Device menu

Field of the invention

The invention relates to defining a device menu for a device. More particularly, the invention relates to using images in defining a device menu.

Background of the invention

A communication device, such as user equipment (UE), a mobile station (MS), a cellular telephone, a personal digital assistant (PDA) or the like, or other terminals, such as a personal computer (PC), or other devices, such as a digital camera, may be used to handle information and/or to access a communication network, for example. A user may use a communication device for tasks such as for making and receiving phone calls, for receiving and sending data from and to the network and for experiencing multimedia content or otherwise using multimedia services. Furthermore, communication devices and other appropriate devices may be used for capturing still or video images, recording and outputting voice and so on.

The operation of a communication device and other devices may be controlled by means of an appropriate user interface such as control buttons, scroll key, voice commands and so on. A communication device and other devices may be provided with a display for displaying images and other graphical information for the user of the device. The display may be a part of the user interface showing, for example, menu item selectable by the control buttons or the like. Speaker means may be provided. A communication device may include an antenna for wirelessly receiving and transmitting signals from and to base stations of a mobile communication network. Furthermore, a communication device is typically provided with a processor entity and memory means.

Digital camera is becoming a common feature in communication devices, such as mobile stations and user equipment. It may be possible to personalize a communication device defining an image or the like as so-called "wallpaper", i.e. a background image in the display of the communication device. The wallpaper may be an image taken by a digital camera of the device or by another digital imaging device. The wallpaper may also be another graphic file, such as a drawing or a geometrical pattern.

In current implementations of wallpaper, the wallpaper is visible only when a device menu, i.e. selectable functions of the device, is not visible in the display. Small screen sizes and resolutions may make it impossible, or at least useless or difficult, to make the device menu appear on top of the wallpaper.

It may also be possible to purchase and download so-called "themes". A theme may comprise a collection of graphics such as wallpaper, icons, interface color definitions, and so on. However, different parts of the theme function separately, such as separate wallpaper and separate menu icons having a similar style or outlook.

This invention suggests improved and/or alternative wallpaper features.

Summary of the invention

In accordance with an aspect of the invention, there is provided an image having distinct image areas as a part of the image, at least one of the distinct image areas configured to match determined device menu functions for functioning as a functional part of a device menu.

In accordance with another aspect of the invention, there is provided a device menu comprising an image having distinct image areas as a part of the image, at least one of the distinct image areas configured to match determined device menu functions for functioning as a functional part of the device menu.

In accordance with another aspect of the invention, there is provided a device menu comprising a device menu comprising an image having distinct image areas as a part of the image, at least one of the distinct image areas configured to match determined device menu functions for functioning as a functional part of the device menu.

In accordance with another aspect of the invention, there is provided a server in a communication network. The server is configured to receive an image, to define distinct image areas in the image, to define at least one of the distinct image areas to match determined device menu functions for functioning as a functional part of a device menu and to allow the device menu to be downloaded from the server to a device via the communication network.

In accordance with a further aspect of the invention, there is provided a method for defining a device menu for a device. The method comprises defining distinct

image areas in an image and defining at least one of the distinct image areas to match determined device menu functions for functioning as a functional part of the device menu.

Brief description of the drawings

The invention will now be described in further detail, by way of example only, with reference to the following examples and accompanying drawings, in which:

Figure 1 shows an example of a device in which the embodiments of the invention may be implemented;

Figure 2 shows a flow chart illustrating an embodiment of the invention; -

Figure 3, comprising Figures 3a-3f, shows an embodiment of the invention; and

Figure 4 shows a further embodiment of the invention.

Detailed description of preferred embodiments

According to embodiments of the present invention, a mechanism is created where distinct image areas (DIA) of an image are selected and made a functional part, such as an icon, of a device menu. The image may be defined as a functional background, such as wallpaper, which may function as a device menu or a part of a device menu.

Typically, a device menu may be displayed on a device display by means of icons. The icons may advantageously be positioned in a grid. In embodiments of the present invention, an analysis algorithm seeks to find an area preferably in the center of the image, where a sufficient number of distinct image areas are located in a grid.

