Analyzing the crowdfunding performance of 'metroidvanias' on Kickstarter

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Abstract—This paper describes a systematic study on the performance of 'metroidvanias' on Kickstarter.com and attempts to identify factors that influence the amount of funding gained. The aim is to provide an indication for indie developers which factors have the biggest influence on the amount of funding that can be gained from these campaigns. By manually collecting data from Kickstarter, the study aims to provide insights by performing a statistical analysis and visualizing potential findings within the dataset.

The analysis yielded mixed results, with a few values showing potential statistical correlation between certain factors, while other fields did not show enough potential for significant correlations. Some fields were also investigated further regardless of their correlation to provide more insights, and showed similarities to other studies that also evaluated the crowdfunding performance of video games.

Keywords—*video games, indie, metroidvanias, crowdfunding, kickstarter.*

I. Introduction

Metroidvania is a sub-genre of video games resulting from the combination of two video games series, Metroid and Castlevania [1]. The metroidvania genre comprises open exploration gameplay, with large interconnected level-maps containing a vast roster of enemies and collectible items.

Crowdfunding is a process that allows a broad group of people to pledge money to a product and aid product creators and their business ideas financially using the Internet [2], [3].

Kickstarter.com is a popular and general crowdfunding platform and the most dominant platform for video games [2], [3]. The funding of Kickstarter campaigns comes from users pledging money. These users are known as *'backers'* and are one of the most important aspects for a project's success [2]. Kickstarter campaigns can make use of *'stretch goals'* [4], that functions as financial milestones above the original goal and allows backers to receive rewards if the stretch goal is met, depending on the amount pledged. Kickstarter uses a "all-or-nothing" approach, meaning that if a project fails to reach its financial goal then the pledgers are not charged and the project leader does not receive any funding [5].

Crowdfunding has its own benefits, such as creating a close connection between the developers and the player-community, which is often limited during a publisher-funded collaboration [6]. This does not only provide direct feedback from the customer base but also allows for various beneficial post-production aspects such as using the community in polls and recruiting testers. However, this close connection to the community might also steer the direction of the development from what was originally planned.

The crowdfunding approach also requires additional engagement in various production efforts that traditionally would be handled by publishers such as marketing, PR, customer service and negotiation with manufacturing partners [7]. Despite the various challenges that come with crowdfunding, developers usually manage to avoid loans and can keep their rights to the developed product. The increase of crowdfunding campaigns for video games is a result of globalization and networking of user communities and markets. It is therefore interesting to look at the performance of video games in the domain of crowdfunding, and narrow down on specific categories such as genres. In this case the focus was put on the genre 'metroidvania'.

II. Methodology

Using an explorative approach, this study aims to investigate the crowdfunding performance of metroidvanias by formulating the following research questions:

- **RQ1:** What is the impact of different factors on the crowdfunding performance of metroidvanias on Kickstarter?
- **RQ2:** What are the relationships between highly correlated factors and the crowdfunding performance of metroidvanias on Kickstarter?

A. Data collection

At the time that this study was conducted, no dataset containing categorization of video games as metroidvanias for crowdfunding projects could be found online. Due to the absence of relevant datasets, it was decided to create a new dataset for the specific purpose of this study. By going through

a time-consuming and tedious process consisting of manually iterating through the contents of 80 kickstarter campaigns that matched the search query "metroidvania" on Kickstarter.com, a dataset was created consisting of the following fields: *product name, percent funding gained, number of words, number of images, number of animated images, number of videos, number of stretch goals, number of backers, days that the campaign lasted, twitter followers, how many platforms the game was planned to be launched on, number of developers working on the game, number of previous campaigns by the hosting Kickstarter-account, if the game had a steam page, if the game used hand-drawn animations, and if the game used pixel art.* Figure 1 shows the steps performed to collect the data. These steps are somewhat abstract since the collection procedure for different fields vary to a certain degree.
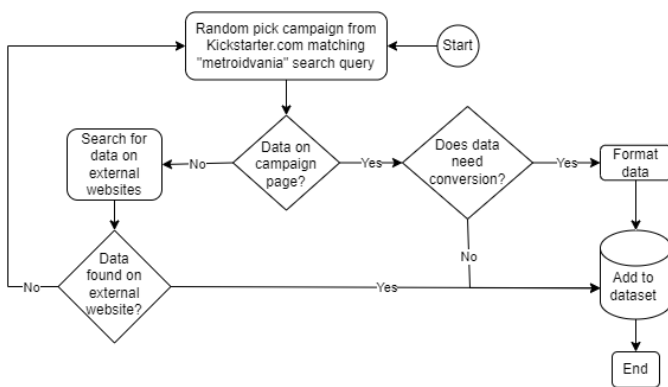

Fig. 1: Steps performed to collect the data.

