Title: TV INTERACTION PARADIGM FOR LIVE AND STORED CONTENT

Abstract: A system and method arrange and manage content for an on-screen user interface. Content, such as a television program, is representatively displayed as a raindrop. The raindrop moves to form a coming region past a present line region as the content it represents becomes current (i.e., the television program becomes live). The term "content" relates to any type of programming or information that can be broadcast or otherwise transmitted to a user.
TV INTERACTION PARADIGM FOR LIVE AND STORED CONTENT

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a nonprovisional application of U.S. provisional and parent application "TV INTERACTION PARADIGM FOR LIVE AND STORED CONTENT - THE RAINDROP MODEL," U.S. Serial No. 60/221,405, filed July 28, 2000 having George Marmaropoulos, Clive Van Heerden, and Nevenka Dimitrova as the inventors and is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

The present invention relates generally to a program schedule and guide, and, more particularly a user interface system that can be used to display content in a user-friendly way.

Digital television has changed and will continue to change home entertainment by offering a vast amount of digital content. The number of channels and variety of content available will become so large that it will be impossible for any viewer to browse the content using conventional channel surfing methods. Electronic program guides (EPGs), such as those described in U.S. Patent No. 4,706,121 and 5,353,121, herein incorporated by reference, describe schedule content processing systems which provide a viewer with a convenient way to select programs based on viewer supplied selection criteria. However, EPGs despite their current developments are insufficient to provide a level of personalization for the copious content available.
Various devices and systems, such as personal TV recorders and agent technologies offer a certain level of personalization. These systems operate at the meta-data level using EPGs and user preferences. Such devices normally have a hard disk with the ability to store several hours of video content in order to facilitate the process of viewing the preferred programs. However, these devices and systems also have difficulty in presenting a user with content in a user-friendly way.

SUMMARY OF THE INVENTION

According to the invention, a system and method arrange and manage content for an on-screen user interface. In one aspect, a method includes representatively displaying content, such as a television program, as a raindrop. The raindrop moves from a coming region past a present line region as the content it represents becomes current (i.e., the television program becomes live).

The term "content" relates to any type of programming or information that can be broadcast or otherwise transmitted to a user.

In some embodiments, a user may selectively mark the raindrop for storing or viewing. This generates a stored raindrop. The method further includes storing the selected content represented by the stored raindrop in a storage medium and displaying the stored raindrop in a storage region. The method may also include passing at least one stored raindrop through a drainage region over a pre-
set period of time and deleting the stored selected content that it represents when the stored raindrop passes entirely through the drainage region.

In various embodiments of the invention, the length, area, or width of the raindrop proportionally represents the temporal length of content. Raindrops may also contain representative still images, representative moving images, or an actual segment of the content the raindrops represent. Additionally, raindrops may move vertically or horizontally on a screen.

In further embodiments of the invention, a user performs selective marking by using a remote control device to highlight a raindrop. Highlighted raindrops include an indication when it is selected for storing.

In other embodiments, stored raindrops assume a different shape than raindrops. Additionally, stored raindrops include an expiration date and time. The stored raindrops begin to pass through the drainage region upon the expiration date and time. Further, a user may alter the expiration date and time.

In another aspect, a system displays a raindrop user interface. The system includes a display means for displaying raindrops corresponding to various types of content (such as television programs, for example). The raindrops move temporally from a coming region, through a present line region. The system also includes a microprocessor and a storage medium.

In some embodiments, the system includes means for moving a cursor for selectively marking raindrops for storing or viewing.
The system also may include means for recording or viewing content corresponding to selectively marked raindrops.

In one embodiment, the display means is a television or monitor screen.

In various other embodiments, the storage medium temporarily stores all content passing through the present line region until it passes completely through the present line region. Once completely through the present line region, content not selectively marked is deleted.

In another aspect, a program segment stored on a processor-readable medium arranges and manages content for an on-screen user interface. The program segment contains portions for displaying a raindrop representing the content and portions for moving the raindrop from a coming region through a present line region as the content the raindrop represents becomes current.