In an embodiment, an image taken with a digital camera comprised in the communication device or by means of some other digital imaging device may be uploaded to a server. Also artificial or manually created images, such as a facsimile copy of a paper image, may be used. The image may be analyzed in the server for separate, distinct image areas of sufficient size, position, contrast and color separation.

For defining a device menu, a distinct image area (DIA) is defined as a functional part of the device menu. In an embodiment, a user may configure the device menu in the device by means of a configuration interface of the device. A DIA may be defined to match a certain device menu function, such as "save", "open" or the like. A DIA may also be defined to match certain successive device menu functions. For example a first selection of a first DIA may select "messages" from the device menu. Reselecting the same DIA, now being a part of a submenu of messages menu, may select "write a message" from the messages menu, and so on. Each DIA may be defined to match a menu function or only a part of the distinct image areas are defined to match a menu function and the others are kept as a part of the image capable to be defined to match a menu function later.

In an embodiment, a user may use a scroll key, control buttons or other control means of the device to move in a DIA based menu. The location of the distinct image areas can be communicated to the device when downloading or defining the image or device menu in the device. The device may then highlight the distinct image areas with vector-based highlights. In an embodiment, a device may have a plurality of device menus co-existing in the device. A user may be enabled to select a device menu to be used and to switch between device menus. The device menu may be selected, for example, by means of a configuration interface of the device.

In an embodiment, user may define a criterion for a number of distinct image area candidates or a criterion for a number of pre-defined functions. For example, if the criterion for the number of distinct image area candidates is set to five, server software or handset software may pick the best five distinct image areas from an image, such as a wallpaper, provided. The best five distinct image areas may be selected, for example, using an analysis algorithm as explained referring to Figure 3.

In an embodiment, server software or handset software may pick a plurality of suitable distinct image areas from an image provided. In an embodiment, all distinct image areas, which are suitable to be used to activate menu functions, are selected. For example, the software finds ten suitable distinct image areas from an image. The image may be sent to a communication device and a user of the communication device may define how many of the suitable distinct image areas the user wishes to use to activate menu functions. If the user wants to use five distinct image areas as icons to activate menu functions, the user can define these in the communication device. These five icons may be identified, for example, by

means of words or characters or by highlighting the distinct image areas. The unused suitable distinct image areas may still remain as a part of the wallpaper and may be defined as icons later.

As mentioned above, the distinct image areas defined as icons may be identified so that it is easier or clearer what menu function becomes activated by activating the icon. In an embodiment, the icons may be identified by means of words or characters added to the image next to or on the distinct image area defined as an icon. Adding the words or characters may be done in the server or in the communication device.

The server may also alter the image, for example, so that a criterion for the number of distinct image area candidates shall be met. Altering may comprise, for example, relocating suitable distinct image areas or modifying selected areas for size and/or contrast and so on.

In an embodiment, the image may be enhanced such that the distinct image areas, or the icons, are highlighted or appear to stand proud of the rest of the image. This may enable a user to easily identify the image areas or icons which, when activated, will activate a menu function and images contained with the overall image which will not activate any menu function.

The size of the grid may be defined for example based on a type of the device for which the background is intended to. The size of the grid may be, for example, 2x2 (i.e. a grid having two distinct image areas in a horizontal direction and two in a vertical direction), 2x3, 2x4, 3x3 and so on.

A resulting theme grid file (TGF) may be saved to a location where a user of the communication device may download the TGF to the device. A device menu may be defined from the TGF in the server or in the device.

When suitable distinct image areas have been selected, the image comprising the selected areas, i.e. the TGF, may be downloaded in a communication device or in another suitable target device, such as a personal computer. The TGF or the device menu may be downloaded from the server to the target device via a communication system, such as a telecommunication system, for example a mobile communication system. The communication system may also comprise a plurality of cooperating communication systems, for example a telecommunication system, such as a general packet radio system (GPRS), and a data communication system, such as an Internet protocol (IP) system. The TGF may be

used to define a device menu in the target device. In an embodiment, the device menu is defined already in the server performing the analysis, or in a separate network entity.

