

MedioVis 2.0 - A novel User Interface for Seeking Audio-Visual Media Libraries

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Abstract: Knowledge work is a demanding activity caused on the one hand by the increasing complexity of today's information spaces. On the other hand, knowledge workers are acting correspondingly to an individual creative workflow, which involves multifaceted characteristics like diverse activities, locations, environments and social contexts. Although it is important to find solutions to specific aspects of knowledge work (information-seeking, information-management, media-warehousing, etc.) our design approach – MedioVis 2.0 – tries to support the entire workflow in one coalescing Knowledge Media Workbench, showcased in the context of digital libraries. To achieve this goal, we apply the concept of zoomable user interfaces, different visualization techniques and investigate additional considerations to provide a satisfying user experience.

Keywords: Zoomable User Interface, User Experience, Semantic Zooming, Information Landscape, Information Visualization.

1 Introduction

Nowadays, accessing digital information spaces such as personal data, online databases or audio-visual media libraries is a daily activity of nearly every individual. However, information work like “writing a scientific paper” or “investigating for a news article” is a very demanding task. One reason for this is the continuously growing complexity of information spaces, resulting from the increasing quantity and heterogeneity of information objects and relations between them. Another cause is the difficulty in execution within a multifaceted individual creative workflow [KUH04] [ADA05] within today's digital information-systems. Such a workflow contains diverse activities like information seeking, information management or archiving of information objects. The majority of tools focus on assisting in single aspects of such a workflow, e.g. the very important task of information seeking (e.g. our visual information seeking system MedioVis 1.0, which is in use in the Library of the University of Konstanz¹ since 2005). Nevertheless, most of them are isolated applications that are hard to integrate into a creative workflow of a knowledge worker. Content and functionalities are

¹ <http://hci.uni-konstanz.de/research/projects/MedioVis>

scattered over dozens of applications, websites, storage formats, interaction models and devices – challenging the user's cognitive skills respectively. This often leads to the necessity for workarounds, resulting in a destructive degree of complexity and "information fragmentation" [KAR06].

2 System Design

Based on these requirements for creative knowledge work and inspired by the framework for mega-creativity from Shneiderman [SHN02], we designed a "Knowledge Media Workbench" [EIB06] that supports the entire workflow in one unifying workspace. Our new system, called *MedioVis 2.0*, tries to offer comprehensive visual support for all activities of creative work with digital audio-visual media libraries such as searching and browsing different information spaces (e.g. audio-visual media libraries) or keeping and managing of information objects and knowledge artefacts for later use. As an example data source we use the media specific part of the library of the University of Konstanz, consisting primarily of DVDs or VHS tapes. Additionally, we augmented this database with different online services like Google Maps² or the IMDb³.

MedioVis 2.0 relies primarily on the paradigms of zoomable user interfaces and object-orientation. In consequence, no windows, menus, files or dialogs are used. To accommodate the various activities of information workers, we integrated different techniques to search and explore the information space via different visualizations. *MedioVis 2.0* offers furthermore personalization functionalities, to keep and manage gathered information objects. Finally, the concept has been designed to work on various devices like PCs, smart phones or multitouch tables, presented with one consistent user experience.

2.1 Zoomable User Interface

The fundamental visualization and interaction paradigm of *MedioVis 2.0* is the idea of a Zoomable Object-Oriented Information Landscape (ZOIL) [JET08]. Within this paradigm, an information landscape of virtually infinite size serves as basic starting point for exploration of the information space (see Fig. 1a). *MedioVis 2.0* arranges each media object corresponding to its primary genre on the landscape. Users are able to navigate in this landscape with zooming and panning operations [LIN05]. This navigation technique takes advantage of the human abilities of visual-spatial orientation and remembering visual "landmarks" [PER93]. By employing this concept, users are

² <http://maps.google.com/>

³ <http://www.imdb.com/>

able to utilize natural and intuitive operations as search strategy in media collections (see Fig. 1a-c).

The deeper the user zooms into the content, a “semantic zoom” reveals the more details and functionalities (see Fig. 1a-c), following the visual information-seeking mantra of Shneiderman [SHN96]: “Overview first, zoom and filter, then details-on-demand”. Thus, the available functionalities such as playing a video (see Fig. 1c) or accessing a website (see Fig. 3a) are always coupled with the information object itself, as it is proposed by object-oriented user interfaces [COL94].