In another embodiment, the program segment also includes portions for selectively marking the raindrop for storing content to generate a stored raindrop. The program segment may also include portions for storing the selected content represented by the stored raindrop in a storage medium and portions for displaying the stored raindrop in a storage region. The program segment may also include portions for passing a stored raindrop through a drainage region over a pre-set period of time and deleting the stored selected content that it represents upon the stored raindrop passing entirely through the drainage region.
The invention provides many advantages over the prior art. For example purposes only, the system and method are capable of displaying content within a unified space in which present (i.e., live), future (i.e., coming), and past (i.e., stored) content may be simultaneously and instantly viewed. Some other advantages include copious amounts of content may be quickly organized and easily viewed using icons and representative raindrops. Further, stored content is organized in a clear and user-friendly manner. Disposal can also be controlled by a user and is preceded by an observable occurrence. These and many other advantages are elucidated with reference to the embodiments below.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 illustrates a preferred embodiment of a raindrop user interface;

Fig. 2 illustrates a preferred embodiment of a system on which a raindrop user interface may be displayed;

Fig. 3 illustrates a block diagram of a program segment stored on a processor-readable medium that arranges and manages content for an on-screen raindrop user interface;

Fig. 4 illustrates a block diagram of a program segment stored on a processor-readable medium that stores content for an on-screen raindrop user interface;

Fig. 5 illustrates a block diagram of a program segment stored on a processor-readable medium that deletes stored content for an on-screen raindrop user interface.
DETAILED DESCRIPTION OF THE PRIMARY EMBODIMENT

The proposed method and system is capable of displaying a user's preferred content within a unified space. The unified space contains a present line region (live content that is currently playing), a coming region (future content), and a past region (stored content) that can be viewed instantly and simultaneously.

Fig. 1 illustrates a preferred embodiment of the proposed user interface system. The type of content displayed is based on the selection made by the user. The user selects from content features such as category 20, subcategory 21, and in conjunction with other parameters such as personal viewing preferences, viewing history, agent findings, etc. Once this pre-filtering process is completed, the related content (i.e., television programs) is displayed.

Inventively, the present apparatus utilizes the paradigm of raindrops signifying coming, live, and stored content. Raindrops 10,11,12 represent content that can be stored or released through drainage region 13. For example, coming content (i.e., raindrops 11,12) are represented by corresponding images or icons in the shape of vertical "raindrops." These raindrops are either automatically generated by the system or provided by the broadcaster in a coming region 22. Live content (i.e., raindrop 10) is displayed passing through present line region 40 into a past region 23. When coming content starts playing (i.e., becomes live) it starts passing the present line region 40 into past region 23.
The length of each raindrop 10,11,12 indicates the temporal length of the content. The coming (i.e., raindrops 11,12) and live (i.e., raindrop 10) content moves vertically down the screen with time as a vertical axis. Horizontally, the content is arranged according to channels 31,32,33. The channels 31,32,33 are displayed in alphabetical order, numerical order, or in any order based on the user's personal preferences and viewing history. If the number of relevant channels is larger than the number the system can display on the screen at once, horizontal scrolling is possible.

Users may select content by moving left, right, up, and down using a conventional input device such as a remote control or any other custom designed input device. When content is highlighted (i.e., raindrop 10 includes cursor 41 that highlights the outer portion of raindrop 10), a representative still or moving image 50 is displayed on the background. Some textual content 51 may also be included with the still or moving image 50. In the case of live content, the live video can be displayed playing on the background. In order to avoid overly busy and therefore confusing visual environments, it is suggested that all the still and moving images 50 used as backgrounds be in a dual-tone mode.

Users have the option to record any of the coming (i.e., raindrops 11,12) and live (i.e., raindrop 10) content which the various raindrops represent. Once a user makes a selection, an indicator, such as symbol 100, appears on the raindrop 10 to
indicate that the represented content has been selected for recording.

A raindrop (not shown) which has not been selected for recording may change its appearance as it passes the present line 40 to indicate that the part of the content which has already been broadcast will or will not be stored.

