MusicGalaxy – An Adaptive User-Interface for Exploratory Music Retrieval

Sebastian Stober and Andreas Nürnberger
Data & Knowledge Engineering Group, Faculty of Computer Science
Otto-von-Guericke-University Magdeburg, Germany
{sebastian.stober, andreas.nuernberger}@ovgu.de

ABSTRACT

Sometimes users of a music retrieval system are not able to explicitly state what they are looking for. They rather want to browse a collection in order to get an overview and to discover interesting content. A common approach for browsing a collection relies on a similarity-preserving projection of objects (tracks, albums or artists) onto the (typically two-dimensional) display space. Inevitably, this implicates the use of dimension reduction techniques that cannot always preserve neighborhood and thus introduce distortions of the similarity space.

MusicGalaxy is an interface for exploring large music collections (on the track level) using a galaxy metaphor that addresses the problem of distorted neighborhoods. Furthermore, the interface allows to adapt the underlying similarity measure to the user's way of comparing tracks by weighting different facets of music similarity. Figure 1 shows a screenshot of the interface visualizing a music collection. Each track is displayed as a star (i.e. a point) with its brightness and (to some extend) its hue depending on a predefined importance measure (here a play count obtained from last.fm – other measures such as a general popularity or ratings are possible). A spatially well distributed subset of the collection (specified by filters) is additionally displayed as a album cover for orientation.

The arrangement of the stars is computed using multi-dimensional scaling (MDS) relying on a set of descriptive features to be extracted beforehand. (Alternatively, feature information may also be annotated manually or collected from external sources.) MDS is a popular neighborhood-preserving projection technique that attempts to preserve the distances (dissimilarities) between the objects in the projection. The result of the MDS is optimal w.r.t. the minimization of the overall distance distortions. Thus, fixing one distorted neighborhood is not possible without damaging others. However, if the user shows interest in a specific neighborhood, this one can get a higher priority and be temporarily fixed (to some extend) at the cost of the other neighborhoods. To this end, an adaptive distortion technique called SpringLens [1] is applied that is guided by the user's focus of interest. The SpringLens is a complex overlay of multiple fish-eye lenses divided into primary and secondary focus. The primary focus is a single large fish-eye lens used to zoom into regions of interest. At the same time, it compacts the surrounding space but does not hide it from the user to preserve overview. While the user can control the primary focus, the secondary focus is automatically adapted. It consists of a varying number of smaller fish-eye lenses. When the primary focus changes, a neighbor index is queried with the object closest to the center of focus. If nearest neighbors are returned that are not in the primary focus, secondary lenses are added at the respective positions. As a result, the overall distortion of the visualization temporarily brings the distant nearest neighbors back closer to the focused region of interest. This way, distorted distances introduced by the projection can to some extend be compensated.

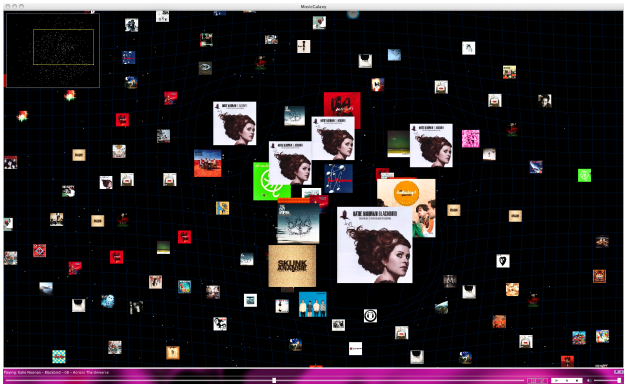

Figure 1. MusicGalaxy user-interface. A demo video is available at http://www.dke-research.de/aucoma

The visualization technique has been evaluated in a study with 30 participants [2] comparing it with traditional panning and zooming and a combination thereof. The results show that the interface is helpful while at the same time being easy and intuitive to use. The participants clearly preferred the fish-eye and the combined interface over the traditional panning and zooming. Further, gaze information recorded with an eye-tracker revealed extensive use of the secondary focus for exploration. Details on the underlying algorithms and data structures are given in [3] whereas [4] focuses on the interface and user-interaction.

References

[1] T. Germer, T. Götzelmann, M. Spindler, and T. Strothotte. Springlens: Distributed nonlinear magnifications. In *Eurographics - Short Papers*, 2006.

[2] S. Stober, C. Hentschel, and A. Nürnberger. Evaluation of adaptive springlens – a multi-focus interface for exploring multimedia collections. In *Proc. of 6th Nordic Conference on Human-Computer Interaction (NordiCHI)*, 2010. submitted.

[3] S. Stober and A. Nürnberger. A multi-focus zoomable interface for multi-facet exploration of music collections. In *Proc. of 7th Int. Symposium on Computer Music Modeling and Retrieval (CMMR'10)*, 2010.

[4] S. Stober and A. Nürnberger. MusicGalaxy – an adaptive user-interface for exploratory music retrieval. In *Proc. of 7th Sound and Music Computing Conference (SMC'10)*, 2010.