

VERSUM: DATA SONIFICATION AND VISUALISATION IN 3D

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1. INTRODUCTION

Versum (Barri, 2008) is an advanced, interactive 3D audiovisual composition environment which is augmented with a hardware and software front-end system that maps data into the environment for the purposes of exploratory scientific analysis. Originally intended as an audiovisual sequencer for real-time or automatable music and video performance, Versum also provides a unique environment for systematically investigating new data mappings for optimized human cognition of complex datasets.

2. ABOUT VERSUM

Versum provides a theoretically infinite virtual 3D space, which can be inhabited by any number of audiovisual entities. These entities are rendered and manipulated spatially in real-time using a combination of Max/MSP/ Jitter, Java/Processing, and Supercollider exchanging Open Sound Control messages. Currently the entities can take on two basic shapes: spheres and lines, of virtually any size, brightness, and color and can be sonically coupled to a large number of “synths” rendered in supercollider. Defining parameters can vary in time as sequences that can be indefinitely repeated or changed on the fly.

The original Versum control interface consists of three panes: 1) a control window; 2) a navigator window; and 3) an actor window.

The control window displays visual and audio numerical data that provide the user info about any entity that is currently selected. Within this window the user may also change these properties, thereby altering the appearance and sonic output of the entity.

The navigator window provides a 2D cross section through simplified representations of the entities and displays the actor’s view and motion vectors. This view allows for selection of (groups of) entities by clicking on their representations and is zoomable, enabling the user to work on both macro- and microscopic scale. Selected entities can be easily copied, deleted, created and dragged to any position in the virtual space.

The actor window gives a 3D, fully-rendered, visual representation of the virtual space as seen from the viewpoint of the actor which can be seen as a virtual camera with virtual directional microphones attached, moving through the space. The actor’s position, speed and viewing angle can be manipulated with the mouse and several supported controllers. Movements of the actor determine not only what is seen in the

actor window, but also what is heard. The actor’s microphones pick up the sounds of entities that are nearby (the closer they are, the louder they will be heard) and each microphone sends its signals to an output on the computer’s audio interface. The amount of virtual microphones can be set to match any amount of audio outputs used, enabling the use of full surround sound setups. As the actor moves, the panning and the volume of these audio signals change.

The three-dimensional nature of both Versum’s imagery and sounds gives the Versum user powerful tools to make explicit use of – and experiment with – the perceptual implications of dynamic spatial distributions of sounds.

We see Versum as a promising experimental environment for data sonification and visualization. Entities and their parameters may be used and adjusted to represent complex datasets, which can be intuitively and efficiently explored by literally moving through them. In the process the user receives information through combined use of visual and sonic pathways, specifically targeted at efficiently exploiting the unique and rich information processing capabilities of the human auditory and visual cognitive systems.

Currently new mappings are explored to determine the best approach for scripts that will automate the process of entering data into Versum, with the objective of eventually creating a scientifically accurate audiovisual representation of the solar system.

3. ABOUT THE COMPOSITION

The sonification/visualization file accompanying this text is the result of musical and visual experimentation with the properties of Versum and its entities in order to explore the consequences of perceiving audiovisual structures and data in this manner. Entities of different sizes and shapes have been used, either moving or static, either pulsating or constant. These entities have been copied, pasted, dragged across space, their parameters tweaked, their velocities adjusted, and so on, to get a feel for the broad scope of new possibilities on the levels of both basic sensory and aesthetic perception. The listener can hear the spatial distributions and perceived volumes of the entities change as the actor moves through space. Also Doppler effects are audible as the actor passes moving entities.

4. REFERENCES

T. Barri, *Versum: Audiovisual composing in 3D*, Copenhagen, DK: ICAD, 2009