In an embodiment, the image may be analyzed directly in the communication device or other target device. Device based implementation may be a native language or java language application able to analyze an image in the device memory for distinct image areas. A resulting TGF may be stored in the device memory.

Embodiments of the invention may be executed in the server and/or in the target device by means of an appropriate computer program.

Figure 1 shows an example of a communication device 10 where embodiments of the invention may be implemented. The communication device 10 comprises radio reception and transmission means built in the casing of the device. The communication device 10 is provided with a display 12 and control buttons 14. Processing means 16 and memory means 18 are also shown.

Figure 1 shows only one exemplifying communication device having a form of a mobile station. It shall be appreciated that the type of the communication device may differ substantially from what is shown in Figure 1. The radio reception and transmission means may as well be in a form of a visible antenna extending from the casing of the communication device. The control buttons may be positioned in an appropriate manner depending on the device type, size and use, for example. The communication device may be any other appropriate communication device, for example a PDA. A target device, where embodiments of the invention may be implemented, may be also another appropriate device comprising a selectable menu, such as a personal computer, even if no reception and transmission means are included.

Figures 2 and 3 illustrate steps of an exemplifying embodiment of the invention. Figure 2 shows a flow chart of the exemplifying embodiment. Figure 3 shows graphically the steps of the exemplifying embodiment. In both Figures 2 and 3, like reference numbers are used for similar steps of the exemplifying embodiment.

In step 100, an analysis matrix is created for an image. Figure 3a shows an example of creating an analysis matrix. Before creating the analysis matrix, an analysis of the image for size, brightness and/or image color depth may be

needed. Matrix cell size may be adjusted for obtaining a desired resolution for different types of images.

In step 110, analysis criteria are set, the analysis criteria comprising at least a criterion for the number of DIA candidates. The analysis criteria may also comprise, but are not limited to, minimum and maximum size of a DIA candidate, limits for pixel group brightness and color (B&C) and so on.

In step 120, image pixels are analyzed for their brightness and color.

In step 130, pixel groups are defined from the image. Figure 3b shows an example of defining pixel groups. The amount of pixel groups that shall be defined may depend on different analysis criteria. Preferably, a pixel group is a relatively uniform area of neighboring pixels with variance of B&C remaining under a limit.

In step 140, the pixel groups defined in step 130 are analyzed to find DIA candidates. A DIA candidate may be a pixel group larger than a minimum size defined in the analysis criteria. In an embodiment, the minimum size may be defined as a percentage of the total image area, for example over a limit (DIA_SIZE_LIMIT_MIN). A DIA candidate may also be a pixel group smaller than a maximum size defined in the analysis criteria. In an embodiment, the maximum size may be defined as a percentage of the total image area, for example under a limit (DIA_SIZE_LIMIT_MAX). For example, in the embodiment of Figure 3c, the pixel groups 1-5 may be defined to pass and the pixel group 6 may be defined to be too small.

In step 150, the number of DIA candidates is determined. In the embodiment of Figure 3c, the target for the number of DIA area candidates may be set to four DIA candidates.

In step 160, it is verified if the number meets the criterion for the number of DIA candidates set in the step 110. Preferably, there should be more than a predetermined number of DIA candidates. A default predetermined number may be 4, 6 or 9. The predetermined number may be customizable, for example, by a user. It may also be defined that there should be a predetermined number of DIA candidates in each or in a certain direction. In the Figure 3c embodiment, five pixel groups passed and thus the number meets the criterion for the number of DIA candidates.

If it is found that the number of DIA candidates does not meet the predetermined criterion, analysis criteria may be readjusted, for example for higher variance. The method may thus return back to step 110 and the steps 120-150 may be repeated. Preferably, maximum two loops comprising readjusting the analysis criteria are performed. If, after two loops, it is found that the number of DIA candidates does not meet the predetermined criterion, the proposed image may not satisfy requirements to be useable for creating a theme grid file.

If it is found that the number of DIA candidates meets the predetermined criterion, the method may continue in step 170.

In step 170, a location of the DIA candidates is determined. Figure 3d shows an example of determining the location of the DIA candidates. A DIA location grid may be formed on the DIA candidates. Optimal positions in the grid may be set for as a target for the distinct image areas, denoted by a, b, c and d in Figure 3. For each DIA candidate, a size-weighted distance from the optimal position in the grid may be calculated.

