



Universiteit
Leiden
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Opleiding Informatica

Changes in Steam genre tags
after Covid-19

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BACHELOR THESIS

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24/08/2022

Abstract

Covid-19 had a big influence on the entire world forcing people to stay at home. This has caused a big rising in the popularity of video games. This thesis focuses on the changes Covid-19 had on the genre tags for the digital distribution platform Steam. Looking at changes in the amount of releases, average score and prices of applications within the genres on Steam. The results shows that Covid-19 had an influence on the amount of releases and the prices of products within genres, however no clear influence could be found for prices.

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1 Introduction

Covid-19 is deadly virus that has plagued the entire world for the last two and a half years. During this time people have been locked inside their houses, while there was a global lockdown. Due to the fact that people had to stay home all the time, many people gained an increased amount of free time. During this time new hobby's were found by people and a hobby that gained much popularity during this time was playing video games. However the influence of the influx of people playing games had on the gaming industry has yet to be researched.

This thesis tries to find out the effect of Covid-19 had on different genres available on the digital video game distributor Steam [ste]. This distributor offers a wide variety of video games under various types of genres. These genre tags give users a idea of what they can expect of the game they are purchasing. Each genre has their own characteristics and Covid-19 might have had an influence on the characteristics of genres.

In this thesis we decided to research if there was any impact on the various genre tags that are available on Steam after Covid-19 happened. The purpose is to compare different aspects for the different genres and denote the changes that have occurred. The main research question to be answered is: *What is the influence of the Covid-19 on characteristics of Steam genre tags?*

1.1 Relevance

Covid-19 has hit everybody in the world. Many people started gaming and research has been done on the impact of the increase in people playing games [Kri20],[LCRSPC20],[BKS+20]. However no research has been done on the effect Covid-19 had on the gaming industry. Specifically if Covid-19 had influence on the different characteristics present in video games genres. Researching if Covid-19 has an impact on the different genres is something that gives a better understanding of the changes. The choice of Steam is first of all since its a popular gaming distributor having a large amount of games available. Moreover besides the large quantity in games, Steam has many API's available to generate the data from needed for the research. With this research it is possible to get a better understanding of the impact that Covid-19 left on the gaming industry.

1.2 Thesis overview

This chapter contains the introduction; Section 2 includes the background of Covid-19 and Steam; Section 3 describes the research questions; Section 4 describes the methods used to answer the research questions; Section 5 shows the results; Section 6 gives the conclusion. Lastly the limitations and further research will be discussed.

This bachelor thesis is supervised by Giulio Barbero and Mike Preuss from the Leiden Institute of Advanced Computer Science and written by Leon Li.

2 Background

2.1 Covid-19

Covid-19 also known as the Corona Virus or SARS-CoV-2 is a global pandemic that started around the end of 2019 in China and was officially declared a pandemic on the 12th of March 2020 [CCT+20]. During the early periods of the Covid-19 pandemic a state of lockdown was called around the world causing disruptions in supply, since people could not work or go to school [LCRSPC20]. Adults had to instead work from their own home offices, while students meanwhile had to take lectures online. People had to socially distance themselves to not only keep themselves safe, but also to keep the safety of others around them. With people having to stay home they managed to get more free time to try out new experiences, that they previously might not have enough time for. One example of popular new hobby during this period of lockdown was the increase of people playing video games [Kri20],[LCRSPC20].

2.2 Steam

Steam is a popular digital distribution platform released on the 12th of September 2003. Selling video games on their platform Steam gained lots of popularity becoming the largest retailer of video games in 2013 [Edw13]. After growing enormously they even started branching out of selling only games to also selling software. As of 2022 they have garnered a large quantity of applications available in their store at well over 50.000 [Dea21],[Gal]. Besides the large library of video games, Steam is furthermore also available on commonly used operating systems such as Windows, MacOS and Linux, which account for over 90% of the market share [Sch], [des22]. Being available on some of the most popular platforms allows users to easily access Steam and gave the influx of people playing video games during Covid-19 an easy location to buy and play video games from.

2.2.1 Genre tags

Each available application on the Steam Store either games or software have a genre tag attached to it. The definition of a genre is "a category of artistic, musical, or literary composition characterized by a particular style, form, or content" according to the Merriam-Webster Dictionary [gen22]. The Steam genre tags follow this same definition. The genre tags on Steam gives users a general idea of what type of application they are buying. For example a product which includes genre tag of 'action' can be expected to be somewhat action oriented. This allows users to easily identify what kind of application they are looking at giving them a better insight in their purchase. Steam has a large quantity of applications available on the platform. This leads to a large amount of different available genres that each have their individual characteristics.

2.2.2 Data sets

Steam offers a large amount of application in their store. This allows for the generation of a large data set. Such data sets already exist such as one generated by the paper "Condensing Steam: Distilling the Diversity of Gamer Behavior" [OVWZ16]. This data set contains information about various applications released on Steam, such as release dates, required age and the genre of applications. However this data set only includes data up to 2016, which makes it not possible to

analyze changes that might have happened since the start of Covid-19. Another data set is the "Steam games complete data set" [Ant19]. This is a more recent data set including over 40.000 games generated in 2019. However just as the previous data set it does not include data since the start of Covid-19 and is not able to be used for the research. Lastly the data set created by "Visualizing gaming trends on Steam" [BHV], they made a data set showing all the genres and the amount of releases within them showing the trends that have occurred. However this data set is also from 2016 and therefore misses the recent data including Covid-19 and could not be used.