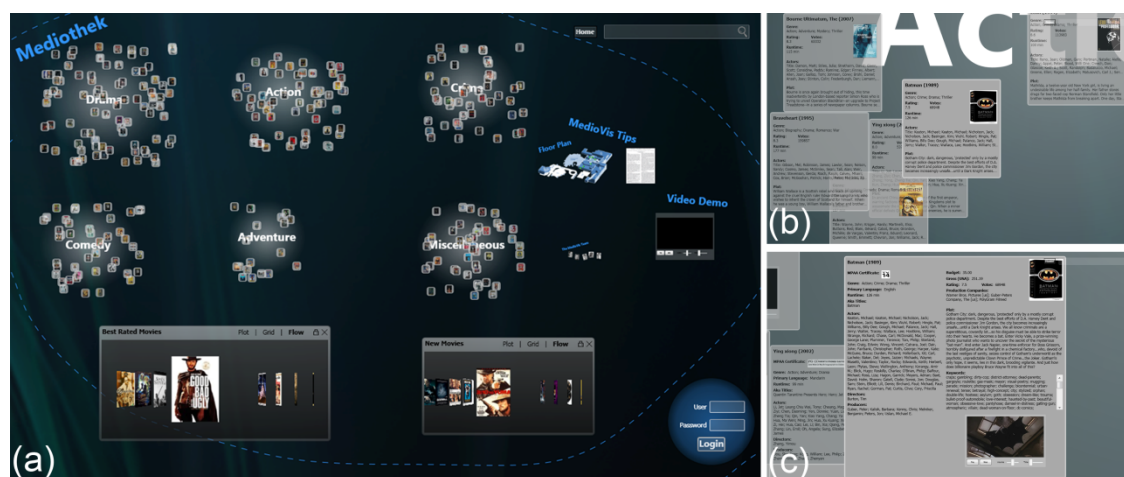


Figure 1: (a) Initial screen of MedioVis 2.0 (b) Zoomed into the action region, movie objects are represented in the second semantic zoom level (c) Most detailed semantic zoom level of a movie object, with access to a full digitalized movie.

2.2 Search, Filter and Explore

As another way to formulate information needs, analytical search methods are supported by MedioVis 2.0. Users are able to enter text queries into a search field on the upper right corner of the screen (see Fig. 2). With each key press, the visual representation of matching objects expands. We applied the concept of “Dynamic Queries” [AHL92] and “Sensitivity” [TWE94] for direct highlighting of objects, which still match the current query instead of removing all non-matching objects. With this technique, the attention of the user is automatically directed towards media objects of current interest. By this approach the representation of the search results is directly integrated into the landscape, instead of displaying them in an isolated visualization like a list view.

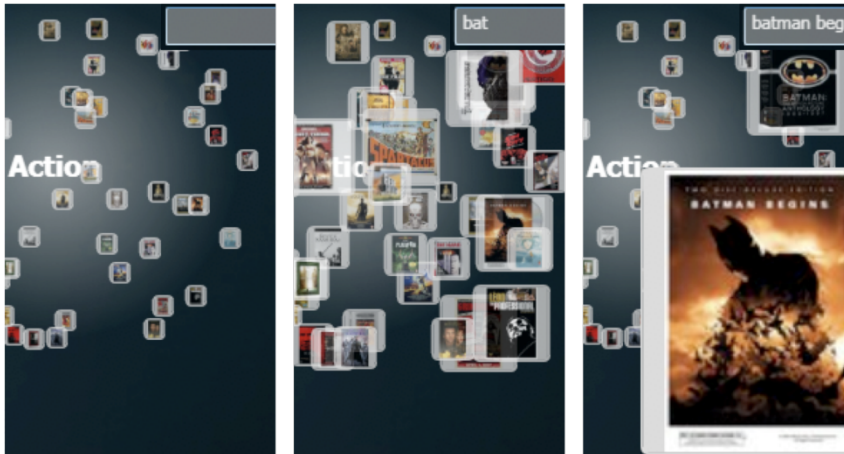


Figure 2: Query “batman begins” entered into the search field on the upper right. The size of the matching movie objects increases with every key press.

2.3 Portals and Visualizations

Portals [PER93] provide a supplementary way of exploration. By selecting an arbitrary region of the information landscape via a lasso gesture, the user creates a portal, providing a special view on the enclosed media objects. Within these portals, *MedioVis 2.0* offers multiple visualization techniques – for understanding, filtering and querying – ranging from a rapid serial visual presentation similar to a cover flow view (see Fig. 3c) [DEB00] over a scatter plot visualization called HyperScatter (see Fig. 3b) [GER08] to a table-based visualization called HyperGrid (see fig. 3a) [JET05].

