

# Beyond letterboxing: Spatial interface patterns for navigating large data sets in VR

## ABSTRACT

When presenting large amounts of information in user interfaces, cases where the content exceeds the size of the viewport need to be accounted for. In screen-based interfaces, these cases are often handled by using pagination, scrolling or zooming. All of the above methods rely on letterboxing, i. e. they employ a virtual space on which all of the information is laid out, and cut off the content at the edges of the screen. This technique works on screens because of their inherently fixed size and the resulting natural boundaries at the edges. It is not ideal, however, because content which is outside the viewport is completely invisible, and there is no spatial sense of position. In Virtual Reality there are no boundaries, interfaces can take up the entire field of vision. However, since this field of vision is not infinitely large, there are still limits to how much data can be viewed at any one time. It would not make sense to use letterboxing to hide the additional information, because there are no natural boundaries in VR.

We propose a new paradigm for showing large amounts of information in VR environments, which does not rely on letterboxing. We will explore various spatial models and interaction techniques which enable the presentation and navigation of large data sets, while giving users a more explicit mental model of the data. For example, instead of disappearing outside the viewport, list items could stack up on top of a list, shrink to a tiny size, arrange themselves in a grid pattern, or a combination of all the above.

We will construct a series of Virtual Reality scenes, each using a different approach to display the same data, in order to compare them effectively. Our implementation will make use of a VR headset with positional tracking and two hand controllers to manipulate items in VR. However, due to the low resolution of commercially available VR headsets, we will also evaluate the viability of using a CAVE, which could potentially provide a higher resolution.

We will evaluate our solutions by running a qualitative user study, wherein users navigate our proposed spatial interfaces, as well as a letterboxing-based solution, in order to compare their usability. We will observe user behavior during the study and collect feedback using a questionnaire after the experiment.

## Contributions

- We will develop and evaluate general-purpose patterns for displaying and navigating large amounts of information in VR, which can be used by others building information-dense VR applications in the future
- Some of our work may be applicable to 2D interfaces trying to avoid the negative effects of letterboxing as well

## NOTES & IDEAS

- A card stack metaphor is probably the most obvious approach to try
- Exponentially decreasing element size around the currently viewed element (a bit like on the Apple Watch homescreen) could help accomodate a lot more data
- Switching representations (e.g. from full content to just the title to just an icon) to make elements further from the currently viewed one smaller