2.2.3 API

For the reasons mentioned above the data set needs to be generated from scratch. Steam has many available API's. The different API's are able to directly communicate with the Steam servers. Using the various API's it is possible to view a users Steam library or use a two-factor authentication. However for the purpose of this research an API that can query information about applications available on Steam is used. For more information about the specific API's used in the research see 4.1.

3 Research question

This influx of people playing video games during the time of Covid-19 might have had an impact on different genres in video games. The purpose of this research is to find possible changes that have occurred with the different genres due to the influx of people playing video games. The main subject of research is figuring out if there are changes on characteristics on Steam genre tags before and after Covid-19. With the following research question: *What is the influence of Covid-19 on characteristics of Steam genre tags?* To answer this research question multiple sub research questions are made to focus on individual changes for specific characteristics associated with steam genres.

3.1 Growth of games

The first sub research questions is about finding the impact Covid-19 had on the amount of releases within genres. Games with a wide variety of genres are released every single day. However Covid-19 might have had an influence on the amount of releases for individual genres. Some genres might have grown largely and gained more release since the start of Covid-19, while other might have lost popularity and decreased in the amount release per day. This influence of Covid-19 is researched with the sub research question: *Did genres on Steam grow or decline in the amount of releases during Covid-19 and is this change significant??*

3.2 Change in Score

The second sub research question is about finding the impact Covid-19 had on the average score of applications with different genres. As stated in 3.1 many games are released all the time. However not every single game has the same amount of effort put into it. This leads to some games being more popular and praised, while others are shunned for their poor quality. During Covid-19 the quality of the released games might have changed. This influence of Covid-19 is researched with

the sub research question: *Did Covid-19 have an influence on the average scores of genres within Steam?*

3.3 Change in prices

The last sub research question is about finding the impact Covid-19 had on the average price of the different genres. Having an influx of people playing video games might have caused developers to shift to either a higher or lower price. This influence of Covid-19 is researched with the sub research question: *Did Covid-19 have an influence on the average price of genres within Steam?*

4 Method

4.1 Data

For the analysis of Steam genre tags a data set needs to be generated. The data set needs at least the following features for a each specific genres:

- Genre of the application - Used to separate the data for each genre
- Release date of an application - Used to plot the applications over time using a time series
- The score of the application - Used to analyze the scores
- The price of the application - Used to analyze the price

To accomplish this two different API's are used. The first API is the SteamSpy API [[Gal](#)]. This API generates a list of all the applications available within a genre in a JSON response. Furthermore this API also includes scores and prices for each applications within the same JSON response. Using this API three out of the four required features are now complete. The API also included more features in it's response. However these features are not needed for the research. The specific features that are stored are the following:

- appid - Steam Application ID.
- score_rank - score rank of the game based on user reviews
- positive - number of positive reviews
- negative - number of negative reviews
- price - current US price in cents.
- initialprice - original US price in cents.

The response generated by this API already includes most of the required features. The first feature is a single output file for a genre with all the applications included. Secondly the `score_rank` feature is the score of an application. Lastly the `price` feature containing the price of the application within the genre. The last features that the API does not included is the release dates of applications used for creating a time series.

To get the release dates of the applications a second API is used, that being the Steam storefront API [sto]. This API searches for an applications `appid` and give multiple features in return in a JSON format. One of the features being the `release_date` feature. Just as with the previous API many features are available, however those are not necessary for the research. The features stored from this API are the following:

- `appid` - Steam Application ID.
- `release_date` - release of the product

Using the prior generated data set from the SteamSpy API [Gal] for each application within a genre all the `appid`'s are called using the Steam storefront API [sto] and stored into the second data set. This data is then merged together based on the `appid` of the applications.

The merged data set now includes all the required data for the research. However the `release_date` feature is not in the correct format for creating a time series. The provided `release_date` feature is in the format: `dd ,mmm, yyyy`, example `10, jan, 2000`. To use the time series the date is converted to the format `yyyy, mm, dd`, example `2000, 01, 10`. To accomplish this the build in Pandas function `to_datetime()` is used to convert feature to the right time format.

The Steam API has a limit to the maximum amount of calls that can be done at a time. This limit is 200 API calls every 5 minutes. To deal with this limit a delay is placed between every API call of 1.5 seconds to not exceed the limit.