When live content finishes (i.e., entirely passes the present line 40) and has not been selected for recording, it may disappear from the screen. However, if it has been selected for recording then the shape of its raindrop collapses to a circular shape. The circular shape, or stored raindrop, automatically moves to the bottom of the screen where the stored raindrops, such as stored raindrop 60, are displayed. To enhance the visual impact, this action can be done in an animated manner.

Stored raindrop 60 is displayed on the bottom area of the screen (i.e., storage area 61). Stored raindrops are arranged in a chronological order irrespective of the channel order from which the stored raindrops were recorded. Alternatively, stored raindrops can be arranged according to the viewer's predefined personal viewing preferences.

As with the coming 11,12 and live 10 content, the selection of a stored raindrop 60 is possible by moving left, right, up, and down using a conventional input device such as a remote control or any other custom designed input device. When a stored raindrop 60 is highlighted, the content it represents starts playing on the
background. For the same visual clarity reasons, the video can be displayed on the background in a dual-tone mode.

If the number of stored raindrops is larger than the number the system can display at once on the screen, then horizontal scrolling of the channels is possible. The scrolling of the coming (i.e., raindrops 11,12) and live (i.e., raindrop 10) content are independent from each other. This is to ensure that the space impression given to the user remains always unchanged and there is no jumping from one space to another.

Each stored raindrop is located above an opening, for example opening 14, appearing on the bottom of the screen. This bar is called the drainage region 13. Every stored raindrop may have an expiration date and time, predefined by the user. Alternatively the system can determine the duration of storing the content for a predetermined time (i.e., 4 days) or based on user's preferences, available space, and upcoming content to record. If a stored raindrop stays inactive for that period then it starts disappearing through the drainage region 13. This means that it is erased from the storage space of the system. The erasing process can be instant but may also take a certain predefined time period. During this period, a circular storage raindrop representing stored content slowly passes down the corresponding drainage hole 14. The user can choose to recover that particular content up until the point when the whole stored raindrop disappears. Users can also select to keep content for as long as they like by removing the expiration date and time. This can be represented graphically by
filling the hole 24 of the drainage 13 below the corresponding stored raindrop 60. The hole can be opened again at any time. This will reactivate the expiration date and time.

Fig. 2 displays a system on which a raindrop user interface may be displayed. Display screen 101 displays the user interface 102. User interface 102 is made up of a coming region 22, a present line region 40, and a past region 23 for displaying coming and present content by corresponding raindrops 10,11,12. The raindrops 10,11,12 move from the coming region 22, through the present line region 40 into past region 23.

Raindrops can be selected and marked for storing or viewing via cursor 41. Cursor 41 can be moved left, right, up, and down using a conventional input device such as a remote control 105 or any other customary input device known in the art. The input the device and display device can be integrated together (e.g. touch screen display on a computer or a palm top device). Also the interface can be rendered on a LCD display of a mobile phone or any other communication device capable of transmitting the controls and data over a communication channel. This is useful if, for example, the user is on vacation and wants to see what content is stored on his home device and which ones should be kept until he comes home.

Raindrops that are marked for storage are placed in a storage region 61. Stored raindrops pass through drainage region 13 over a pre-set period of time once their expiration date and time is achieved. Stored content which stored raindrops represent is
deleted upon the stored raindrops 60 passing entirely through the drainage region 13.

A microprocessor 103 selects content and raindrops based on user inputs and stores them in storage medium 104. The amount of content that the system can record simultaneously depends on the number of tuners 106 available and the storage capacity of the storage medium 104 of the system. Assuming a sufficient number of tuners and storage capacity, the system can temporarily store all live content until it completely passes the present line region and then delete it if it is not marked for recording. This allows the user to choose to store or delete content at any point during its broadcast time. The link between storage medium 104 and microprocessor can be a local communication channel as well as a network (public or private). The storage device can be an array of storage servers capable of storing all content.

