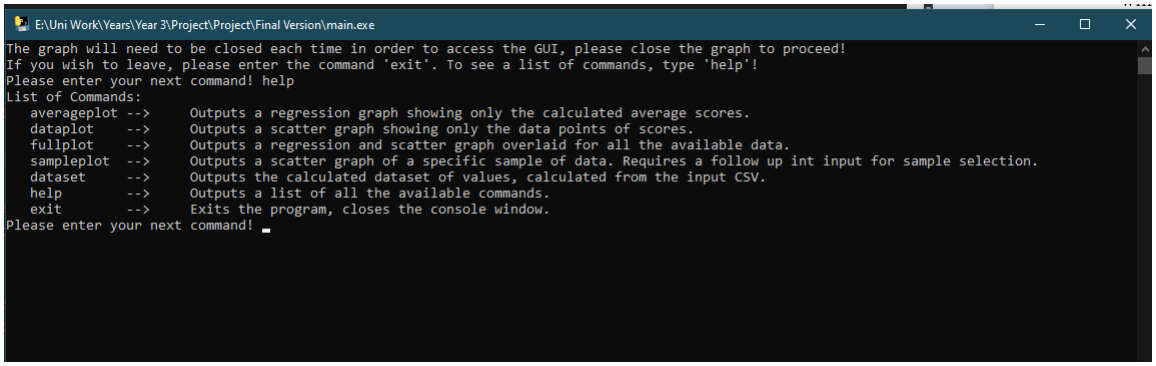


Figure 6: The help command being utilized within the program's GUI.

Here, the help command has been inputted, and lists every single command available, alongside a simple explanation for each command. Here is the command in plain text:

Please enter your next command! help

List of Commands:

averageplot –> Outputs a regression graph showing only the calculated average scores.

dataplot –> Outputs a scatter graph showing only the data points of scores.

fullplot –> Outputs a regression and scatter graph overlaid for all the available data.

sampleplot –> Outputs a scatter graph of a specific sample of data. Requires a follow up int input for sample selection.

dataset –> Outputs the calculated dataset of values, calculated from the input CSV.

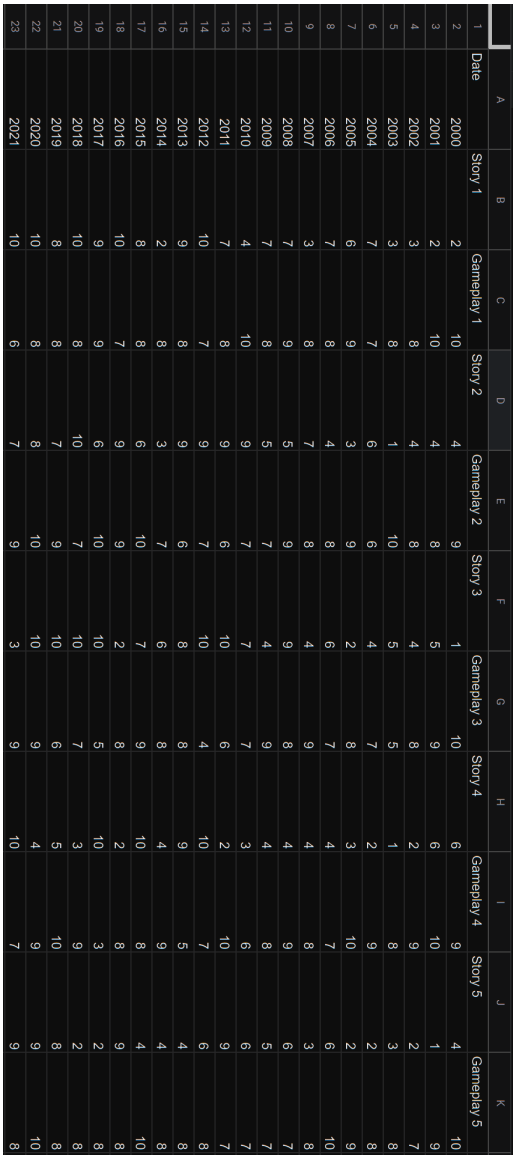
help –> Outputs a list of all the available commands.

