ABSTRACT

We present a survey of the design space of player-created strategic visualizations for video games, to better understand how players make sense of complex game mechanics and incorporate feedback from fellow players. We present several examples of these visualizations, and contrast them to developer-created visualizations, both in information presentation and purpose. We find that there is a rich community-building aspect to visualization development within game ‘fandoms’, facilitated by cross-platform exchange and iterative development, including: social media, informational ‘wikis’, and in-game modifications (‘modding’). Finally, we consider player-created visualizations in the context of a broader imagining about the future of visualization development for non-game but analogous strategic applications. We maintain a collection of tagged and categorized examples of player-created video game visualizations at https://dev.universalities.com/playerviz.html.

1 INTRODUCTION

There exists a wealth of information about user interface design within video games [6, 9], player behavior within games [7], and analysis of game mechanics from an academic perspective [5, 8]. However, an area that is presently under-explored is the visualization underworld of player-created data visualizations for understanding and optimizing gameplay. We have performed a preliminary survey of this design space by collecting 89 different visualizations from various gaming communities and categorizing them by visual encoding type. In this process, we have unearthed some interesting characterizations of the player-created visualization design space, and posit that they may provide useful information for the broader visualization research community.

2 RELATED WORK

It’s no secret that video games, while they foremost exist for entertainment purposes, have significant utility for broader understanding of the world. For example, the 2005 “Corrupted Blood” pandemic bug in World of Warcraft [1, 4] made waves in the epidemiological research community for understanding how humans respond to pandemics, e.g. medics (“healers”) swarming into infected areas to attempt to save their friends, only to re-infect others when the medics returned to hubs to resupply. The MineRL Competition was started in 2019 as a testbed for deep reinforcement learning in a challenging, sparse rewards environment, using human data in an open world [2]. The results of this annual competition inform research understanding of model design and reward function specification. Sometimes, interactive media even blurs the line between game and lesson, as with flight simulators, for which there exist both entertainment-focused users as well as aircraft pilots, for whom flight simulators consistently contribute to improvements in flight training [3]. Therefore, it is useful to consider how user-created improvements to gameplay might inform subsequent improvements to real-world problem spaces.

3 METHODS

As players ourselves, we as authors had some examples which inspired this project initially, which we used in a collaged image to solicit additional responses from game communities. We chose game communities based on a combination of game popularity, active members on Reddit, and prevalence of player-created visualizations in prior posts. In our solicitations, we stated, “Hey [X] community! I’m a student researcher looking at player-created data visualizations for video games and board games. Do you have any favorite #player-created# data visualizations from your community to share? Here are some cool examples I’ve found from other game communities” followed by the collage image. We learned that posts needed to be tailored to each subreddit in order to evade moderation bans, e.g. by tagging “No Spoilers”, posting an “R5 comment” describing the image, or waiting until certain days of the week when user-generated content or images were permitted. Some communi-
ties were unresponsive, but many were excited to share examples. Interestingly, several users referred us out to other communities that we had not considered: EVE Online and Factorio were two in particular that were recommended by users on several occasions.

Following the user recommendation period, we collected all of the responses (some of which required additional digging to find, since links were omitted), and added them to a large survey document. We also sourced some additional visualizations by querying within Fandom Wikis and subreddits for terms like “[game] cheat sheet”, “[game] data visualization”, and “[game] chart”. We collected a title for the visualization, the game or game community from which it came, the image(s), the source link, and the name of the recommender (if applicable). Additionally, we hand-selected at least one chart type categorization for each visualization. We relied on chart types from the Data Visualization Catalog (https://datavizcatalogue.com) where there was ambiguity, and also applied multiple categorizations to complex or unusual visualizations.

4 FINDINGS

We organize our findings into our observations about the iterative visualization design process as evidenced by community forum contexts in which visualizations were found, and typology of visualization, for which many visualizations were assigned multiple categorizations.

