MagicMikes—Multiple Aerial Probes for Sonification of Spatial Datasets

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We present a method for sonification of data sets located in spatial environments in such a way that both individual point sources and overviews of larger data areas can be observed.

The spatial sonification method consists of three stages. First the area of interest is geometrically defined in the data set. Around the probe's location there is a variable sensitivity area, inside which the data points are selected for sonification. Each selected point is then treated as a sound source. One may select independently of the visualized information the data channels that are mapped to sound parameters. At the last stage the sound sources are spatialized according to their location relative to the probe. This consists of adding acoustic cues for sensation of direction and distance. The sources are then mixed together.

Our implementation of the method, called MagicMikes, follows the three-phase architecture described above. The probes are like virtual microphones, controlled for their position, orientation, and sensitivity. Using the wide sensitivity area one can quickly scan through a data set and discover if there are interesting spots. Closer examination is then possible with a finer probe. Several probes with adjustable sensitivity areas and activity levels are used simultaneously. The sensitivity area of MagicMikes can be a geometric shape or it may be determined by data attributes. For example with GIS data it can be a geographical area.

Delimiting the listening area corresponds to search with multiple keys in a geographical data base. The data points collected are mapped to parameters of sound sources in corresponding locations. As a navigational aid in the environment, the sounds are spatialized according to the distance and direction of sources with echoes and reverberation provided by an artificial acoustic environment. To make this process efficient, we precompute the acoustic response at points on a grid, between which values can be interpolated. All physical parameters of the virtual environment are freely adjustable.

For navigation purposes it is important to know where the probes are located and how they are oriented. The user is able to see the probes on the screen in addition to visualized data.

The method is best suited to data sets with clear extreme locations for each data channel. The spatialization is done in cooperation with the Laboratory of Acoustics at Helsinki University of Technology.