The HyperGrid is a novel visualization integrating zooming concepts and an Internet browser into the well-known spreadsheet visualization. Every row, representing one media object, can be zoomed to access further information. By integrating the hyperlink-concept and an embedded Internet browser, users can immerse into the information space without losing their context.

Furthermore, portals provide visualization-independent filter mechanisms. These filters are preserved even if the user switches the visualization. By moving and scaling portals in the landscape, *MedioVis 2.0* allows to visually formulating complex queries in a direct-manipulative manner [AHL92] as proposes with the concept of magic lenses [BIE93].

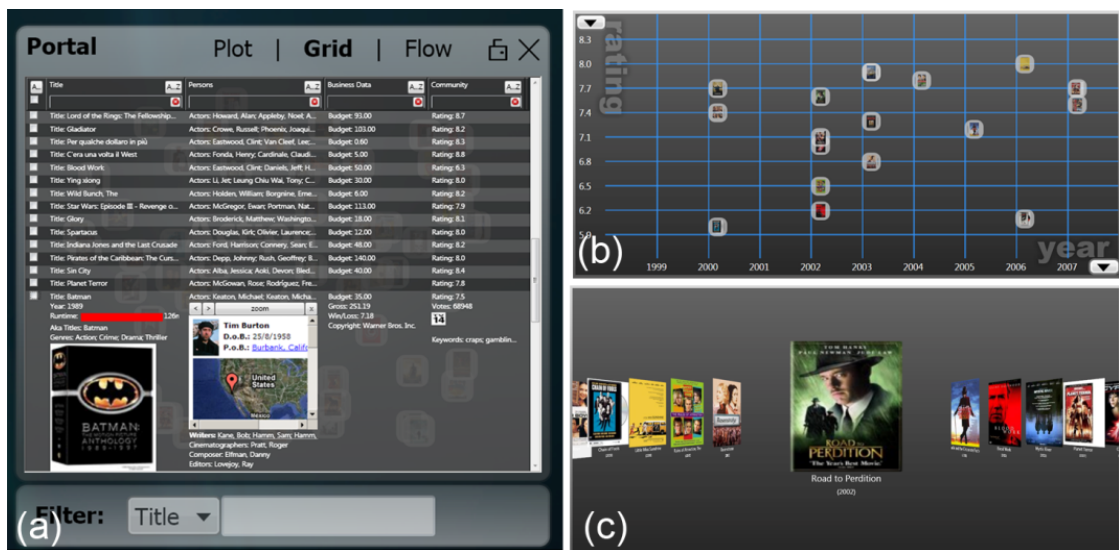


Figure 3: Inside of portals a subset of movie objects can be represented by various visualizations: (a) the HyperGrid, (b) the HyperScatter and (c) a rapid serial visual presentation inspired by Apple’s Cover Flow⁴.

2.4 Personalization

To retain the state of a portal – with its filters and visualizations – for later use, *MedioVis 2.0* provides the possibility to lock its state and assign a name to it. Furthermore, users can reach their personal region of the information landscape (see Fig. 4) by logging into the system, revealing space to store and manage individual information artefacts. Drag & drop operations allow adding previously “locked” portals or copies of single media objects into this region. A search task is therefore no longer a transient action that is often difficult to repeat but rather a persistent object of a creative work process. Furthermore, the personal region can be organized individually by annotating, labelling and arranging artefacts the way that fits best to the user’s needs.