The queried Kickstarter campaigns were chosen by using Kickstarters *"Magic"* sorting option, which lists projects within the search query randomly. The search term metroidvania did not filter between 2D and 3D games. Therefore the randomly selected campaigns that were 3D games were excluded from the analysis. If a selected project was live (currently undergoing funding), then it was ensured that the original financial goal was reached, so that the project's state (successful/failed) could be determined in advance. Furthermore, the selection of campaigns did not consider the geographic location of the development team and was not purposefully left out, instead other fields that were more relevant to the content of the campaigns and the marketing of the games were prioritized.

The percent funding gained was calculated by dividing the campaign's backed amount with its financial goal, since some campaigns receive amounts that are drastically higher than their original goal, and because different campaigns use different currencies. The funding gained for the selected campaigns ranged between 0.0 (0%) and 16.16 (1616%). The number of words was counted by copy-pasting the *campaign content* (not the entire webpage) into a Google-sheets document and using its word count-tool. The number of images counted only included images that had game content or concept art. Images that served as banners or other widgets were not counted. Some fields required additional searching

online, such as games that had official twitter/steam pages, but did not provide a link on the campaign page. For more accuracy, it was also ensured that the twitter account existed by the time that the campaign ran. Unfortunately, for some games there was no way to ensure that the steam page existed by the time that the campaign ran. If a game had a steam page without date verification, it was assumed that the page existed during the campaign. This is discussed further in the threats. In some cases the campaign did not state the number of developers working on the game, which required additional searching online. If the number of developers could still not be found, that game was left out from the data collection to reduce errors. The number of previous campaigns was counted by looking at if the hosting account had any other campaigns hosted prior to the current one. The data for the field if the game used hand-drawn animations and for the field if the game used pixel art or not was determined by performing the steps in Figure 2.
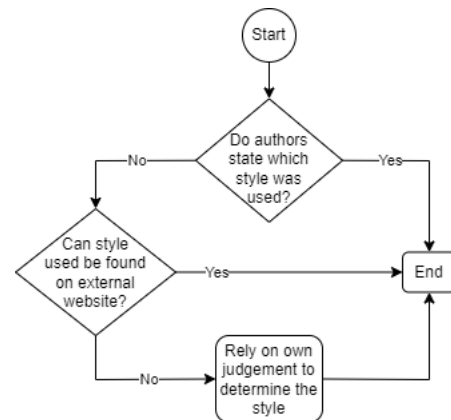

Fig. 2: Steps performed to determine animation style and if the game used pixel-art.

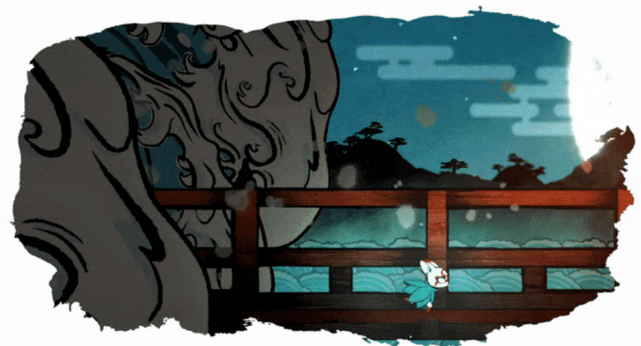Figures 3-6 shows examples of images from campaigns that would be classified based on their styles.

Fig 3: Example of a game that would classify as using hand-drawn animations (Bo Path of the Teal Lotus).

Fig 4: Example of a game that would classify as not using hand-drawn-animations (Red Goddess).