The block diagram of Fig. 3 depicts how a program segment stored on a processor-readable medium arranges and manages content for an on-screen user interface. The program segment screens content from tuner 106 to see if it matches an available category 20 in step 300. If the content does not match an available category 20, the program directs microprocessor 103 to filter or delete the content in step 301. If the content does match an available category 20, the program verifies whether a raindrop exists for that content in step 302. The program directs microprocessor 103 to generate a raindrop if none exists in step 303. If a raindrop does exist for the content, or once a raindrop
is generated, the program directs microprocessor 103 to determine content length and adjust the area of the raindrop accordingly in step 304.

In step 305, the program verifies whether the content is coming content. If so, the program directs microprocessor 103 to display a corresponding raindrop (i.e., raindrop 12) in coming region 22 in step 306. In step 308, the program then directs microprocessor 103 and display screen 101 to move the raindrop temporally until it reaches the present line region 40.

If the program determines that the content is not coming content in step 305, or if the raindrop reaches the present line in step 308, the program verifies whether the content is present content in step 307. If the content is not present content, the program directs microprocessor 103 to filter or delete the content in step 301. If the content is present content, the program directs microprocessor 103 to display the raindrop on display 101 at least partially within present line region 40 in step 309. In step 310 the program directs microprocessor 103 to move the raindrop temporally until it passes completely through the present line region 40.

Fig. 4 depicts a block diagram of a program segment stored on a processor-readable medium that stores content for an on-screen raindrop user interface. The program determines whether a raindrop is selected in step 400. If not, the program directs microprocessor 103 to continue moving the raindrop through present line region 40 in step 401. The program queries whether the
raindrop is through the present line region 40 in step 402. If so, the program directs the microprocessor to remove the raindrop from display and erase the content it represents in step 403. If not, the program returns to step 401.

If the program determines that a raindrop was selected in step 400 it queries whether the user desires storage of the content the raindrop represents in step 404. If not, the program returns to step 401. If the user desires storage, the program directs microprocessor 103 to display an indicator 100 in step 405 and store the content in storage medium 104 in step 406. The program then queries if the raindrop is through the present line region 40 in step 407. If so, the program directs the microprocessor 103 to generate and display a stored raindrop (i.e., stored raindrop 60) in step 409. If not, the program directs the microprocessor to continue moving the raindrop through present line region 40 in step 408.

Fig. 5 illustrates a block diagram of a program segment stored on a processor-readable medium that deletes stored content for an on-screen raindrop user interface. The program queries if an expiration date and time is set on a stored raindrop (i.e., stored raindrop 60) in step 500. If no expiration date and time has been set, the program directs microprocessor 103 to request input of the expiration date and time in step 501. The program determines if the expiration date and time have been inputted in step 502. If not, the program repeats step 501. If the user input the
expiration date and time the program directs microprocessor 103 to store the inputted information in step 503.

Once the expiration date and time are set, the program queries whether the date and time are achieved in step 504. If not, the program directs microprocessor 103 to retain and display the stored raindrop, and it directs storage medium 104 to retain the content that the stored raindrop represents. This occurs in step 505. Once the expiration date and time are achieved, the program directs microprocessor 103 to pass the stored raindrop through the drainage region 13 in step 506. Step 506 may occur either instantly, or over a period of time observable by the user. The program verifies whether the stored raindrop is completely through the drainage region in step 507. If not, the program directs microprocessor 103 to continue moving the stored raindrop through the drainage region in step 508. If the stored raindrop is completely through the drainage region, the program directs microprocessor 103 to delete the stored raindrop in step 509. The program also directs storage medium 104 to delete the content that the stored raindrop represents in step 509.

The preceding expressions and examples are exemplary and are not intended to limit the scope of the claims that follow.
What is claimed is:

1. A method of arranging and managing content for an on-screen user interface comprising:
   displaying at least one raindrop representing the content;
   moving the at least one raindrop from a coming region through a present line region as the content the at least one raindrop represents becomes current.