⁴ <http://www.apple.com/itunes/>

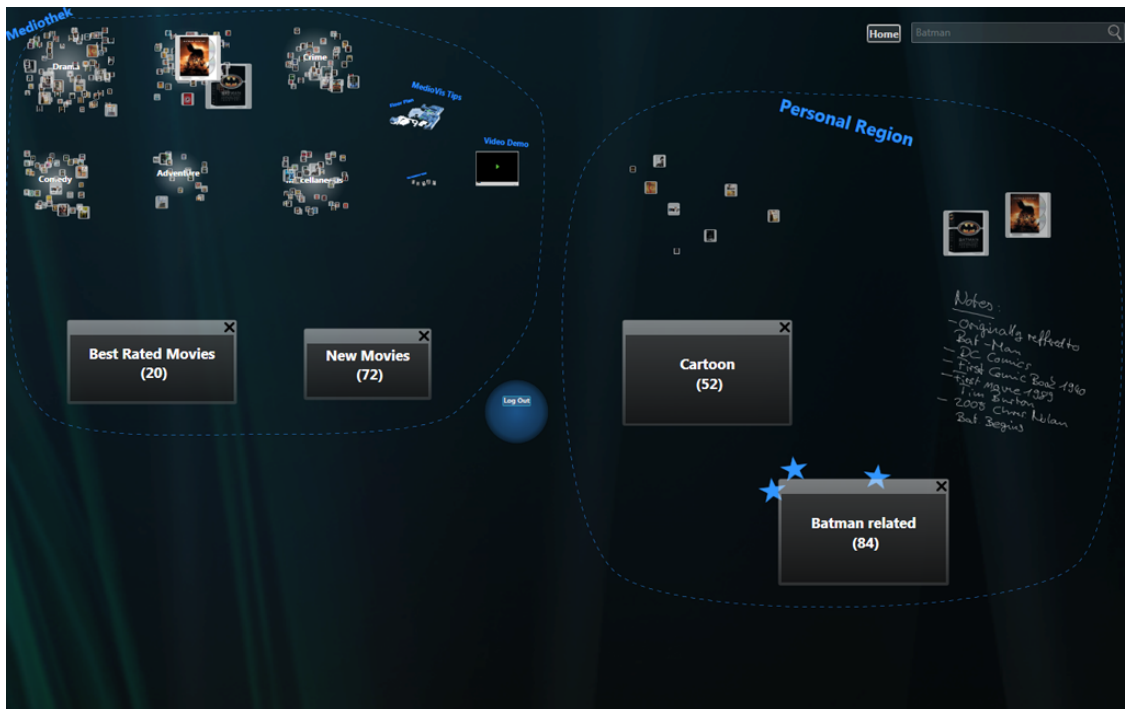


Figure 4: Users reach their personal region of the information landscape by login into the system. Herein, gathered movie objects and portals can be stored, arranged and annotated. The portals are also represented in different semantic zoom levels, depending on the zoom level of the landscape.

2.5 Multiple Environments and Devices

Creative information work is a complex activity, usually executed in varying physical and social situations and environments. Therefore, a further goal of *MedioVis 2.0* is to develop an interface concept suitable for many different devices, which unifies all kinds of content and functionality with one consistent interaction model, while leaving the user the possibilities to establish own workflows, data structures or views on the information space.

Due to the nature of zoomable user interfaces, information presentation scales implicitly to different display sizes and is therefore applicable on very different hardware platforms. We currently run *MedioVis 2.0* on standard desktop PCs as single user workstations, on large high resolution displays which are used as public walls to enable the work in groups or project teams and on multitouch tables to further improve simultaneous multiuser interaction (see Fig. 5).

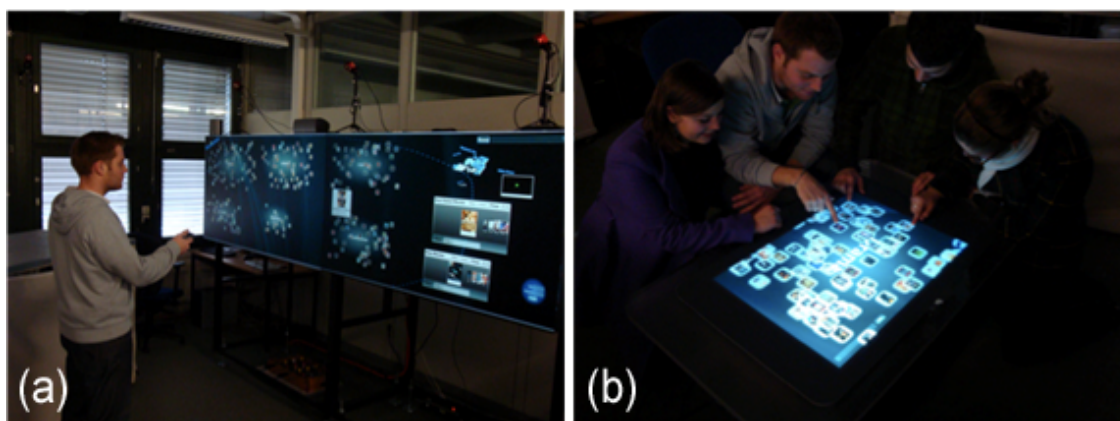


Figure 5: Besides traditionally used devices like desktop and laptop computers, *MedioVis 2.0* is designed to be used on forward-looking devices, e. g. (a) large high resolution displays or (b) multitouch tables like the Microsoft Surface⁵.

2.6 User Experience

An additional design goal of *MedioVis 2.0* is to unite all techniques and features described above in one consistent and positive user experience [KUN03]. Besides a satisfying usability we also considered several soft factors like joy of use or attractive visual design.