4.1.1 Excluded genres

Not every genre is included in the research. There are multiple reason for an exclusion of a genre. The first reason is due to the total application count for a genre being lower than 100 as of June 2022. Genres with a low application count were excluded, since regression is for finding the total amount of releases. For regression a certain amount of data entries should be available to train the regression line. With a low application count the regression in 4.2 will have a high change of creating an unreliable regression line. Examples of genres excluded for this reason:

- Job Simulator
- Reboot
- Volleyball
- Rugby
- Snooker
- Cricket
- Steam Machine
- Jump Scare

The second reason for exclusion is if there exist an overarching tag over the genre. Genres that fall into this category are genres defined by using two or more genre tags that already exist as separate tags. Well having a genre tag that is a combination of other genre tags, applications that have these genre also included the genre tag as a separate genre tag. In this research the focus is one the changes in individual genres, instead of focusing on combinations of different genres. For this reason these genres are excluded. Examples of genres excluded for this reason:

- Medical sim
- Roguelike Deckbuilder
- Looter Shooter
- Co-op Campaign
- Local Multiplayer
- Psychological Horror
- Online Co-Op
- Action-Adventure

Lastly some of the genres were not included for either of the following reasons. The genre had a negative response from the SteamSpy API [Gal]. With a negative response from the SteamSpy API the list of applications for a genre could not be generated. The other reason is for the genres where many negative responses for individual applications occurred using the Steam Web API [sto]. Due to the amount of applications that were unable to connect with the API it led much missing data. Due to the amount of missing data these genres have also been excluded.

- Lovecraftian
- Classic
- Stylized
- Controller
- Great Soundtrack

4.2 Total amount of releases

The data set includes the `release_dates` feature for each applications that is released within that genre. Using a cumulative sum the total release amount of releases over time can be calculated. Then using `pyplot` the cumulative sum of a genre can then be plotted over a period of time see fig. 1.

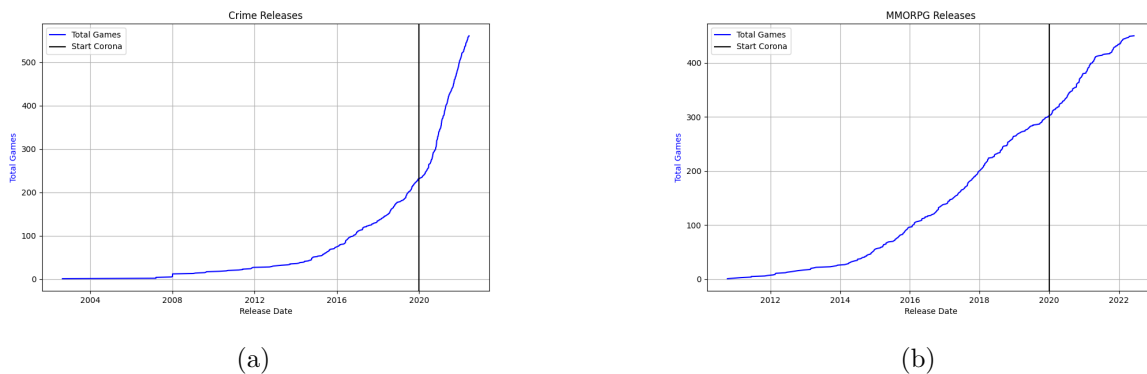


Figure 1: Example of releases

Several dates are missing in the data. The reason for the missing dates are because on those days no apps were released. However this leads to a lot of missing data. For this reason the missing dates are added to the data with a dummy variables 0 for the releases on those days.

To find the changes in releases the data is split into two sets, the first one being data from January 2017 to December 2020. This data is used for finding the growth before Covid-19. The reason for not including all the data, is to compare the growth of releases before Covid-19, with the growth after Covid-19 in a similar time frame. The rough time frame after Covid-19 is around 2.5 years. Therefore the growth of a similar time frame before Covid-19 was used rounding down to the start of the year. The second set is the testing set consisting the period of Covid-19 with data starting from January 2020 to the July 2022.

Linear regression from SKlearn [sld] is applied on both sets on the previously mentioned cumulative sum of releases to create two regression lines see fig. 2. These regression lines have a slope that indicate the amount of releases per day. The two slopes are compared to each other to determine if the amount of releases have increased or decreased for a genre. See results 5.1.

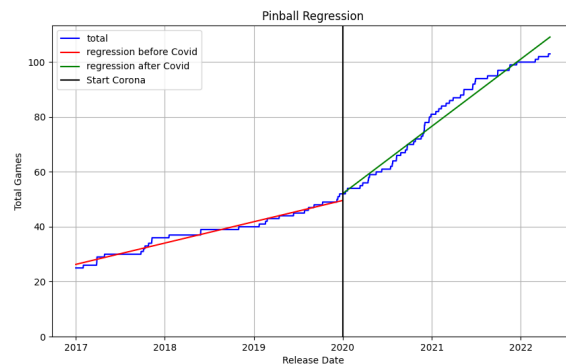


Figure 2: Example of regression

The two regression lines can furthermore be tested by using a t-test to see if there exist a significant change in the slope before and after Covid-19. For the t-test the `ttest_ind` from `scipy.stats` is used. See results 5.1. This t-test compares the groups before and after Covid-19 which each other a returns a statistic and a p-value. To be considered a significant change the p-value needs to be lower than an α -level of 0.05.