In step 180, the distinct image areas are selected from the DIA candidates based on the location of the DIA candidates. The DIA candidates having smallest size-weighted distance may be selected as the distinct image areas. In Figure 3d embodiment, DIA candidates 1, 2, 4 and 5 could thus be selected. Remaining DIA candidates may be rejected. In Figure 3d embodiment, DIA candidates 3 and 6 could thus be rejected.

The location from the optimal location on the grid may be analyzed for each DIA just selected. If total variance between the true location and the optimal location is below a predetermined limit, the method may continue in step 190. If the total variance is not below a predetermined limit, the analysis defined in steps 100-170 may be repeated, preferably for a limited area only. Results from the analysis rounds are combined. Preferably, only a limited number, such as two or three, of analysis loops are performed.

In step 190, analysis result may be shown. The analysis result may be shown, for example, by drawing a transparent film over the image highlighting the distinct image areas which have been selected in steps 100-180. In Figure 3e, an example of an analysis result is shown. As mentioned above, analysis result, i.e. the theme grid file (TGF), may be stored in a server memory, if the analysis was performed in a server. If the analysis was performed in the target device, the TGF may be stored in a memory of the device.

In step 200, the distinct image areas are defined to match determined device menu functions for functioning as a functional part of a device menu. Figure 3f shows an example of a device menu in a communication device having distinct image areas 20, 22 as functional parts of the device menu.

Other image analyzing methods may also be used to select the distinct image areas.

Figure 4 shows an example of an embodiment, where an image is an artificial image, for example a facsimile copy of a paper image, such as a page from a book or the like. Distinct image areas, such as separated animal figures 40, 42, 44, 46, may be selected from the image as explained above. Each animal 40, 42, 44, 46 may then be defined as an icon relating to a selected menu function. If desired, icons may be identified further, for example by means of characters.

Embodiments of the invention may enable selected distinct image areas visible in a selected image to be made functional. The functional distinct image areas may be used as icons of a device menu to control functions of a communication device or another target device.

Embodiments of the invention may increase the value of background images or wallpaper, since the background image or the wallpaper becomes a functional feature in a device. This feature may facilitate users to remember where certain functions of the device are located in the background image. An automatic image analysis in a server or in the communication device is preferred, because manual methods to come up with a TGF may be laborious.

Although the invention has been described in the context of particular embodiments, various modifications are possible without departing from the scope and spirit of the invention as defined by the appended claims. It should be appreciated that whilst embodiments of the present invention have mainly been described in relation to mobile communication devices, such as mobile stations and user equipment, embodiments of the present invention may be applicable to other types of devices that may have a selectable menu or another application requiring selectable locations on a display.

Claims

1. A displayed image having distinct image areas as a part of the image, the distinct image areas being defined by an automatic analysis of the displayed image, a plurality of the distinct image areas each being configured to match at least one respective determined device menu function for functioning as a functional part of a device menu.

2. A displayed image according to claim 1, wherein a predetermined number of distinct image areas are located in a grid.

3. A displayed image according to claim 1 or 2, wherein the distinct image areas are configured to be selected by analyzing the image for separate, distinct image areas of a predetermined size, position, contrast and color separation.

4. A displayed image according to any of claims 1-3, wherein the image is a created by a digital imaging device.

5. A displayed image according to any of claims 1-4, wherein the image is a photograph.

6. A displayed image according to any of claims 1-3, wherein the image is a facsimile copy of a paper image.

7. A displayed image according to any of claims 1-6, wherein the functional part is an icon of the device menu.

8. A device menu comprising an image according to any of claims 1-7.

9. A device menu comprising a displayed image having distinct image areas as a part of the image, the distinct image areas being defined by an automatic analysis of the displayed image, a plurality of the distinct image areas each being configured to match at least one respective determined device menu function for functioning as a functional part of the device menu.