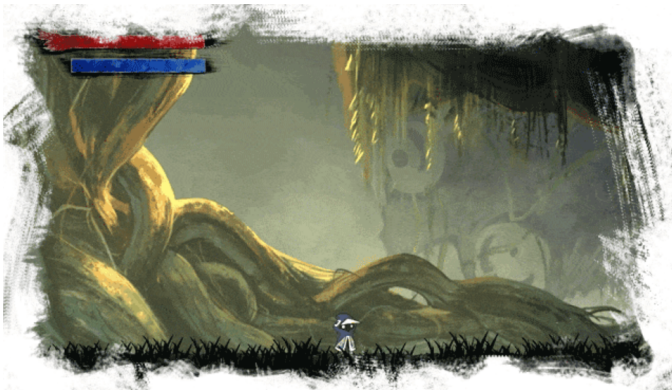**Fig 5: Example of a game that would classify as using pixel-art (Monster Sanctuary).**

Fig 6: Example of a game that would classify as not using pixel-art (Souno's Curse).

The year that the campaign ran was also collected to be able to produce a visualization of the distribution of what times the campaigns ran, but was not used in the analysis.

All data was collected into a Google-sheets document and then downloaded as a .csv-file. The data collection procedure was done over the period 2022.02.11 - 2022.03.02.

B. Cleaning the data

Since the usage of statistical tests were planned to be used for the analysis, some fields were coded into binary values. If the game had an official steam page, the value was coded 1, otherwise 0. If the game used hand-drawn animations, the value was coded 1, otherwise 0. If the game used pixel-art, the value was coded 1, otherwise 0. The coding of these values was done directly during the data collection procedure.

C. Data analysis

The data was analyzed and visualized by using software scripts[1] that were developed for the specific purposes of this study. To get an idea of the amount of influence the different fields have on the performance of the kickstarter campaigns, statistical correlation-tests were used and visualized in trimmed-down correlation matrices.

Since some variables were coded into binary format, the correlation between the funding gained and those variables were visualized in a separate correlation matrix using the Point biserial correlation test, while the correlation for the continuous variables were visualized by using Pearson's correlation test. The binary variables in the final dataset were distributed as follows: 58% had a steam page and 42% did not, 75% used hand drawn animations and 25% did not, 64% used pixel art and 36% did not.

By looking at the results from the statistical analysis we can identify which factors are interesting to discuss further. However, as will be described in the discussion, regardless of the statistical significance some fields are worth discussing rather than simply discarding them, because insignificant correlation scores might be caused by issues in the dataset rather than the factors themselves.

The statistical tests were executed and visualized using Python 3.10.2, Pandas 1.4.0, Numpy 1.22.2, Matplotlib 3.5.1 and Seaborn 0.11.2.

The reason that a manual approach was used rather than automated approaches to collect data, such as web-crawling, was that such an attempt would not have excluded images such as banners or widgets and counted those in the number of images. It would neither have been able to classify or count images for the fields related to the used art-styles. Furthermore, other fields such as previous campaigns, number of developers, twitter followers or steam pages would not have been possible to gather since those fields were not systematically formatted on the campaigns page to be recognized by crawling-technologies, or required searching on other sites.

The raw and cleaned data can be found in the Github repository of the software scripts[2].

III. RESULTS

This study analyzed the amount of funding gained from kickstarter campaigns matching the search query "metroidvania". Figure 7 and 8 presents the continuous and categorical variables respectively that influenced the amount of funding gained in the campaigns.
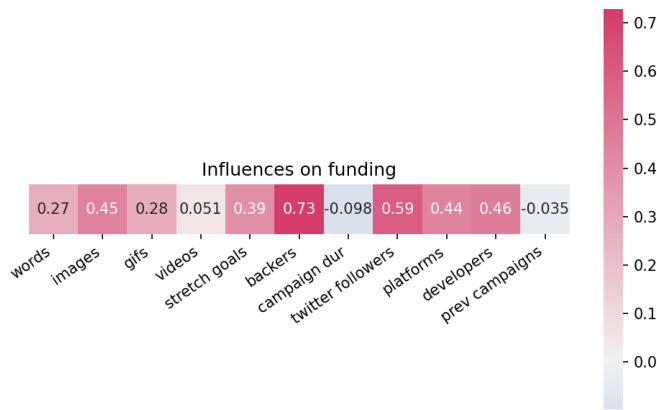
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[1] https://github.com/fabianfroding/kickstarter-correlator

[2] https://github.com/fabianfroding/kickstarter-correlator/tree/master/data

Fig. 7: Correlation values for continuous variables.

