

Enhancing Seeker-Bars of Video Players with Dominant Color Rivers

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Abstract. Interactive navigation through a video is a simple way for a user to get a quick overview of its content and to find interesting scenes. Although common video players provide only poor navigation facilities – in comparison to real video search applications – they are often employed by users due to their simplicity. We present a tool using a similarly simple interaction method but enabling much more efficient navigation.

1 Introduction

Video navigation is known as the interactive process of navigating through a single video, usually to get an overview of its content and to locate potentially interesting scenes. An example application enabling video navigation is a common video player that provides a seeker-bar for random access. Many users employ such video players for video search as these tools provide an intuitive user interface which is easy to use for non-experts as well. For instance, the popular YouTube player still uses a simple seeker-bar for navigation. We present a video navigation tool that provides an extended seeker-bar which can visualize the progression of dominant colors throughout the whole video. Our extension allows navigation like a usual seeker-bar but shows a colored content abstraction in the background, which can be helpful for many search tasks. While there is already existing work on that general idea, we further improved this concept in several ways:

1. We use not only one dominant color (DC) per frame but rather several ones (e.g. 1st, 2nd, 3rd DC, a.s.o.), which allows a user to derive more useful information from the visualization. For example, in a news video we can easily locate segments showing a black-dressed anchorman in front of an orange background and distinguish them from orange commercials (Fig. 2).
2. Our seeker-bar provides an *overview visualization* for the whole video as well as a *detailed visualization* for a user-defined segment. The overview visualization contains a *zoom window* specifying the clipping for the detailed visualization (Fig. 1). A user can interactively change the size and location of the zoom window and easily navigate through videos of any duration.
3. The user can restrict the visualization to a spatial region. For example, in a quiz show this allows to find all the different questions or answers, which are always presented at the same spatial position in same or similar colors.

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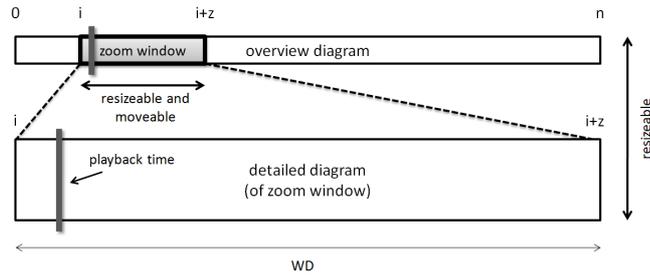


Fig. 1. Interaction model of the enhanced seeker-bar for a video with n frames.[1]

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For every frame of the video we quantize the color values to a 64-bin histogram, extract the five-most dominant colors, and visualize these colors in a vertical line. This vertical line consists of sub-lines, one for each dominant color. The height of each sub-line is determined by the proportional number of pixels related to that dominant color. The adjacent visualization of such composed vertical lines results in a diagram showing the progression of dominant colors throughout the video. We use that visualization as an interactive visual time-line for navigation. The vertical position of a dominant color is set according to the bin number in the color histogram, where the smallest bin is drawn at the bottom and the highest bin is drawn at the top. This ensures a smooth "river-like" visualization of one dominant bin in temporal sequence, since the relative position of one particular bin stays constant over time.

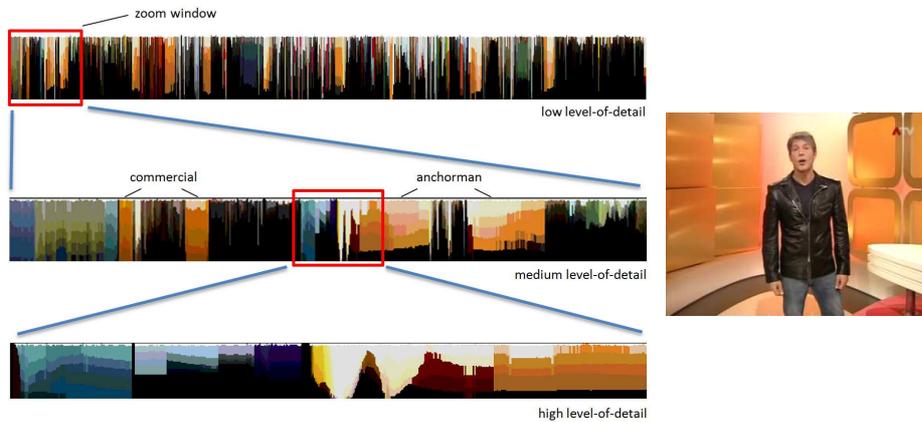


Fig. 2. Dominant color rivers (detailed diagram of Fig 1 only) visualized for a news video at several levels of detail. While the first visualization shows the entire video (full zoom window), the second one shows a small range from the beginning, and the third one shows an even smaller segment, as defined by the zoom windows through the user.

Fig. 2 shows an example of the enhanced seeker-bar for a news video at several levels of detail. The visual seeker-bar helps users at navigation by giving a rough content abstraction instead of a (relative) time information only. For example, if the user knows that a news anchorman appears several times in a video, wearing black clothes and usually in front of an orange background, the user can easily detect those events by typical color patterns in the visualization (compare Fig 2). On playback the visualization smoothly scrolls along with the playback time, showing the current time position at the center of the diagram.

The user can also restrict the visualization to a particular spatial area by drawing a rectangle directly on the display area. This allows a user to concentrate on colors of small areas which would not be shown in the visualization due to their minor proportional extend in comparison to the entire frame. For example, in a video of a quiz show with dark colors in general this helps to concentrate on colors of areas showing questions/answers only (see Fig. 3).



Fig. 3. Restricting dominant color visualization to a spatial area (white rectangle).

3 Conclusions

Our enhancement to seeker-bars allows simple and intuitive navigation in a video and enables more efficient search than common seeker-bars do. The visualization requires a short preceding content analysis step. The method could be used as an alternative to common seeker-bars, especially in systems which process videos before users consume them. Such an example system is YouTube, for instance.

References

1. K. Schoeffmann and L. Boeszoermenyi. Video browsing using interactive navigation summaries. In *Proceedings of the 7th International Workshop on Content-Based Multimedia Indexing*, Chania, Crete, June 2009. IEEE.