4.3 Score

As mentioned in 4.1 the generated data from the SteamSpy API set included a feature called `score_rank` which gives a score rank for a application based on the user reviews. When generating the data, the feature for the `score_rank` feature is left as an N/A value. Therefore the score value needs to be calculated manually. To do this the features `positive` and `negative`, which respectfully corresponds to the amount of positive and negative reviews for specific application are used. Using these values the percentage of positive reviews compared to negative reviews can be calculated using the following formula:

$$s = \frac{p}{p + n} \cdot 100$$

- s = score_rank
- p = number of positive reviews
- n = number of negative reviews

With the `score_rank` now available for each application within the genre, the means are calculated. For this research two methods to calculate the means are used. The first method is using an expanding mean. This method expands the mean for the current application by taking all the previous scores of applications into account. This means that for each new released application the mean also takes the scores of all applications before into consideration for calculating the current mean. The second method uses a rolling mean instead of an expanding mean. The rolling mean functions in a similar way as the expanding mean, as it expands the current mean each time for a new application. The difference between the two methods is when using a rolling mean not the all previous data is used for calculating the current mean. However in the case of a rolling mean a rolling window is selected as the total amount of previous data entries used for calculating the mean. That means that when using a rolling window of 10%, only the last 10% of the last applications are used for calculating the current mean. Using the second method the change of the mean is more visible, since it now only takes the last few data values into account for the calculation of the mean. This makes it able to see the trend in shorter periods of time instead over a long time see fig. 3.

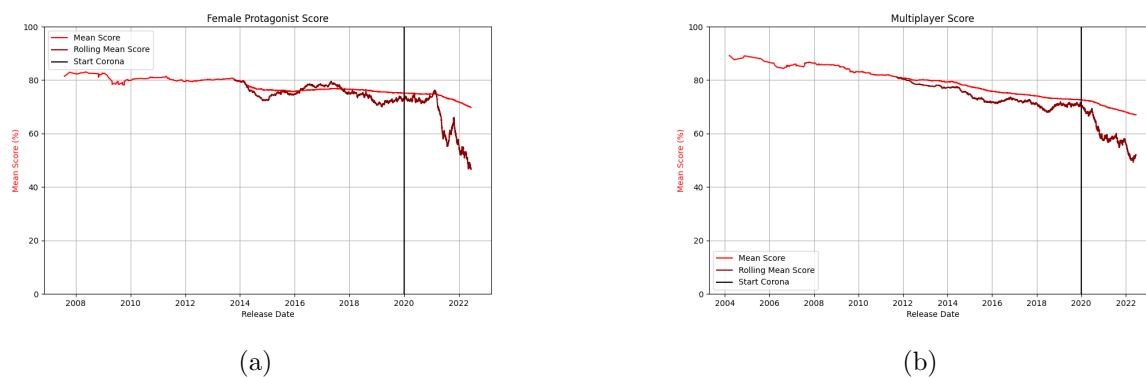


Figure 3: Examples of generated scores

4.4 Price

The generated data from 4.1 lastly contains a `price` feature. The feature shows the price of an application in the currency of USD in cents. The price feature is changed from cents to dollar by multiplying the price values by 100. This changes is to make interpretation easier. To calculate the mean a expanding mean is used just as in 4.3. The expanding mean is then plotted over time see Fig. 4

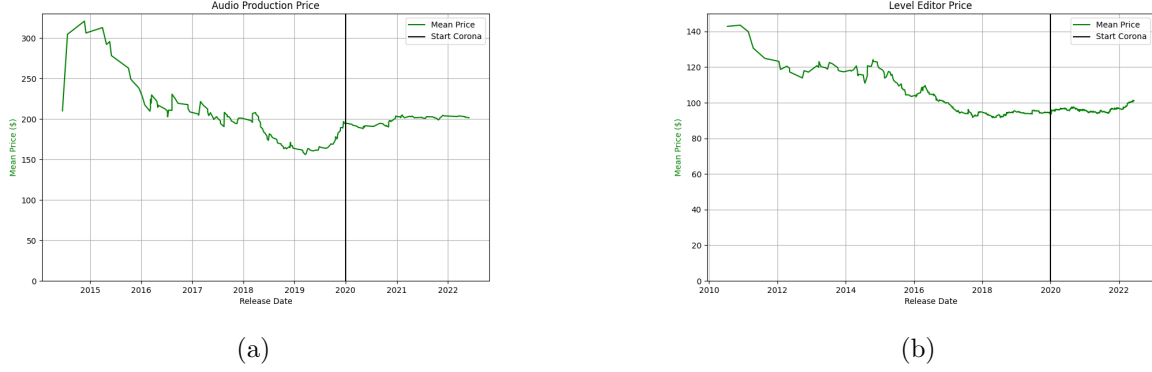


Figure 4: Example generated prices

5 Results

5.1 Releases

In Table 1 the slope changes after Covid-19 happened are visible. The result for slopes shows a clear change in the slopes after Covid-19 happened. The overwhelming majority of the genres had an increases in slopes with a total of 282 having an increase slope. This means that the amount of releases per day increased after the start of Covid-19.