Fig. 8: Correlation values for binary variables.

Out of the 11 continuous variables, only the number of words, Gifs and stretch goals had statistically significant results with p-values < 0.05, which means that these variables are statistically correlated with the amount of funding gained. Following are the scores for each of the continuous variables. The number of words were statistically significant with a positive 0.27 Pearson correlation with p-value < 0.05 (0.02). The number of images had a positive 0.45 Pearson correlation with p-value > 0.05 (3.2), making the result statistically insignificant. The number of Gifs (animated images) were statistically significant with a positive 0.28 Pearson correlation with p-value < 0.05 (0.01). The number of videos showed a positive 0.05 Pearson correlation with p-value 0.7, making the result statistically insignificant. The number of stretch goals were statistically significant with a positive 0.39 Pearson correlation with p-value < 0.05 (0.0003). The number of backers showed a 0.73 positive Pearson correlation with p-value > 0.05 (2.0), making the result statistically insignificant. The campaign duration had a negative Pearson correlation -0.09 with p-value > 0.05 (0.39), making the result statistically insignificant. The number of twitter followers had a positive 0.59 Pearson correlation with p-value > 0.05 (8.33), making the result statistically insignificant. The number of platforms had a positive 0.44 Pearson correlation with p-value > 0.05 (4.35), making the result statistically insignificant. The number of developers had a positive 0.46 Pearson correlation with p-value > 0.05 (1.44), making the result statistically insignificant. The number of previous campaigns had a negative -0.04 Pearson correlation with p-value > 0.05 (0.76), making the result statistically insignificant.
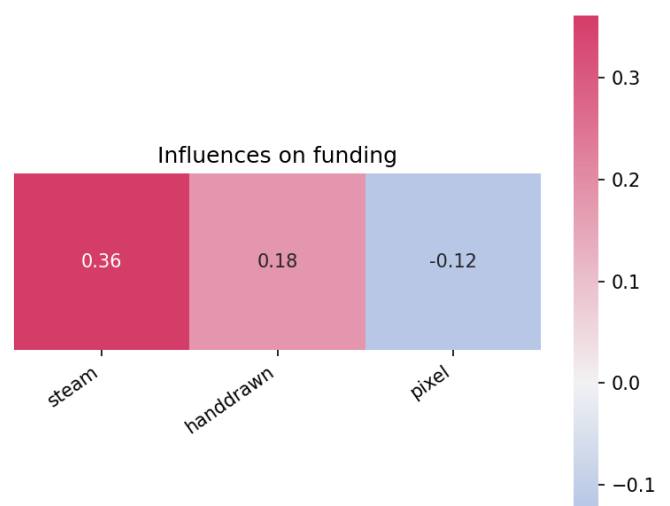
Out of the 3 categorical variables, only the steam-field yielded statistically significant results, which means that campaigns that had a steam page were statistically correlated with the amount of funding gained. Following are the scores for each of the categorical variables. If the campaign had a steam page or not was statistically significant with a positive 0.36 Point biserial correlation with p-value < 0.05 (0.001). If the game used hand-drawn animation or not showed a positive 0.18 Point biserial correlation with p-value > 0.05 (0.11), making the result statistically insignificant. If the game used pixel art or not showed a negative -0.12 Point biserial correlation with p-value > 0.05 (0.28), making the result statistically insignificant.

The random selection of campaigns resulted in a distribution of campaigns by year, as seen in Figure 9. We can see that most campaigns are from 2018 and 2021, while campaigns from 2014 and 2022 are much less represented.
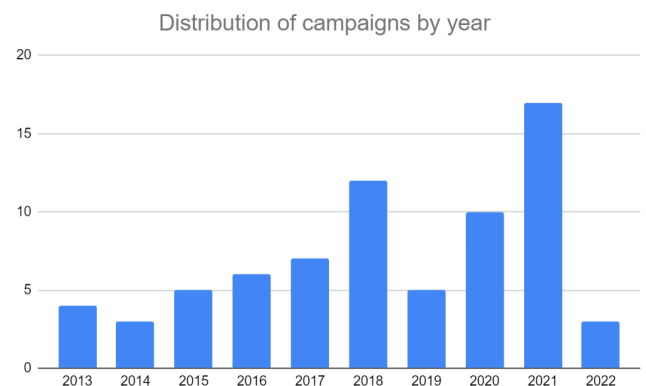

Fig. 9: Distribution of campaigns by year.