As every visual design communicates associations of values and functionalities [CRO03], we used a semi-transparent background for portals, so that contained objects are still perceptible. We also placed premeditatedly sized halos behind the genre clusters to generate visual landmarks. To improve the joy of use we chose animated zooming as interaction technique, using a sinusoidal instead of linear animation, to imitate a real world movement. The transition between different semantic zoom levels is accomplished by a cross-fading morphing animation. Furthermore, a parallax background layer is placed behind the information landscape that zooms with a smaller factor to arouse the feeling of depth and speed and to enhance the orientation in the landscape.

Eventually, the design of *MedioVis 2.0* encourages the explorative and playful discovery of information objects or novel functionalities during the overall navigation process in the information landscape.

3 Outlook

MedioVis 2.0 represents a novel perspective on how to implement a comprehensive Knowledge Media Workbench through the use of the zoomable user interface paradigm

⁵ <http://www.microsoft.com/SURFACE>

and object-oriented user interfaces. Thereby, knowledge workers are able to accomplish activities within one consistent system. *MedioVis 2.0* provides a unified user experience, not only on a desktop PC, but also on different devices such as multitouch tables and large high-resolution displays. To further evaluate the potential of the concept, we will transfer *MedioVis 2.0* to other complementary devices like mobile gadgets (e.g. smart phones, netbooks), which already play an increasing role in creative workflows of many knowledge workers.

Reality based interaction [JAC08] and the combination or “blending” of real world artefacts with digital information objects will also be of particular importance in our future research. For example the user can put a DVD on the surface and related content is displayed, e.g. the famous actors or actresses, producer, etc (Fig. 6a). This information can now become a starting point to explore the digital collection. Output becomes input, e.g. selecting one or more actors or actresses presents all matching movies on the information landscape. This query by example approach allows the blending of real world objects with the power of digital content and thereby allows a smooth transition between a searching and browsing mode.

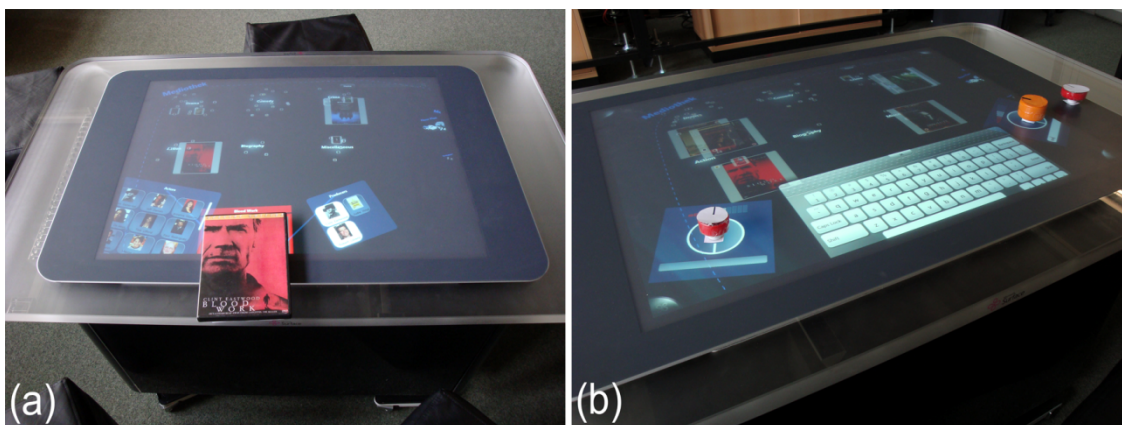


Figure 6: Integrating real world objects into the interaction offers new ways of exploration: (a) A DVD can be used to find related content, by laying it onto the surface and using the provided filter panels; (b) Search terms can be embodied by rotary knobs, their weights can be adjusted by turning these tokens.

Another idea is to develop specific kind of search tokens to manually weight the search terms (Fig. 6b). The user puts the tangible search token embodied by a rotary knob onto the screen and then enters the search term(s) via the automatic launched onscreen keyboard. Turning the knob to the right increases the weight of the term and so the matching objects increase in size, turning to the left decreases the weight. This way the user can combine a variety of search tokens standing for different search terms and each term can get an individual weight.

Despite of open issues regarding the creation of knowledge artefacts or collaboration, which we want to approach in future work, we believe that our Knowledge Media

Workbench – *MedioVis 2.0* – offers reasonable possibilities to support individual creative workflow of knowledge workers.

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