	Slope decreases	Slope increases
Genre amount	25	282

Table 1: Slope changes after Covid-19

Furthermore looking at the changes in slopes it shows that for the 25 genres that decreased in slopes the largest decrease is only an decrease of 0.85 for the Indie genre. On the contrary the largest increase in slope is the Singleplayer genre with an increase of 12.46. This not only shows the increase in releases, it also shows that the decreases in amount of releases for the genres are relatively small, while some increase in slopes grew largely after Covid-19 see Table 2, Fig 5.

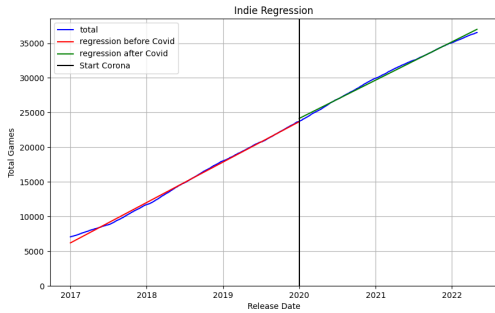
	Max decrease slope	Max increase slope
Genre amount	-0.85	12.45

Table 2: Minimum and maximum slope changes after Covid-19

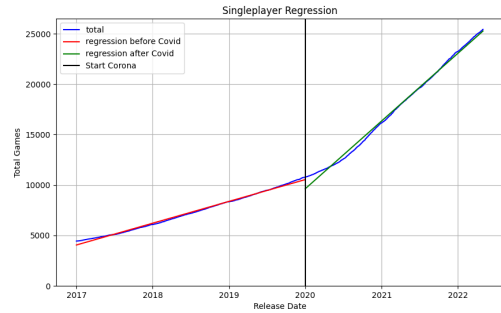
	$p\text{-value} \leq 0.001$	$0.001 < p\text{-value} \leq 0.05$
Genre amount	305	2

Table 3: P-values of the slopes

In Table 3 the results of the t-test on the slopes are visible. Using the specified α -level of 0.05 shows that each change in slope is significant and shows that Covid-19 did have an impact on the amount of releases. Of the note is also that the calculated p-values for almost all the slopes are very close



(a) Largest slope decrease

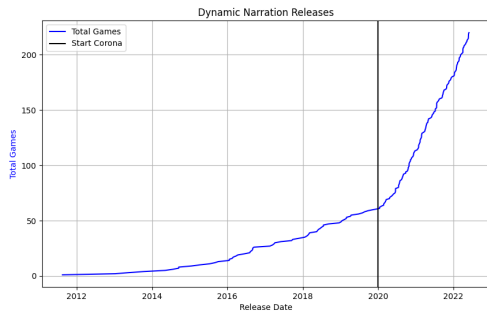


(b) Largest slope increase

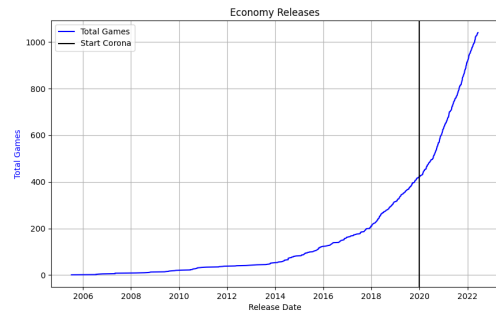
Figure 5: Slopes changes

to zero. Which means that the chance of type-I errors and thus the chance of a false positive is very low.

The results show a clear trend of an increase in amount of releases after Covid-19. There are multiple possible reasons for this increase. The first reason has most likely to due with the increase of people playing video games. With the demand growing game developers started making more games to help keep up with the demand. However when looking at Fig. 6 and 7 another possible reason can be found. The figure shows that before Covid-19 started, the amount of releases per day was already steadily growing. This is an indication that the game industry was already growing before Covid-19 even happened. However after Covid-19 happened due to the influx of people playing games during Covid-19 it seems that this growth has increased more.



(a)



(b)

Figure 6: Increasing releases

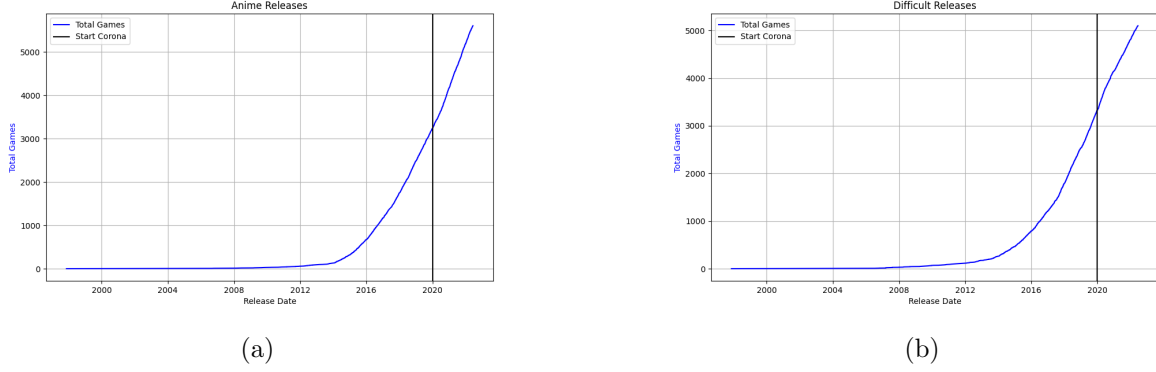


Figure 7: Increasing releases

5.2 Score

Looking at the result for the calculated scores for each genres there is a clear trend to be seen for most of the genres. In the Table 4 and 5 the changes in score are displayed. A distinction is made here between the sizes of the increases and decreases. The first size that gets distinguished are when the score changed by a small amount. This is the case when a score changed with less than or equal to a value of 5. The other distinction are the larger changes. This is the case when the score changed by a value larger than 5.

