Abstract: After the most-frequently-used font size (Sdominant) is determined on a Web page acquired from a server unit 10, all of the text items are changed to the optimum font size (Sopt). At the same time, the text items whose original font size is smaller than the most-frequently-used font size (Sdominant) are changed to an inconspicuous italic font pattern and the text items whose original font size is larger than Sdominant are changed to a conspicuous bold font pattern.
DESCRIPTION

INFORMATION OUTPUT APPARATUS, INFORMATION OUTPUT METHOD, AND RECORDING MEDIUM

Technical Field

This invention relates to an information output apparatus, an information output method, and a recording medium which are for causing a browser to output a Web page acquired by a client unit from, for example, a server unit to enable the user to browse the Web page.

Background Art

In a recent client-server system as typified by the Internet, a wide-area network (WAN), or a local-area network (LAN), it is common practice to cause a browser to output a Web page loaded from a server unit into a client unit, thereby enabling the user to browse the Web page.

The Web page offered by the server unit is generally created in such a manner that the character size (or font size), color, and shape are changed according to each different piece of information dealt with in the divided areas of the page, for example, according to the attention-grabbing level, taking into account the balance of the entire page.

As a client unit, a terminal device whose display screen size differs variously, such as a personal...
computer (PC), a personal digital assistant (PDA), or a mobile phone, is used.

Therefore, when browsing a Web page on a relatively large display screen of a terminal device, such as a PC, the user can sufficiently read the information displayed even in a small font size. However, when browsing the Web page on a small display screen of, for example, a mobile phone, the user might not sufficiently read the information displayed in the same small font size. Conversely, the information displayed in a large font size is displayed widely on the small display screen, making it difficult to grasp the whole information.

To overcome this problem, "a method of and system for improving the readability of text" have been considered (refer to, e.g., Jpn. Pat. Appln. KOKAI Publication No. 2007-122708). In the method and system, when text is displayed on a display unit, the font size of the text is changed so as to be not smaller than the limit value of the readable font size.

With "the method of and system for improving the readability of text," characters smaller than the limit value of the readable font size are increased uniformly in their size until the limit value of the readable font size has been exceeded. Accordingly, unreadable characters can be eliminated. However, in a Web page where text items of various font sizes are mixed
together consciously to represent highlighted information and non-highlighted information, the correlation in conspicuousness between the text items collapses, which causes the problem of impairing the strong and weak information image of the entire page taken into account at the time of creating the page.

Disclosure of Invention

It is, accordingly, an object of the invention to provide an information output apparatus, an information output method, and a recording medium which enable all characters to be read sufficiently without impairing the strong and weak information image of the entire page.

According to an aspect of the invention, there is provided an information output apparatus comprising: a size setting module which presets the font sizes of text items included in display data to a specific font size; a size distribution extraction module which extracts the frequency of use for each of the font sizes of the text items included in the display data; a size decision module which determines a font size whose frequency of use is high in the frequencies of use for the individual font sizes extracted by the size distribution extraction module; a size change module which changes the font sizes of the text items included in the display data to the specific font size set by the size setting module; and a style change module
which changes to a first font style the font styles of the text items included in the display data as a font size smaller than the font size whose frequency of use is determined to be high by the size decision module before the size change in the text items changed to the specific font size by the size change module and which further changes to a second font style the font styles of the text items included in the display data as a font size larger than the font size whose frequency of use is determined to be high by the size decision module.

According to another aspect of the invention, there is provide a recording medium in which a program capable of causing a computer to realize the main functions of the information output apparatus of the invention has been recorded.

With the information output apparatus of the invention, all characters can be read sufficiently without impairing the strong and weak information image of the entire page.

