# VISUALIZATION IN MOTION IN VIDEO GAMES FOR DIFFERENT TYPES OF DATA

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Video games produce rich dynamic datasets during gameplay that are visualized to help players succeed in a game. These visualization frequently move across the screen due to camera changes or because the game elements themselves move. Our ultimate goal is to understand **how motion factors affect visualization readability in video games** and subsequently the players' performance in the game. We contribute an analysis of situated visualization in motion in video games for different types of data with a **focus on quantitative and categorical data representations.**

## TYPES OF DATA IN VIDEO GAMES

Video games produce a wide range of types of data, defined by the values they can express. We conducted a ***systematic review*** surveying the characteristics of situated visualizations in motion in video games. We collected **160 visualizations** in motion by analyzing 50 video games from 17 genres.

Moreover, we analyzed how different types of data are represented in games. Our results show that **quantitative** and **categorical data** are the most recurrent types of data visualized in video games, followed by spatial and ordered data. Specifically, we focused on those kind of data by analyzing two prominent examples of the information displayed in video games: character's health and the type of specific game elements.


CATEGORICAL

Categorical data examples are resource types and team identification (i.e. allies and enemies).


ORDERED

Ordered data examples are the position of a character in a leaderboard as in racing games.




QUANTITATIVE

Quantitative data examples are character's health points, number of resources crafted, or the distance from a location.




SPATIAL

Spatial data examples are the position of a character, object, location or a trajectory to follow.

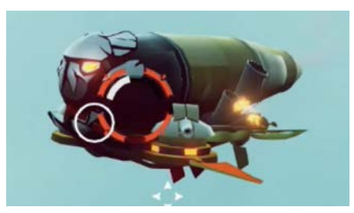


### Quantitative data

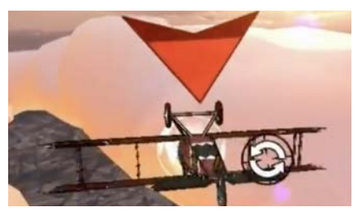
## CHARACTER'S HEALTH

24 out of 67


BAR CHARTS



RADIAL BAR CHARTS



PICTORIAL CHART

A typical way to represent health were horizontal **bar charts** (18/24). Only 3/24 representatives were **radial bar charts**, and the remaining 3/24 were a pie chart, a label with numbers and a pictorial fraction chart. Health was represented with both single encoding (**length**) or double encoding (**length + color**). 16/24 visualization had an **opaque** background while the remaining 8/24 had a **transparent** background.

### Categorical data

## GAME ELEMENT TYPES

26 out of 64

Game elements are - for example - characters and interactive objects, their type is mainly represented by **signs** (13/26). Another prevalent method is the use of **color** in the character's health bar charts. There was also a case of information displayed by using **text** (1/26). The majority of categorical data visualizations used **color-only** encoding (12/26), while 8/26 used both **shape** and **color** and 5 used only **shape**.


SIGNS


COLOR ENCODING


LABEL WITH TEXT

## FUTURE WORK

We are now designing an **empirical study** to evaluate the **readability** of different visual representations under motion in the context of video games. To do so, we are developing a First Person Shooter (FPS) game with embedded visualization about both character's health and game element types. We plan on gathering qualitative data from the user, extracting patterns and insights about the contextual factors influencing the visualization readability under motion.

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