4.1 Community-Driven Design

Community forums, such as the Steam Community Forum, Reddit, and Fandom, are rich resources for players to solicit (or, in some cases, receive unwarranted) feedback on their visualizations for game strategy. For example, consider Fig. 5, and the following comments from users:

- “Aesthetically I’ve always hated that diagram. I’ve taught circuitry and used diagrams like this a lot and found that students new to the subject learn better off of 3D renderings of the circuit.” - u/Adolpheappia
- “A tad out of date, what with the new piston systems, but agreed that is a very handy diagram” - u/greentrafficcone
- “I actually find the diagram more confusing than someone telling me how to make it.” - u/iPeer

In addition to these comments describing the user experience of making sense of the charts, there is detailed conversation about how to improve the visualization, information that is missing, and real-world analogies to electrical engineering circuit design. In our survey, we have included links to the source material for each of the visualizations surveyed not only as a typical citation, but also as a further archival resource, because many of the visualizations posted boast long comment threads of community input and refinement.

In many cases, users create visualizations knowing that there will be community feedback, and apply version control systems to their design process. As shown in Fig. 6, edits are made iteratively to a hex map showing adjacency bonuses of districts in turn-based strategy game Civilization VI. From a visual encoding perspective, we can consider this to be both a map and a node-link diagram,
4.2 Typology

After collecting all survey data, we ran some data analysis on the games and visualization types represented in the data. Games that were included more than once are shown in Fig. 2, and visualizations that were found more than once are shown in 7.

The most common visualizations found in the survey were Node-Link Diagrams. This is most likely due to three main types of node-link visualizations represented in the data:

1. Recipes These types of visualizations demonstrate how certain game components combine into other components, e.g. how herbs might combine into a potion, or how raw materials can be smelted into weapons.

2. Timelines Many temporal maps employ node-link diagrams to outline branching narratives, such as “tech trees” in RTS games, or “quest lines” in MMO games.

3. Maps Often, complex maps are represented more simply as node-link diagrams in games where physical distance is less important than connectivity. This is especially common in games with trade routes, where players are traversing a large map, such as a star system, and are more concerned with connectivity between points rather than terrain.

The second most common visualization found in the survey was maps. Across many of the games surveyed, maps were commonly generated by players both for strategic purposes as well as narrative goals. Maps ranged from small-scale, such as blueprints of dungeon layouts, to world- and even galaxy-scale. Some player-created maps were simply annotation layers applied to in-game maps, whereas others were completely new creations, some even hand-drawn.

The third most common visualization found in the survey was tables. We hypothesize that tables are in part most common because they are the easiest for novice visualizers to create. Many of the tables we found in the survey used simple tools like Google Sheets or Microsoft Excel to coalesce complex data about in-game interactions.

Some of the more surprising visualization types that we found in our survey included a dasymetric dot density map, a 3D “spike map” of density, two examples of state machines (a special kind of node-link diagram), and even a chord diagram showing relationships between Pokémon types, which was created using D3.js.

4.3 Conclusion

We are excited to present our preliminary survey, and hope that others will continue to make recommendations to add to the library so that this data set can inform future research about player-created visualization types. Additional studies could be performed related to the relationship between players and game developers; the tools that players use to create these visualizations; and the differences in chart type prevalence across different game type categories.

5 Acknowledgements

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References


Figure 6: Three iterations of hex maps showing the adjacency bonuses of districts in Civilization VI, created by reddit user u/iotafox in 2016. Version A) had some issues, e.g. “aerodrome (spelled wrong on chart) can’t be on a hill” - u/redaelk. Version B) was posted soon after, with further edits, e.g. “Correction: In +1 for every 2 it says ‘Does not round down’ when it should say ‘Does not round up’” - u/The_KazaakplethKilik. Version C), shared with the comment “Just think of mistakes as ‘Easter Eggs’”, comments are mostly just “this is really well made” - u/coltblood, and “After 3 editions this is almost perfect. Kudos, greek for glory, to you my friend. I will be gladly using this in my first game in about 10 mins.” - u/ProudNitro.