Brief Description of Drawings

FIG. 1 is a block diagram showing the configuration of a client-server system according to an embodiment of an information output apparatus of the invention;

FIG. 2 is a block diagram showing the circuit configuration of a server unit 10 in the client-server
FIG. 3 is a block diagram showing the circuit configuration of a client unit 20 in the client-server system;

FIG. 4 shows the contents of a data memory secured in a RAM 24 of the client unit 20;

FIG. 5 shows an example of a Java (registered trademark) script program for extracting the font size of text displayed on a Web page;

FIG. 6 shows an example of a Java (registered trademark) script program for changing the font size of text displayed on a Web page;

FIG. 7 shows an example of a Java (registered trademark) script program for changing the font style of text displayed on a Web page, (a) being a program for changing the font style to an italic font and (b) being a program for changing the font style to a bold font;

FIG. 8 is a flowchart to explain the process of extracting the font size distribution on a Web page at the client unit 20;

FIG. 9 is a flowchart to explain a Web-page font changing process at the client unit 20;

FIG. 10 is a diagram showing font size distribution data before a change made by a Web-page font changing process at the client unit 20;

FIG. 11 is a table showing the descriptions of the
font size and font style after a change on the basis of the most-frequently-used font size (Sdominant) set in the Web-page font changing process at the client unit 20;

FIG. 12 is a diagram showing a comparison between a page display state (a) before a change and a page display state (b) after the change in the Web-page font changing process at the client unit 20;

FIG. 13 shows a page display state after the change of the font size/color style in the Web-page font changing process in another embodiment (1) of the client unit 20;

FIG. 14 shows an example of a Java (registered trademark) script program for changing the color font style of text displayed on a Web page;

FIG. 15 shows a page display state after the change of the font size/character style and color style in the Web-page font changing process in still another embodiment (2) of the client unit 20; and

FIG. 16 shows an example of a Java (registered trademark) script program for changing the line spacing of text displayed on a Web page.

Best Mode for Carrying Out the Invention

Hereinafter, referring to the accompanying drawings, embodiments of the invention will be explained.

FIG. 1 is a block diagram showing the
configuration of a client-server system according to an embodiment of an information output apparatus of the invention.

The client-server system includes a plurality of client units 20, . . . and a server unit 10 which are connected to a network N composed of the Internet, WANs, LANs, and the like.

The server unit 10 has a plurality of application programs activated by operating the server unit 10, including a Web page creation program, a registered user management program, a Web page delivery program, a mailing program, and a word-processing program. In response to access requests from the client units 20, . . . user-registered in, for example, the server unit 10, the server unit 10 delivers the requested Web pages to the individual client units 20, . . . .

The client units 20, . . . which include mobile phones, PDAs, and PCs, have a plurality of application programs activated by operating the terminal device 20, including an Internet connecting program, a Web display program, a Web printing program, a mailing program, a word-processing program, and an image processing program. For example, the client unit 20 accesses the server unit 10 at a desired Web site and acquires the Web page and displays or prints it.

FIG. 2 is a block diagram showing the circuit configuration of the server unit 10 in the
client-server system.

The server unit 10 includes a CPU 11 serving as a computer. A ROM 13, a RAM 14, a frame buffer RAM 15, and a display unit 16 are connected to the CPU 11 via a bus 12.

Further connected to the CPU 11 via the bus 12 are an input unit 17, such as a keyboard or a mouse, an external storage unit 18a, an auxiliary storage unit 18b, and a communication interface (I/F) 19 for communicating with the client units 20, . . . .

The CPU 11 controls the operation of each part of the circuit using the RAM 14 as a working memory according to a system program and various application programs prestored in a program memory 13a of the ROM 13. In response to, for example, a key input signal from the input unit 17 or a Web page acquisition request signal corresponding to the user operation from the client unit 20 received via the communication interface 19, the CPU 11 activates and executes the various programs.

FIG. 3 is a block diagram showing the circuit configuration of the client unit 20 in the client-server system.

The client unit 20 includes a CPU 21 serving as a computer. A ROM 23, a RAM 24, and a frame buffer RAM 25 are connected to the CPU 21 via a bus 22. The drawing data written to the frame buffer 25 is output
to a display unit 26, which displays the data.

Further connected to the CPU 21 via the bus 22 are an input unit 27, such as a keyboard or a mouse, an external storage unit 28a, an auxiliary storage unit 28b, and a communication interface (I/F) 29 for communicating with the server unit 10.