	Score < -5	Score $-5 \leq x \leq 0$
Genre amount	237	69

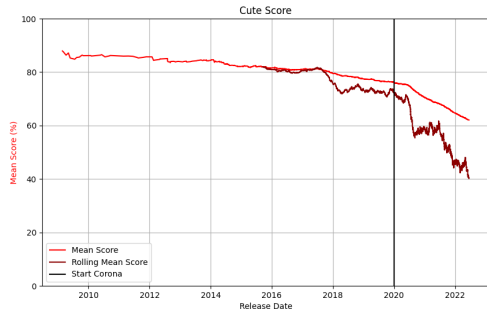
Table 4: Score decrease changes after Covid-19

	Score > 5	Score $0 \leq x \leq 5$
Genre amount	0	1

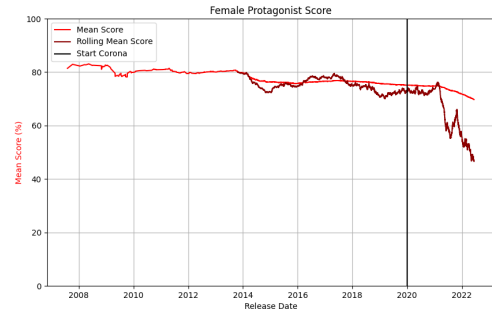
Table 5: Score increase changes after Covid-19

A clear visible trend is the lack of large score increases within the data and only one small increase in score. This indicates that genre had a difficulty managing to increase their average scores after Covid-19. This is in contrast with the large amount of large decreases in average score, this is the scenario that occurred the most, with a total of 237. The total of genres that have a small change in their average score is also a large part with total of 69 genres having a small decrease in average score. This indicates that in general scores had mostly a downward trend after Covid-19.

This trend is visible in the expanding average mean over the entire data set of a genre. However when looking at the rolling mean of the score this trend is even more visible. In this case the window for the rolling mean is the last 10%, thus only taking the last 10% of application into account for calculating the mean. In the Fig. 8 and 9 the average score is shown over the entire period of the existence of the genre. Two clear patterns are visible. The first pattern is visible in fig. 8, where the rolling means show a clear downward trend after the start of Covid-19. This show that scores in general have gone down after the start of Covid-19. The second trend is visible in fig. 9, where



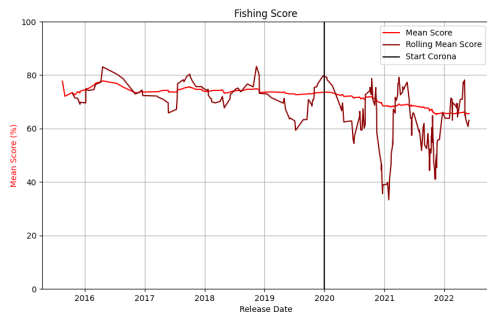
(a)



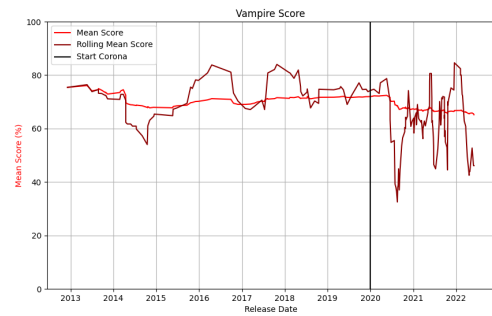
(b)

Figure 8: Decreasing rolling mean

the rolling mean is fluctuating a lot. This means there is a stark difference in the best released application and the worst applications causing the fluctuations between the best and worst releases.



(a)



(b)

Figure 9: Fluctuating rolling mean

There are multiple possible reasons for the general decrease in score. First of all, in general there is an increase in the amount of release of games released after Covid-19 stated in 5.1. With the increase in the quantity, the general quality of games seems to be lower. Secondly, another factor in the decrease in quality might be that during Covid-19 many developers themselves also had to deal with the lockdown. Being unable to work from their own offices the production might have been worse. Lastly the fluctuations in score after Covid-19 can be explained for the following reasons. For the later period there are less available reviews due to the shorter amount of time the games have been released. Since less reviews are available the influence of a bad review is more noticeable. Furthermore the fluctuations are most apparent for genres with a relative low total releases count visible in fig. 10. Less reviews are available and the difference in release date of leaves longer gaps before a a new mean is calculated making the overall fluctuations also more visible.