The amount of funding gained between solo developers and teams were also visualized (see Figure 10).
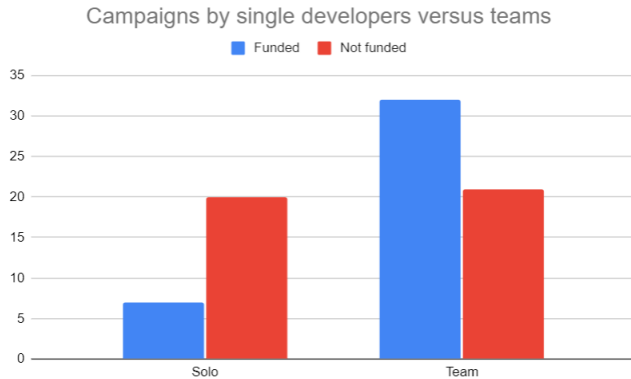

Fig. 10: Campaigns by single developers versus teams.

IV. DISCUSSION

Despite some of the factors showing a correlation to the amount of funding gained, these correlations are weak and can be hard to interpret. For example, the correlation to the number of words would technically mean that the more words a campaign has, the more funding it will gain. We could also argue that a more elaborate and detailed description of the game will draw more interest and gain more funding, but the quantity of words does not necessarily mean that the description is elaborated and detailed. The fact that the number of animated images (Gifs) has an impact on the amount of funding gained makes more sense, since they can contain in-game content, gameplay mechanics and graphical effects. Perhaps the most interesting of the correlated continuous variables is the stretch goals. The more stretch goals a campaign has, the more funding it gains. This can be interpreted in different ways. Potential backers can see it as dedication by the developer(s), interest in the acquisition of backer-rewards, or that a certain stretch goal has a specific feature that backers want. However, confirming these speculations would require a study on its own focused on stretch goals.

According to the results, if a campaign had a steam page or not, had an impact on the amount of funding gained. Similar to the continuous variables, this can have various reasons. Campaigns with games on steam might tell potential backers that the developers are dedicated. Some games might even have demos available on steam, which would further strengthen the support from backers if they like the demo. However, a demo might as well have opposite effects if the game shows bad qualities. Some of the campaigns were also 'greenlit' by the steam community, which also might have had an effect, but would require further investigation and confirmation. Generally, the most likely reason for the correlation to steam pages is that campaigns that have their game on steam show more efforts from the developers than from campaigns that do not.

Cha *et al.* [3] found that the entrepreneur's previous relevant work experience was the most important factor for the success of video game crowdfunding campaigns, something that was not covered in the scope of this study. Cha also found that it is crucial for a campaign to have a team rather than a single developer. Since this study has the data necessary to perform a comparison to Cha's findings, a chart was produced (see Figure 10). The results of the chart seem to agree to Cha's findings, which strengthens the validity of this finding and indicates that campaigns with solo developers are prone to perform worse than campaigns made in a team.

Even though some fields show significant correlations to the funding gained, other fields that had insignificant correlations might not necessarily indicate that they do not play a major role in the success of the campaign. Fields such as images (non-animated) for example, might have a greater impact based on their *quality* rather than their quantity, and can suggest that future work is required to evaluate the impact of quality for various factors.

V. THREATS TO VALIDITY

There are several threats to the validity of this study, most of them being related to the data collection procedure.

Some campaigns did not state which platforms the game was planned to be launched on. If the creator of the campaign did not put in the effort of stating which platform(s) the game was aimed to be launched on, an assumption was made that the game was planned to be launched on only one platform. Due to this assumption, the values in the field of number of platforms for some campaigns may be incorrect.