The CPU 21 controls the operation of each part of the circuit using the RAM 24 as a working memory according to a system program and various application programs pre-stored in a program memory 23a of the ROM 23. According to an input signal from the input unit 27, the CPU 21 activates and executes the various application programs.

The ROM 23 comprises a front memory 23b. Font pattern data of various letters and characters is stored in the font memory 23b. By use of the font pattern data, texts constituting web pages automatically received from the server unit 10 and documents prepared by terminals (20) are developed in the frame buffer RAM 25, and are displayed or printed.

If the server unit 10 is a Web site on the Internet (N) and the client units 20, . . . are user terminals capable of accessing the Web site, a user terminal (20) delivers a Web page written in Hypertext Markup Language (HTML) at the Web site (10) to the access requesting user terminal (20) in response to the request for access to the Web site (10). The Web page
is expanded by its Web browser and the expanded page is displayed on the display unit 26.

When the client unit 20 related to the information output apparatus receives a Web page from the server unit 10 and displays the page on the display unit 26, the client unit 20 carries out the process of extracting the font sizes of all the text items displayed on the Web page and generating the distribution of the font sizes (see FIGS. 8 and 10).

The client unit 20 further carries out the process of not only changing the font sizes of all the text items to the optimum font size ($S_{\text{opt}}$) preset according to the screen size of the display unit 26 but also changing text items whose font size is larger than the most-frequently-used font size ($S_{\text{dominant}}$) determined from the font size distribution to text items of a bold font style and further changing text items whose font size is smaller than $S_{\text{dominant}}$ to text items of an italic font style (see FIGS. 9, 11, and 12).

This makes it possible to change text items displayed in various sizes on the Web page to those of the optimum font size ($S_{\text{opt}}$) without losing the prominent strong-and-weak image, thereby displaying a user-friendly Web page.

FIG. 4 shows the contents of a data memory secured in the RAM 24 of the client unit 20.

The RAM 24 of the client unit 20 prepares a font
In the font size distribution memory 24a, distribution data on the font sizes of all the text items displayed on the Web page acquired from the server unit 10 is stored in the form of distribution data (cnt[fs]:fs = 1 to max) obtained by counting the number of characters for each font size (pixel).

In the optimum font size setting memory 24b, the optimum font size (Sopt) preset according to the screen size of the display unit 26 or set arbitrarily by the user.

In the most-frequently-used font size memory 24c, the most-frequently-used font size (Sdominant) determined on the basis of the font size distribution stored in the font size distribution memory 24a is stored.

In the change target font size memory 24d, a font size to be changed in changing the fonts of the text items different in font size displayed on the Web page is stored.

In the client unit 20, when the Web page acquired from the server unit 10 is displayed on the display unit 26, both the process of extracting the font size distribution on the Web page (see FIGS. 8 and 10) and
the process of changing the size and style of a font
(see FIGS. 9, 11, and 12) are realized by a program
plugged into or added to the Web browser of the client
unit 20.

In the font size distribution extraction process,
a program written in, for example, Java (registered
trademark) script extracts the font sizes of all the
nodes in a document object model (DOM) tree.
Specifically, the program is as shown in FIG. 5.

FIG. 5 shows an example of a Java (registered
trademark) script program for extracting the font size
of text displayed on a Web page.

FIG. 6 shows an example of a Java (registered
trademark) script program for changing the font size of
text displayed on a Web page.

FIG. 7 shows an example of a Java (registered
trademark) script program for changing the font style of
text displayed on a Web page, (a) being a program
for changing the font style to an italicized font and
(b) being a program for changing the font style to a
bold font.

Next, a Web-page font-size optimization function
of the client unit 20 configured as described above
will be explained.

FIG. 8 is a flowchart to explain the process of
extracting the font size distribution on a Web page at
the client unit 20.
FIG. 9 is a flowchart to explain a Web-page font changing process at the client unit 20.