10. A device comprising a device menu comprising a displayed image having distinct image areas as a part of the displayed image, the distinct image areas being defined by an automatic analysis of the displayed image, a plurality of the distinct image areas each being configured to match at least one respective determined device menu function for functioning as a functional part of the device menu.

11. A device according to claim 10, wherein the distinct image areas are set to match determined device menu functions by means of a configuration interface of the device.

12. A device according to claim 10 or 11, comprising a plurality of co-existing device menus configured to enable a user to switch between the co-existing device menus.

13. A device according to any of claims 10-12, comprising a communication device.

14. A device according to claim 13, comprising one of a mobile station, user equipment or a personal digital assistant.

15. A device according to any of claims 10-13, comprising a personal computer.

16. A device configured to
display an image, and
define a device menu in the displayed image by:
defining distinct image areas in the displayed image by an automatic analysis of the displayed image; and
enabling a user to define a plurality of the distinct image areas each to match at least one respective determined device menu function for functioning as a functional part of the device menu.

17. A device according to claim 16, wherein remaining distinct image areas of the at least one distinct image area are left undefined as a part of the image.

18. A device according to claim 16 or 17, wherein the at least one distinct image area defined to match the determined menu function is identified using one of words, characters, highlighting and appearing to stand proud of the rest of the image.

19. A server configured to:
receive an image;
define distinct image areas in the image by an automatic analysis of the image;
define at least one of the distinct image areas to match determined device menu function for functioning as a functional part of a device menu; and
allow the device menu to be downloaded from the server to a device via the communication network.

20. A server according to claim 19, wherein the communication network is a telecommunication network.

21. A method comprising:

displaying an image on a device;

defining distinct image areas in the displayed image by an automatic analysis of the displayed image; and

enabling a user to define a plurality of the distinct image areas each to match at least one respective determined device menu function for functioning as a functional part of the device menu.

22. A method according to claim 21, wherein the defining the distinct image areas in the image comprises defining a predetermined number of distinct image areas located in a grid.

23. A method according to claim 21 or 22, wherein the defining the distinct image areas in the image comprises analyzing the image for separate, distinct image areas of a predetermined size, position, contrast and color separation.

24. A method according to any of claims 21-23, wherein the defining the distinct image areas in the image comprises the steps of:

creating an analysis matrix for the image;

setting analysis criteria comprising at least a criterion for the number of distinct image area candidates;

analyzing image pixels of the image for their brightness and color;

defining pixel groups from the image;

analyzing the pixel groups to find distinct image area candidates;

determining the number of the distinct image area candidates;

verifying whether the number meets the criterion for the number of the distinct image area candidates;

if the number of the distinct image area candidates does not meet the criterion for the number of the distinct image area candidates, adjusting the analysis criteria in the step of setting the analysis criteria and repeating the steps of analyzing the image pixels, defining the pixel groups, analyzing the pixel groups and verifying whether the number meets the criterion;

determining a location of the distinct image area candidates; and

selecting the distinct image areas based on the location of the distinct image area candidates.

25. A method according to any of claims 21-24, further comprising altering the image.

26. A method according to claim 25, wherein the altering the image comprises altering the image to meet the criterion for the number of distinct image area candidates.

27. A method comprising receiving an image on a server for defining the device menu

defining distinct image areas in the image by an automatic analysis of the image; and

defining at least one of the distinct image areas to match at least one determined device menu function for functioning as a functional part of the device menu; and

allowing the device menu to be downloaded from the server to a device.

28. A method according to claim 27, wherein the allowing the device menu to be downloaded from the server to the device comprises allowing the device menu to be downloaded via a communication system.

29. A method according to any of claims 21-26, further comprising providing the device with the image and defining the device menu by means of at least one computer program in the device.

30. A computer program comprising program code means for performing any of the steps according to any of claims 21 to 26 and 29 when the program is run on a computing means.

31. A computer program comprising program code means for performing any of the steps according to any of claims 27 and 28 when the program is run on a computing means.

32. A memory means configured:

to store an image that can be displayed, the image having distinct image areas as a part of the image, the distinct image areas being defined by an

automatic analysis of the image, wherein a plurality of the distinct image areas is configured each to match at least one respective determined device menu function for functioning as a functional part of a device menu.