exit –> Exits the program, closes the console window.

```
Please enter your next command! dataset
Outputting dataset below:
        Date    Game 1    Game 2    Game 3    Game 4    Game 5
0   2000.0  0.200000  0.444444  0.100000  0.666667  0.400000
1   2001.0  0.200000  0.500000  0.555556  0.600000  0.111111
2   2002.0  0.375000  0.500000  0.500000  0.222222  0.285714
3   2003.0  0.375000  0.100000  1.000000  0.125000  0.375000
4   2004.0  1.000000  1.000000  0.571429  0.222222  0.250000
5   2005.0  0.666667  0.333333  0.250000  0.300000  0.222222
6   2006.0  0.875000  0.500000  0.857143  0.571429  0.600000
7   2007.0  0.375000  0.875000  0.444444  0.500000  0.375000
8   2008.0  0.777778  0.555556  1.125000  0.444444  0.857143
9   2009.0  0.875000  0.714286  0.444444  0.500000  0.714286
10  2010.0  0.400000  1.285714  1.000000  0.500000  0.857143
11  2011.0  0.875000  1.500000  1.666667  0.200000  1.285714
12  2012.0  1.428571  1.285714  2.500000  1.428571  0.750000
13  2013.0  1.125000  1.500000  1.000000  1.800000  0.500000
14  2014.0  0.250000  0.428571  0.750000  0.444444  0.500000
15  2015.0  1.000000  0.600000  0.777778  1.250000  0.400000
16  2016.0  1.428571  1.000000  0.250000  0.250000  1.125000
17  2017.0  1.000000  0.600000  2.000000  3.333333  0.250000
18  2018.0  1.250000  1.428571  1.428571  0.333333  0.250000
19  2019.0  1.000000  0.777778  1.666667  0.500000  1.000000
20  2020.0  1.250000  0.800000  1.111111  0.444444  0.900000
21  2021.0  1.666667  0.777778  0.333333  1.428571  1.125000
Please enter your next command!
```

Figure 7: The data set being outputted by the GUI.

As my program now calculates the scores automatically for the user, the program needed some form of functionality to show these calculated scores to the user. As such, I simply added a function that prints the scores to the console for the user. This hasn't been tested with a larger dataset, so I can't be sure of how the data will be formatted for different sets of data, but for my dataset, this works well.



	A	B	C	D	E	F	G	H	I	J	K
1	Date	Story 1	Gameplay 1	Story 2	Gameplay 2	Story 3	Gameplay 3	Story 4	Gameplay 4	Story 5	Gameplay 5
2	2000	2	10	4	9	1	10	6	9	4	10
3	2001	2	10	4	8	5	9	6	10	1	9
4	2002	3	8	4	8	4	8	2	9	2	7
5	2003	3	8	1	10	5	5	1	8	3	8
6	2004	7	7	6	6	4	7	2	9	2	8
7	2005	6	9	3	9	2	8	3	10	2	9
8	2006	7	8	4	8	6	7	4	7	6	10
9	2007	3	8	7	8	4	9	4	8	3	8
10	2008	7	9	5	9	9	8	4	9	6	7
11	2009	7	8	5	7	4	9	4	8	5	7
12	2010	4	10	9	7	7	7	3	6	6	7
13	2011	7	8	9	6	10	6	2	10	9	7
14	2012	10	7	9	7	10	4	10	7	6	8
15	2013	9	8	9	6	8	8	9	5	4	8
16	2014	2	8	3	7	6	8	4	9	4	8
17	2015	8	8	6	10	7	9	10	8	4	10
18	2016	10	7	9	9	2	8	2	8	9	8
19	2017	9	9	6	10	10	5	10	3	2	8
20	2018	10	8	10	7	10	7	3	9	2	8
21	2019	8	8	7	9	10	6	5	10	8	8
22	2020	10	8	8	10	10	9	4	9	9	10
23	2021	10	6	7	9	3	9	10	7	9	8

Figure 8: My CSV dataset in full; all the category scores and dates for every game.

As can be seen, I increased the data size to 5 games per year, allowing for a more accurate conclusion to be gleaned from my data. This data will all be included with the report, in the Scores spreadsheet.