FIG. 10 is a diagram showing font size distribution data before a change made by a Web-page font-size changing process at the client unit 20.

FIG. 11 is a table showing the descriptions of the font size and font style after a change on the basis of the most-frequently-used font size (Sdominant) set in the Web-page font-size changing process at the client unit 20.

FIG. 12 is a diagram showing a comparison between a page display state (a) before a change and a page display state (b) after the change in the Web-page font-size changing process at the client unit 20.

First, the values of the counter variables corresponding to all the font sizes stored in the font size distribution memory 24a are cleared for initialization (cnt[fs] = 0:fs = 1 to max(px): px is a pixel) (step A1).

Next, a DOM tree of HTML data used to write the Web page is analyzed, checking each of the nodes (step A2). It is determined whether the node is a node where text data has been displayed (step A3).

If it has been determined that the checked node of the DOM tree is not a node where text data has been displayed (No in step A3), it is determined whether the next node exists (step A4).
If it has been determined that the next node exists (Yes in step A4), it is determined again whether the next node is a node where text data has been displayed (steps A2 and A3).

If it has been determined that the checked node of the DOM tree is a node where text data has been displayed (Yes in step A3), not only is the font size \( fs \) of the text data acquired (step A5) but also the number of characters \( t_1 \) in the text data is acquired (step A6) from the description of the node according to, for example, the program of FIG. 5.

Then, the value of the counter variable \( cnt[fs] \) corresponding to the acquired font size \( fs \) is increased by the acquired number of characters \( t_1 \) (step A7).

Thereafter, the processes in steps A2 to A7 are carried out repeatedly as described above, which causes the distribution of the font sizes of all the text data displayed on the Web page to be extracted as shown in, for example, FIG. 10. The extracted font size distribution is stored in the font size distribution memory 24a.

In FIG. 10, font size \([S]\) represents the most-frequently-used font size (Sdominant) stored in the most-frequently-used font size memory 24c. In \([S-I]\), \([S-2]\), . . ., \([S-I]\) indicates a font size one pixel (px) smaller than the most-frequently-used font size (Sdominant) and \([S-2]\) indicates a font size two pixels
smaller than $S_{dominant}$. In $[S_{H-I}]$, $[S+2]$, ..., $[S+l]$ indicates a font size one pixel larger than the most-frequently-used font size ($S_{dominant}$) and $[S+2]$ indicates two pixels larger than $S_{dominant}$.

After the font size distribution data on the Web page acquired by the client unit 20 from the server unit 10 has been extracted as shown in FIG. 10 and stored in the font size distribution memory 24a, the font size changing process of FIG. 9 is activated.

In the font size changing process, first, the change target font size ($i$) is set to "1" for initialization (step B1).

Then, it is determined whether there is a node of the DOM tree where text of the change target font size ($i=1$) has been displayed (step B2). If it has been determined that there is not such a node (No in step B2), the change target font size ($i$) is incremented to "2" (step B9), and it is determined again whether there is a node of the DOM tree where text of the change target font size ($i=2$) has been displayed (step B2).

Thereafter, if it has been determined in step B2 that there is a node of the DOM tree where text of the change target font size ($i$) has been displayed (Yes in step B2), the font sizes of the text data items at all the nodes displayed in the change target font size ($i$) are changed to the optimum font size ($S_{opt}$) previously set and stored in the optimum font size setting memory.
24b according to, for example, the program of FIG. 6 (step B3).

Then, it is determined whether the change target font size \( (i) \) is equal to the most-frequently-used font size (Sdominant) stored in the most-frequently-used font size memory 24c (step B4). If it has been determined that the change target font size \( (i) \) is not equal to Sdominant (No in step B4), it is further determined whether the change target font size \( (i) \) is smaller or larger than the most-frequently-used font size (Sdominant) (step B5).

If it has been determined that the change target font size \( (i) \) is smaller than the most-frequently-used font size (Sdominant) (Yes in step B5), the font styles of the text data items at all the nodes displayed in the change target font size \( (i) \) are changed to an italic font style less conspicuous than a normal font style according to, for example, the program shown by (a) in FIG. 7 (step Bβ).