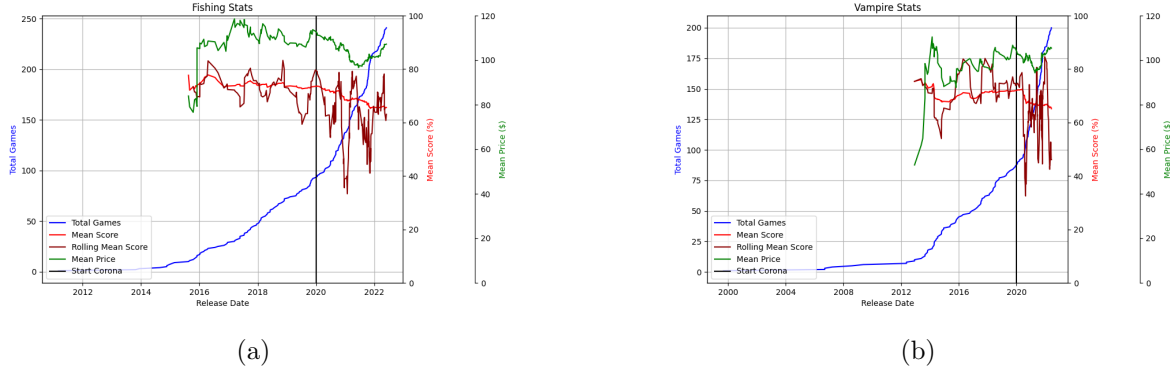


Figure 10: Fluctuating rolling mean including total releases

5.3 Price

In Table 6 and 7, the prices changes are displayed. The results for prices shows a a relative even spread in the changes of prices of applications in each genre. Looking at the results it shows that 175 genres have their average prices decrease during Covid-19 and 132 genres have their average prices have increase. This shows that genres had a small tendency to decrease in prices.

	Price <-10	Price $-10 \leq x \leq 0$
Genre amount	52	123

Table 6: Price decrease changes after Covid-19

	Price > 10	Price $0 \leq x \leq 10$
Genre amount	25	107

Table 7: Price increase changes after Covid-19

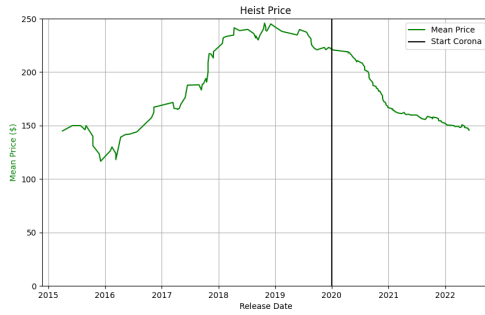
However when looking at the size of the prize changes it shows that the large majority of the prices changes stayed in a relative small area with a total of 230 genres having a price change that stayed in a margin of \$10. This shows that even with prices changes present most genres had kept their prices changes to a relative minimum.

Based on these results it is not definitive that Covid-19 had an influence on prices. Their exist a small bias for prices decreasing, however knowing that prices for most genres stayed in a margin of \$10 after Covid-19, it is unclear if Covid-19 had an influence on this changes..

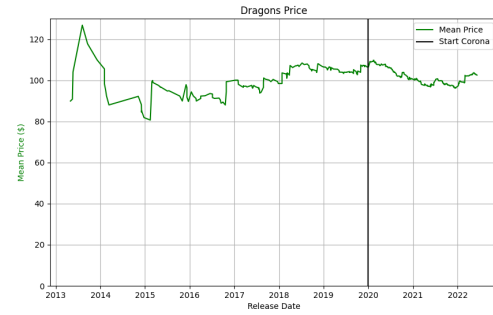
6 Conclusions

In this thesis we tried to answer the question *What is the influence of the Covid-19 on characteristics of Steam genre tags?*. To answer this the focus was on three main characteristics with Steam genre tags those being the total amount of releases, average score and average prices for genres.

The first characteristics of the research was looking for a change in the amount of releases for genres. The results for the releases 5.1 show that Covid-19 had influence. A large amount of the genres

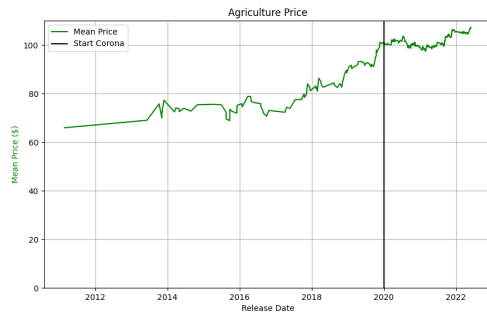


(a) Large price decrease

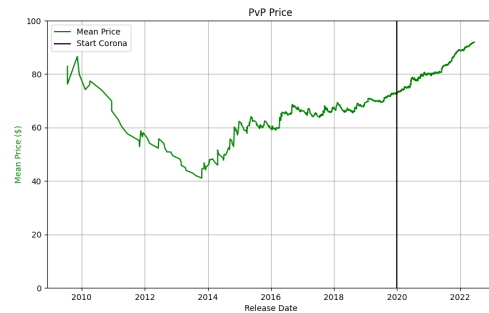


(b) Small price increase

Figure 11: Decreases in price changes



(a) Small price decrease



(b) Large price increase

Figure 12: Increase in price changes

showed an increase in the amount games released after Covid-19 compared to before. Furthermore using a t-test on the slopes before and after Covid-19 showed a significant results for all the genres. This clearly indicates that Covid-19 had an influence on the amount of releases, mainly being a increase in the amount of releases.