Date	Game 1	Game 2	Game 3	Game 4	Game 5
2000	Tony Hawk's Pro Skater 2	Perfect Dark	NFL 2K1	Baldur's Gate II: Shadows of Amn	The Legend of Zelda: Majora's Mask
2001	Tony Hawk's Pro Skater 3	Grand Theft Auto III	Halo: Combat Evolved	Metal Gear Solid 2: Sons of Liberty	Gran Turismo 3: A-Spec
2002	Metroid Prime	Grand Theft Auto: Vice City	Legend of Zelda: Link to the Past	Madden NFL 2003	Tony Hawk's Pro Skater 4
2003	Legend of Zelda: Wind Waker	Madden NFL 2004	Star Wars: Knights of the Old Republic	SSX 3	SoulCalibur II
2004	Half Life 2	Grand Theft Auto: San Andreas	Halo 2	Burnout 3: Takedown	Tom Clancy's Splinter Cell Pandora Tomorrow
2005	Resident Evil 4	Ninja Gaiden Black	Tom Clancy's Splinter Cell Chaos Theory	God of War	Sid Meier's Civilization IV
2006	The Legend of Zelda: Twilight Princess	Gears of War	The Elder Scrolls IV: Oblivion	Company of Heroes	Okami
2007	Super Mario Galaxy	BioShock	Call of Duty 4: Modern Warfare	Halo 3	God of War II
2008	Grand Theft Auto IV	Little Big Planet	Metal Gear Solid 4: Guns of the Patriots	Super Smash Bros. Brawl	Fallout 3
2009	Uncharted 2: Among Thieves	Call of Duty: Modern Warfare 2	Street Fighter IV	Batman: Arkham Asylum	Assassin's Creed II
2010	Super Mario Galaxy 2	Mass Effect 2	Red Dead Redemption	God of War III	Halo: Reach
2011	Batman: Arkham City	The Elder Scrolls V: Skyrim	Portal 2	Minecraft	The Legend of Zelda: Skyward Sword
2012	Persona 4 Golden	Mass Effect 3	The Walking Dead: A Telltale Games Series	Journey	Xenoblade Chronicles
2013	Grand Theft Auto V	The Last of Us	Bioshock Infinite	Fire Emblem: Awakening	Rayman Legends
2014	Super Smash Bros. for Wii U	Dark Souls II	Bayonetta 2	Diablo III: Ultimate Edition	Dragon Age: Inquisition
2015	Metal Gear Solid V: The Phantom Pain	Bloodborne	The Witcher 3: Wild Hunt	Undertale	Shovel Knight
2016	Uncharted 4: A Thief's End	INSIDE	Overwatch	Forza Horizon 3	Inside
2017	The Legend of Zelda: Breath of the Wild	Super Mario Odyssey	Persona 5	What Remains of Edith Finch	Mario Kart 8 Deluxe
2018	Red Dead Redemption 2	God of War	Celeste	Super Smash Bros. Ultimate	Forza Horizon 4
2019	Divinity: Original Sin II - Definitive Edition	Resident Evil 2	Final Fantasy XIV: Shadowbringers	Sekiro: Shadows Die Twice	NieR: Automata
2020	Persona 5 Royal	The Last of Us Part II	Half-Life: Alyx	Demon's Souls	Ori and the Will of the Wisps
2021	Disco Elysium: The Final Cut	Hades	Forza Horizon 5	Final Fantasy XIV: Endwalker	Psychonauts 2

Figure 9: The table listing every game that I retrieved a review from and scored.

I created a list of all the games that I retrieved scores from, that way with a comprehensive list, other researchers and people can look through the list, review it, and come to their own conclusions, or perhaps perform the data analysis and scoring to the same set of games I used, and see how their conclusions compare to mine. This table will be provided

in a separate file, alongside the CSV file and spreadsheet that I used for all my data management during the course of this research project.

Final Results Discussion

As evidenced by my final graph, my results show a clear positive trend, with the average scores increasing throughout the years. This means that over time, it can be said that the focus of story within video games has increased somewhat throughout the years, which therefore proves my hypothesis from the start correct, where I stated that the story focus of video games has increased during the industry's lifetime. Also of note is the error range around my line of best fit; this is better seen in the standalone average graph, which shows that over time, the scores for each game have begun to diversify. This is because a larger area around the line of best fit means that it is more likely for results to vary within that range in the data set, and this is important because it shows that video games as an industry have diversified. While throughout the industry's life, there are still video games that focus heavily on gameplay, and this can be seen from lower ranking scores in the later years, there are also now more games with a mixed focus on gameplay and story, or even games with an intensive focus on story only. The wider variety of games available in the modern years proves that the industry has diversified, and my data proves this too by showing the expanding range of potential results.

My thought behind the reasoning for this diversification is that within recent years, game stores have expanded much more greatly online, and with the spread of the internet, it is now much more easier for indie studios and lone developers to create games for platforms like PC, whereas in the past, most people played games on consoles mostly. With the expansion of the online marketplace for video games, with places such as Steam, or the Epic Games Store, indie developers are able to sell their more niche video game projects that can be much more experimental and narrative focused than the usual yearly releases. A good example of this being the case with a game is *Undertale* (2015), a game created by a single developer, Toby Fox, becoming an absolute phenomenon within the gaming industry, being so successful as to leading to one of the most recognisable characters from the game being added to Nintendo's own Super Smash Bros. Ultimate, as referenced in Lee

(2019). Undertale was critically rated high enough to appear within my own spreadsheet of collected games too, showing the impact these more niche titles can have on the industry, and the critics too.