2. The method of Claim 1 further comprising the steps of:
   selectively marking the at least one raindrop for storing content to generate a stored raindrop, and
   storing the selected content represented by the stored raindrop in a storage medium.

3. The method of Claim 2 further comprising the step of displaying the stored raindrop in a storage region.

4. The method of Claim 2 further comprising the step of passing at least one stored raindrop through a drainage region over a pre-set period of time and deleting the stored content which it represents upon the stored raindrop passing entirely through the drainage region.
5. The method of Claim 1, wherein the coming region represents future content, the present line region represents live content, and the past region represents past content.

6. The method of Claim 1, wherein the moving step further comprises vertical or horizontal movement on a screen.

7. The method of Claim 1, wherein the length, area, or width of the at least one raindrop proportionally represents content's length.

8. The method of Claim 1, wherein the at least one raindrop contains a representative still or moving image.

9. The method of Claim 8, wherein the moving image further comprises a segment of content the at least one raindrop represents.

10. The method of Claim 2, wherein the stored raindrop comprises a different shape than the at least one raindrop.

11. The method of Claim 2, wherein the selectively marking step further comprises use of a remote control device to highlight the at least one raindrop.
12. The method of Claim 11, wherein the at least one highlighted raindrop includes an indication when it is selected for storing.

13. The method of Claim 1, wherein the storage region is adjacent to the drainage region.

14. The method of Claim 2, wherein the stored raindrop further comprises an expiration date and time.

15. The method of Claim 14, wherein the stored raindrop begins to pass through the drainage region upon the expiration date and time.

16. The method of Claim 15, wherein the expiration date and time can be altered or removed by a user.

17. A system on which a raindrop user interface may be displayed comprising:
   - a display means for displaying content as at least one raindrop wherein the at least one raindrop moves temporally from a coming region, through a present line region;
   - a microprocessor; and
   - a storage medium.

18. The system of Claim 17 further comprising means for moving a cursor for selectively marking the at least one raindrop for storing or viewing content.
19. The system of Claim 17 further comprising means for recording or viewing content corresponding to the selectively marked at least one raindrop.

20. The system of Claim 17, wherein the display means comprises a television or monitor.

21. The system of Claim 17, wherein the content further comprises at least one television program.

22. The system of Claim 17, wherein the storage medium temporarily stores the content the at least one raindrop represents until the at least one raindrop passes completely through the present line region.

23. The system of Claim 22, wherein the content not selectively marked is deleted.

24. The system of Claim 17, wherein the means for recording or viewing further comprises at least one television tuner.

25. The system of Claim 17, wherein the storage device is a server with very large capacity.
26. The system of Claim 25, wherein the server can be accessed remotely using a mobile communication device.

27. The system of Claim 26, wherein the mobile communication device comprises the display means and accepts input commands.

28. The system of Claim 26, wherein the mobile communication device further comprises a touch screen interface or palm top device.

29. A program segment stored on a processor-readable medium for arranging and managing content for an on-screen user interface comprising:
   portions for displaying at least one raindrop representing the content; and
   portions for moving the at least one raindrop from a coming region through a present line region as the content the at least one raindrop represents becomes current.

30. The program segment of Claim 29 further comprising:
   portions for selectively marking the at least one raindrop for storing content to generate a stored raindrop;
   portions for storing the selected content represented by the stored raindrop in a storage medium; and
   portions for displaying the stored raindrop in a storage region.
31. The program segment of Claim 30 further comprising portions for passing at least one stored raindrop through a drainage region over a pre-set period of time and deleting the stored selected content which the stored raindrop represents upon the stored raindrop passing entirely through the drainage region.
Fig. 5

Flowchart:

1. Request Input of Expiration Date and Time
   - Yes: Store Expiration Date and Time
   - No: Continue Moving Through Drain Region

2. Expiration Date Set on Stored Raindrop Image?
   - Yes: Pass through Drain Region
   - No: Retain Stored Raindrop Image and Content It Represents

3. Expiration Date and Time Achieved?
   - Yes: Delete Raindrop and Content it represents
   - No: Continue Moving Through Drain Region