If it has been determined that the change target font size \( (i) \) is larger than the most-frequently-used font size (Sdominant) (No in step B5), the font styles of the text data items at all the nodes displayed in the change target font size \( (i) \) are changed to a bold font style more conspicuous than the normal font style according to, for example, the program shown by (b) in FIG. 7 (step B7).
If in step B4, it has been determined that the change target font size \((i)\) is equal to the most-frequently-used font size \((S_{\text{dominant}})\) (Yes in step B4), it is determined whether the change target font size \((i)\) has reached the maximum font size stored in the font size distribution memory 24a on the Web page without carrying out the font style changing process in steps B5 to B7 (step B8).

Here, if it has been determined whether the change target font size \((i)\) has not reached the maximum font size yet (No in step B8), the change target font size \((i)\) is further incremented (step B9) and processing is performed again from step B2.

In this way, the processes in steps B2 to B9 are repeated, causing the font sizes of all the text data items displayed on the acquired Web page to be changed to the eye-friendly optimum font size \((S_{\text{opt}})\) previously set and stored. At the same time, text data whose font size is equal to the most-frequently-used font size \((S_{\text{dominant}})\) is caused to remain in the standard font size, text data whose font size is smaller than the most-frequently-used font size \((S_{\text{dominant}})\) is changed to an italic font style less conspicuous than the standard font style, and text data whose font size is larger than the most-frequently-used font size \((S_{\text{dominant}})\) is changed to a bold font style more conspicuous than the standard font style.
Accordingly, on a Web page display screen obtained by subjecting a Web page display screen whose font size has not been changed on the small display unit 26 of the client unit 20 as shown by (a) of FIG. 12 to the font changing process as shown by (b) of FIG. 12, text whose font size is too large is changed to the optimum font size (S_{opt}), which makes it possible to increase the information mount of the entire page remarkably without impairing the eye-friendly state. Moreover, text whose font size is too small is also changed to the optimum font size (S_{opt}), which makes it possible to eliminate unreadable information. In addition, since text whose original font size is large is changed to a bold font style and text whose font size is small is changed to an italic font style, it is possible to maintain the correlation in conspicuousness between the text items on the entire page taken into account at the time of creating the page.

Thereafter, in step B8, if the change target font size (i) has reached the maximum font size stored in the font size distribution memory 24a on the Web page (Yes in step B8), it is determined that the process of changing the font sizes and font styles of all the text data items existing on the Web page has been completed and the series of font changing processes is terminated (End).

Accordingly, with the font optimization changing
function of the client unit 20 configured as described
above, after the most-frequently-used font size
(Sdominant) has been determined on the Web page
acquired from the server unit 20, the font sizes of all
the text items are changed to a preset optimum font
size (Sopt). At the same time, text whose original
font size is smaller than the most-frequently-used font
size (Sdominant) is changed to an inconspicuous italic
font pattern and text whose original font size is
larger than Sdominant is changed to a conspicuous bold
font pattern.

Therefore, all of the characters can be read
sufficiently without impairing the strong and weak
information image of the entire page.

In the embodiment, not only is the font sizes of
the text items on the entire Web page changed to the
optimum font size (Sopt), but also text whose font size
is larger than the most-frequently-used font size
(Sdominant) is changed to a conspicuous bold font style
and text whose font size is smaller than Sdominant is
changed to an inconspicuous italic font style to
maintain the conspicuousness balance between the text
items before the change. In contrast, as shown in one
other embodiment (1) of the invention in FIG. 13, text
whose font size is larger than the most-frequently-used
font size (Sdominant) may be changed to a conspicuous
red font style and text whose font size is smaller than
Sdominant may be changed to an inconspicuous blue font style.

Like the above embodiment, this embodiment makes it possible not only to change the font sizes of the text items on the entire page to an easy-to-read font size but also to maintain the correlation in conspicuousness between the text items on the entire page taken into account at the time of creating the page.