The third option of determining if the games used hand-drawn animations and pixel-art was not optimal and biased towards my own subjective opinion of which style was used. Even though I have experience using hand-drawn animations and expose myself to different types of metroidvanias on a regular basis, combined with the fact that there were only a few cases where this option had to be used, this option was not entirely without a sense of accuracy, but may or may not have some effect on the values of hand-drawn animations and pixel-art.

Another threat related to the data collection is that when gathering the data for if the game had a steam page or not, it was not taken into consideration that the game might not have had a steam page by the time that the campaign was running, but might have been created at a later time. Unfortunately there was no way to retrieve information of when the steam page for the game was created for all of the games. Therefore, the relationship between a campaign's state and the steam page might be inaccurate.

Yet another threat is that the number of previous campaigns by the Kickstarter account might be inaccurate because the individual members of that team may or may not have taken part of previous campaigns in other accounts. Investigating each individual member's accounts to look for previous

campaigns would have required too much additional work, but is a possibility for future studies focusing on that specific factor.

Even though it was ensured the twitter account had been *created* by the time the campaign ran, it is also important to consider that the amount of twitter followers might have dramatically increased during or after the campaign, rather than before. Therefore it is difficult to make any conclusions about the effect of twitter followers on the campaign success, since it might as well have been the campaign that increased twitter followers rather than the other way around.

The number of previous campaigns did not consider if the previous campaign has succeeded or failed, which may thwart the correlation value between funding gained and previous campaigns. If the study would have been conducted for a second iteration the previous campaigns would have been split into previous campaigns succeeded and failed, since this would have given more insightful possibilities. Nevertheless, the experience of previous campaigns in general could have had an impact on successful campaigns regardless of their state.

It is also questionable how random Kickstater's "magic" sorting option truly is. Without knowing the underlying mechanic, there is no way to ensure that the queried campaigns were truly random.

Finally, the uneven distributions of the binary variables for hand drawn animations and pixel art might also have affected the statistical result for those factors. A more even distribution might have yielded different results.

VI.   Related Work

Stojiljkovic *et al.* [2] conducted a study analyzing the performance of Kickstarter campaigns divided into two categories; games and other. The games category also included board games. They found that games are more likely to succeed than campaigns in other areas. Stojiljkovic used pre-existing datasets from Webrobots.io, which means that the selection of features/fields was not tailored for the specific purposes of their study, but may or may not have suited their needs regardless. The datasets on Webrobots.io are very large, meaning that the results from statistical tests could be more accurate than manual collection of data. However, the datasets from Webrobots.io used web crawling to collect data, which means that it can only gain general information related to the raw contents of the campaign pages. Similarly to the study in this paper, the number of backers, goal amount, pledged amount, pledged amount per backer, and pledged to goal ratio and their impact on the success of the campaign were analyzed. Despite the usage of statistical tests, the study concluded that more work is needed to identify the key factors that influence the success of the campaigns.

Cha [3] also analyzed factors that influenced the success of crowdfunding campaigns for video games but without any genre filtering, and also the campaigns' capital pledged in relation to their goal. On the contrary to the findings of Stojiljkovic, Cha discovered that video game campaigns were less likely to succeed than campaigns in other areas. This controversy might depend on the different types of methodologies used to collect and analyze the data, or that Stojiljkovic included board games in addition to video games.

Both Stojiljkovic and Cha used datasets consisting of similar fields as in this study, and also relied on statistical tests to test their hypotheses and research questions. Therefore, this seems to be a common approach when analyzing the performance of crowdfunding campaigns.

VII.   Conclusion

This study analyzed the impact of different factors on the crowdfunding performance of metroidvania games. The analysis found that the number of words, animated images, stretch goals and if the campaign had a steam page had a significant correlation on the amount of funding gained. The study also speculated on what could be the reasons for these correlations. Some fields were also discussed despite having insignificant correlations, but had similarities to other studies that analyzed crowdfund performances.

In future iterations of this study, it would have been interesting to include more fields that are unique to the metroidvania-genre, or perform a more in-depth analysis of fewer fields.

Future studies could also benefit from focusing on the quality of the campaign content rather than the quantity. However, such a study would require a standardized method to categorize the different types of qualities that would need evaluation.

Future work could also focus on the used art styles. Unlike in this report, if a more even distribution of the art styles were represented, it might have yielded more insightful results.

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