The second characteristics of the research was looking in the changes in score. The results from 5.2 showed that all but one genre had their average scores decrease after Covid-19. This shows that Covid-19 had an influence on the score, this being a decrease in score. However it is also clear that more games were released in the time of Covid-19, which is possibly another large factor in the reduction in average scores.

The last characteristics of the research was looking for changes in average prices. The results from 5.3 did not show a clear pattern. All the genres showed a change in price, with a relatively even spread in price increases and decreases. Furthermore even with the prices changes, the size of price changes for most of the genres was relatively small. Thus, it can not be concluded that Covid-19 had an influence on the change of prices.

Based on the results of the subresearch question it shows that that Covid-19 did have an influence

on some characteristics of Steam Genre tags. Those being the total release and price. These characteristics showed a clear trend after Covid-19, however the average prices did not show a clear trend and thus it can not be concluded that Covid-19 had an influence on prices.

7 Discussion

7.1 Limitation

The first limitation is that only linear regression is used for testing the growth of releases. Linear regression fit well for most genres and is easy to implement. However the linear model did not always have a good fit. Another model might have been able to solve this for some genres, for example using an exponential model instead of a linear model.

The second limitation is for the accuracy of the calculated average scores. The exact scores for each application were not available and were manually calculated using the amount of positive and negative reviews. The scores calculated are percentages just as Steam does, however there is no guarantee that the calculated scores are accurate to the actual scores.

Lastly a limitation is with the exclusion of genres. These genres were excluded for the reasons stated in 4.1, however the excluded genres might have some interesting patterns that could have been missed since they were not included in the research.

7.2 Further Research

This research has shown that since the start of Covid-19 the amount of games released is higher compared to before the start of Covid-19. However there has not been looked at why specific genres have gained a higher amount of new releases compared to other genres. In the same light, scores have decreased and possible hypotheses have been given for the decrease, however finding the reason why the different scores have decreased is something that could be further researched.

Another point is that only a handful of characteristics have been looked at, those being the total releases, the average score and the average price of genres. Steam genre tags have many more characteristics that have not been looked at in this research. Such an example is the average playtime of the game or the PEGI age rating. These are all characteristics that could still be looked into to find influences of Covid-19 on the genre tags.

Lastly an option to look at combination of genres is a further possibility for research. In this research the focus was on changes within individual genres. For this reason the combination of genres have not been looked into. However this might also show some interesting results that have not been found in this research.

References

[Ant19] Alexander Antonov. Steam games complete dataset, 06 2019.

- [BHV] Laurens Bolle, Melvin Hulsmans, and Dries Verreydt. Visualizing gaming trends on steam.
- [BKS⁺20] Yatan Pal Singh Balhara, Dheeraj Kattula, Swarndeep Singh, Surekha Chukkali, Rachna Bhargava, et al. Impact of lockdown following covid-19 on the gaming behavior of college students. *Indian journal of public health*, 64(6):172, 2020.
- [CCT⁺20] Marco Ciotti, Massimo Ciccozzi, Alessandro Terrinoni, Wen-Can Jiang, Cheng-Bin Wang, and Sergio Bernardini. The covid-19 pandemic. *Critical reviews in clinical laboratory sciences*, 57(6):365–388, 2020.
- [Dea21] Brian Dean. Steam Usage and Catalog Stats for 2022, 04 2021.
- [des22] Desktop Operating System Market Share Worldwide — Statcounter Global Stats, june-2022.
- [Edw13] C.E. Edwards. Bloomberg - Valve Lines Up Console Partners in Challenge to Microsoft, Sony, 11 2013.
- [Gal] Sergey Galyonkin. Steamspy api. <https://steamspy.com/>.
- [gen22] *Genre*. Merriam-Webster, 2022.
- [Kri20] Willy C Kriz. Gaming in the time of covid-19, 2020.
- [LCRSPC20] M Ángeles López-Cabarcos, Domingo Ribeiro-Soriano, and Juan Piñeiro-Chousa. All that glitters is not gold. the rise of gaming in the covid-19 pandemic. *Journal of Innovation & Knowledge*, 5(4):289–296, 2020.
- [OVWZ16] Mark O’Neill, Elham Vaziripour, Justin Wu, and Daniel Zappala. Condensing steam: Distilling the diversity of gamer behavior. In *Proceedings of the 2016 internet measurement conference*, pages 81–95, 2016.
- [Sch] Christian Schauer. Comparison of major desktop operating systems.
- [sld] scikit-learn developers. sklearn.linear_model. https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.LinearRegression.html/.
- [ste] Steam Store. <https://store.steampowered.com>.
- [sto] Web API Overview (Steamworks Documentation). https://partner.steamgames.com/doc/webapi_overview.