As such, I believe that the rising popularity of online marketplaces has resulted in a boom in the industry at allowing indie projects and more niche games to be made and sold online, diversifying the market of video games, and therefore with more niche and diverse games being made and sold, the industry has attained the ability to shift away from arcade focused video games, and being diversifying and experimenting with the medium of video games itself, leading to more creative, and narratively compelling stories, just as I had said within my hypothesis at the start of this project.

Aside from analysing the general trend overtime, I can also analyse specific years from my graph too. Most notably, I wish to point out 2011 through to 2013. The first set of years, in my opinion, show the greatest shift in score upwards compared to the earlier years. The main reason I believe this to be the case, is that around the turn of 2010, the life cycle of the current generation of consoles, which at the time, were the Xbox 360 and PS3, was coming to a close. I believe that these 3 years held the greatest shift in video game narratives, because the most influential projects designed with the new systems and technology were finally releasing.

As mentioned in Trenholm (2013), the release of the PS4 was slated to and released at the end of November 2013. As such, the most innovative games that could push the current technology as far as it could go were released in the years leading up to 2013, hence why the graph shows such an increase during these years. Some noteworthy examples of such narratively innovative games within this period, that I have also included in my data set, include *The Walking Dead: A Telltale Games Series* (2012), which scored a 10 in Story and a 4 in Gameplay, *Journey* (2012), another indie developed game, which scored a 10 in Story and a 7 in Gameplay, and finally *The Last of Us* (2013), which scored a 9 in Story, and a 6 in Gameplay, and was so well critically received that a TV series is in the works to turn the

story of the game into a show, as discussed in Russel (2022), theorised to be released in 2023. This, to me, shows that by the simple fact that a video game story can now be so critically received, and determined great enough to be converted into a TV show, shows just how far the medium as a whole has advanced in terms of narrative storytelling, and alongside the evidence shown within my data and graph, proves my hypothesis true, that narrative storytelling within the medium has advanced, due to multiple factors, such as accessibility for indie developers, and a wider appreciation for narrative games due to accessibility to games and other mediums contributing to their stories.

Limitations and Future Work

In terms of research limitations for my project, there are only a few that I can name. Firstly, in terms of the data set, one limitation that can be seen would be the amount of data I have. Theoretically, if I wanted an accurate representation, my sample would be of all video game reviews from IGN, as that would allow me to get the data for every single game released across their history, allowing for a more accurate result. A sample such as this would also include poorly rated games, which can still be included within my results by ranking low in the features that they performed poorly in, allowing for a full representation of the medium. However, collecting a data set like this would either take an unrealistic amount of hours for me, or take the work of multiple people or some form of automation. If possible however, this would greatly increase the accuracy of results, and either prove or disprove my hypothesis more strongly than I could with my current data, allowing for a more accurate conclusion. For reference, reading a video game review takes around 15 minutes on average to fully read, process, and break down into specific scores. Considering I had 110 reviews in my data set, that puts the average time taken to around 27 and a half hours of reading just for my data set. Hence, some form of automation, or easier data collection, would speed up this process considerably, while also offering a more accurate conclusion to make from the data.

Aside from this, in terms of programming, there are some limitations I came across. Having experimented with *Seaborn* (Version 0.11.2), I was able to code and meet many of my requirements for my software to succeed, however I struggled with considering how to implement one specific feature, being how to program the ability to show all my data for a specific year on a single graph. This was mainly due to time constraints caused by collecting the final data set, but if I could revisit this project, the first thing I would reconsider and develop would be to find a way to plot the data for specific years on a graph, as a user may find it useful to see the specific results for a year on a graph.

Alongside this, I would also look into altering my function to output my dataframe of scores to the console. While it works perfectly with my current data set, more testing is needed, as there is no telling how the program would react to a dataset with either a large amount of rows or columns, and how that output would be formatted. So with more time, and with a larger data set, I would test and analyse this function, and edit it in case it does not work well with much larger data sets than I could gather. Finally, the one last addition that comes to mind would be to add more functions to add numerical outputs, such as the mean for a year of results, or the gradient of the line of best fit, and so on, to better analyse and understand the graph. Some of these would be relatively simple to add, such as the mean output for a year, as those results are stored in the dataframe I created, however options such as the graph gradient might be more complex to add, and require research into the Seaborn documentation in order to understand how to implement them.

