

Video Browsing with a 3D Thumbnail Ring Arranged by Color Similarity

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Abstract. We propose a 3D arrangement of thumbnail images for the purpose of browsing a single video file. The thumbnail images are linearly extracted from the video and used as textures for bended screens in a 3D-ring arrangement, which act as links for the playback of the corresponding video segments. Furthermore, the thumbnail images in this 3D-ring are intuitively organized by their dominant colors according to the HSV color space. This color-based organization should help users to estimate the position of a known item in the 3D-ring.

1 Introduction

A 3D arrangement enables to visualize a large number of images with a relatively small screen estate. Such a visualization has the characteristic that images in the front are shown at high detail while images in the back are kept in view, although at low detail and with some distortion due to 3D projection. However, through interaction/navigation the user can bring images from the back to the front in order to inspect them in more detail. The low detail images are supposed to be informative enough for deciding whether a given image could be of interest at all.

Based on our previous research results [1] we propose using a horizontal *3D Ring* arrangement for the purpose of browsing a moderately large set of images, as it provides an intuitive and convenient way of navigation and produces minor distortion of images in comparison to other 3D arrangements. For the purpose of the Video Browser Showdown we linearly sample images from the video (e.g., with five seconds distance) and arrange them on the 3D Ring according to their dominant color. These thumbnails act as links for the playback of the corresponding segment, shown at larger size above the 3D Ring (see Figure 1).

2 User Interface

Images in the 3D arrangement are sorted by color according to an efficient and intuitive sorting algorithm, that allows for real-time (i.e., on-the-fly) processing. The basic idea is to sort images based on their dominant hue color in the HSV color space. Therefore, we classify pixels of images into a 16-bin hue histogram (each bin represents pixels belonging to a hue range of 22.5 degrees) and use the

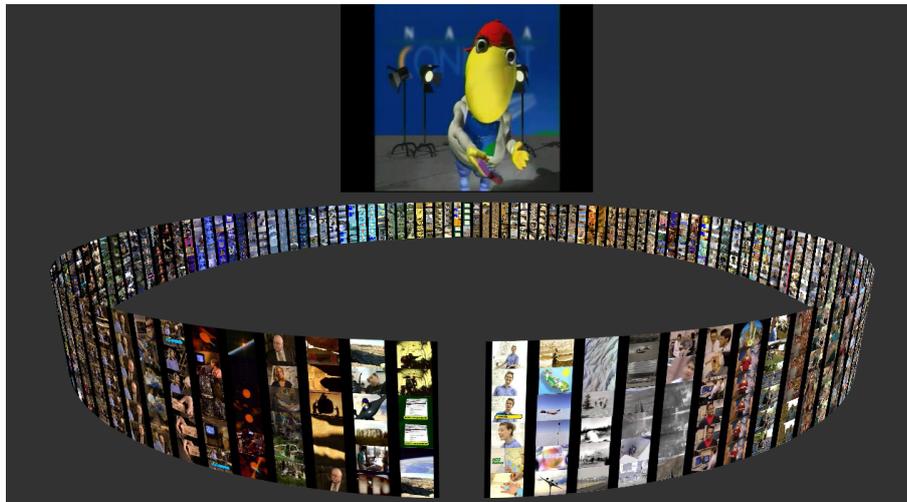


Fig. 1. Video Browsing with a 3D Thumbnail Ring Arranged by Color Similarity. The missing column indicates the begin/end of the list.

index of the dominant bin as a basic sorting criterion. To give a more consistent view, images belonging to the same dominant bin are sorted such that the Euclidian distance of an HSV histogram between adjacent images is minimal. Moreover, we perform a special treatment for bright and dark images; these are arranged at the beginning and the end of the list, respectively. The resulting sorted list is directly used for the cylindrical arrangement with a column-major order. Therefore, the images on the 3D Ring arrangement are always presented in the same 'color-sequence'. It starts with bright images, followed by gray, brown, orange, yellow, green, turquoise, blue, pink, red, and finally dark images (if available, respectively). Please note that based on the available colors in the chosen image set, specific colors may be not contained while other colors may utilize a rather large area in the 3D Ring. The color-based arrangement should enable a trained user to roughly estimate the position of a known image in the 3D Ring and help him/her to more quickly find desired images.

The user can smoothly rotate the 3D Ring arrangement by using the mouse-wheel or quickly bring a particular area of the 3D arrangement into view (i.e., to the front) by using the right mouse button. A left click on a thumbnail image immediately starts playback for the corresponding segment in a playback window above the ring.

References

1. K. Schoeffmann, D. Ahlström, and L. Böszörményi. A user study of visual search performance of interactive 2d and 3d storyboards. In *Proceedings of the 9th International Workshop on Adaptive Multimedia Retrieval (AMR 2011)*, 2011.