Otherwise, aside from the limitations listed above, I believe my program to be in a fully completed state as is, as it aided in data analysis and investigation, made graphing simple and automatic, and calculated all my scores for me. Referring back to my aims and objectives, my program does in fact:

1 - Prove that the trend in narrative video games has changed over time.

2 - Is a program that aids with handling my data.

3 - Can read the data that I have gathered from reviews in a CSV format.

4 - Involve qualitative data that has been converted to quantitative data.

5 - This data can be plotted on my graph automatically.

6 - The trend can be found automatically, and allow the user to analyse the graph.

7 - The results obtained from my program do in fact allow an answer to my hypothesis.

As my aims have all been met, and I believe that I have gone further than was originally required with the GUI and user input additions, I am confident to say that this research project has been a success.

Conclusion

To conclude, I believe that my results prove my hypothesis correct. My hypothesis stated that I believe that the video game industry has become much more story driven, and that story-focused titles have become much more critically acclaimed in recent years, due to the diversification of video games, and the expansion of the playerbase of games as a whole. I believe that this has been proven true, due to the data I have gathered showing a positive trend in story relevance within video game reviews, and more critically acclaimed games having a larger focus on story. Not only this, I analysed and noted specific video games, such as *The Last of Us* (2013), and *Undertale* (2015), which were massive critical successes, both with large focuses on story narratives, and scored similarly, despite one being a triple-A game by major studio Naughty Dog, and the other being made by a single independent game developer being Toby Fox. I believe that the fact both of these games can exist, can be equally acclaimed and regarded fondly for their story, as well as the trend proven via my graph, all together prove my hypothesis correct. I believe that there is also further research that can be done into this field, the fruits of which can and would likely benefit and shape the future of the gaming industry, allowing it to thrive even more so than it currently already is, and reach ever greater heights as a creative medium.

References

Bloodborne. (2015, From Software).

BoostLabs.com. (2019, November). *4 powerful programming languages for data visualization.* Retrieved 2022-01-20, from https://boostlabs.com/blog/popular-programming-languages-for-data-viz/

Casamassina, M. (2000, May). *Perfect dark review.* Retrieved 2022-01-22, from https://www.ign.com/articles/2000/05/20/perfect-dark-3

Death stranding. (2019, Kojima Productions).

Jetbrains pycharm. (2021.2.3). Retrieved from https://www.jetbrains.com/pycharm/

Journey. (2012, Thatgamecompany).

The last of us. (2013, Naughty Dog).

Lee, J. (2019, September). *Sans from undertale joins smash bros. ultimate as a mii fighter costume.* Retrieved 2022-05-03, from https://www.polygon.com/2019/9/4/20850211/sans-undertale-smash-bros-ultimate

Matplotlib. (Version 3.5.0). Retrieved from https://matplotlib.org/

Metacritic.com. (2021, 12). *Metacritic.* Retrieved 2022-05-05, from https://www.metacritic.com/browse/games/score/metascore/year/all/filtered?year_selected=2021&distribution=&sort=desc&view=detailed

Pandas. (1.3.4). Retrieved from https://pandas.pydata.org/

Pyinstaller. (Version 5.0.1). Retrieved from https://pyinstaller.org/en/stable/

Python. (Version 3.10). Retrieved from https://www.python.org/

Russel, B. (2022, April). *The last of us tv show: Everything we know so far about the hbo series.* Retrieved 2022-05-03, from https://www.gamesradar.com/uk/the-last-of-us-hbo-series-release-date-cast-trailer/

Seaborn. (Version 0.11.2). Retrieved from https://seaborn.pydata.org/

Stone, C. (2019, January). *The evolution of video games as a storytelling medium, and the role of narrative in modern games.* Retrieved 2022-01-20, from

https://www.gamedeveloper.com/design/the-evolution-of-video-games-as-a-storytelling-medium-and-the-role-of-narrative-in-modern-games

Taylor-Morgan, S. (2020, April). *The 7 most popular ways to plot data in python.* Retrieved 2022-01-20, from https://opensource.com/article/20/4/plot-data-python

Trenholm, R. (2013, August). *Ps4 release date revealed.* Retrieved 2022-05-03, from https://www.cnet.com/tech/gaming/ps4-release-date-revealed

Undertale. (2015, Toby Fox).

The walking dead: A telltale games series. (2012, Telltale Games).

Wijman, T. (2021, May). *Global games market to generate 175.8 billion in 2021; despite a slight decline, the market is on track to surpass 200 billion in 2023.* Retrieved 2022-01-20, from https://newzoo.com/insights/articles/global-games-market-to-generate-175-8-billion-in-2021-despite-a-slight-decline-the-market-is-on-track-to-surpass-200-billion-in-2023/