FIG. 13 shows a page display state after the change of the font size/color style in the Web-page font-size changing process according to the one other embodiment (1) of the client unit 20.

FIG. 14 shows an example of a Java (a registered trademark) script program for changing the color font style of text displayed on a Web page.

Furthermore, as shown in still one other embodiment (2) of the invention in FIG. 15, the above embodiment may be combined with the font optimization changing function in the one other embodiment (1).

FIG. 15 shows a page display state after the change of the font size/character style and color style in the Web-page font-size changing process according to the still one other embodiment (2) of the client unit 20.

FIG. 16 shows an example of a Java (registered trademark) script program for changing the line spacing
of text displayed on a Web page.

In the still one other embodiment (2), not only are the font sizes of the text items on the entire Web page changed to the optimum font size (Sopt), but also text whose font size is larger than the most-frequently-used font size (Sdominant) is changed to a conspicuous bold, red font style and text whose font size is smaller than Sdominant is changed to an inconspicuous italic, blue font style. In addition, the line spacing where the font size of the original text is changed is made wider than the normal one.

As in each of the above embodiments, in this embodiment, it is possible not only to change the font sizes of the text items on the entire page to an easy-to-read font size but also to maintain more effectively the correlation in conspicuousness between the text items on the entire page taken into account at the time of creating the page.

In the font optimization changing function of each of the above embodiments, pixel values (px) have been used as font sizes. Even when a display font size is determined and controlled by specifying a percentage (％) of the font size with a default font size as a reference, the same font size optimization changing function may, of course, be applied.

While in each of the embodiments, the optimum font size (Sopt) has been set previously according to the
display screen size of the display unit 26 or set arbitrarily by the user, table data for setting the optimum font size \((S_{opt})\) according to the display screen size may be stored in advance together with a font size changing program and the optimum font size \((S_{opt})\) may be selected automatically according to the display screen size.

As for the most-frequently-used font size \((S_{dominant})\) set on the basis of the Web-page font size distribution data in each of the embodiments, a font size whose frequency of use is relatively high \((S_{dominant})\) may be used in place of the most-frequently-used font size in the font size distribution.

In each of the embodiments, various application programs have been installed in the client unit 20 configured to function as the information output apparatus and the client unit 20 has been used as a PC, a PDA, or a mobile phone which can operate independently. In contrast, when a Web page received from the server unit as in each of the embodiments is changed and displayed using easy-to-read fonts in a balanced manner in a client unit of a server-based computing (SBC) system typified by a thin client system, the font size distribution extraction program shown in FIG. 8 and the font changing programs shown in FIG. 9 are installed in the server unit. Then, the
server unit carries out the Web-page font size changing process on the basis of the display screen size of the client unit and the font style changing process on the basis of the most-frequently-used font size ($S_{dominant}$) in response to a Web page request access from the client unit and delivers the resulting Web page to the client unit.

While in each of the embodiments, the font optimization changing function has been applied to a case where the client unit displays a Web page, it may be applied without any modification to a case where a printer unit prints out data. In the printer unit, the optimum font size ($S_{opt}$) may be set according to the print size. In addition, the character style and color font style may be changed with the most-frequently-used font size ($S_{dominant}$) as a reference.

The font optimization changing function explained in each of the embodiments may be applied not only to Web pages but also to pages for display or printing where text items of a plurality of font sizes are mixed, which produces the same operational advantages.

The processes at the information processing apparatus of each of the embodiments, including the font size distribution extraction process shown in the flowchart of FIG. 8 and the font changing process shown in the flowchart of FIG. 9, can be stored in a medium.
of an external storage unit 28a (18a), such as a memory card (e.g., a ROM card or a RAM card), a magnetic disk (e.g., a floppy disk or a hard disk), an optical disk (e.g., a CD-ROM or a DVD), or a semiconductor memory, in the form of programs the computer can execute.

Accordingly, the processes at the information processing apparatus of each of the embodiments, including the font size distribution extraction process shown in the flowchart of FIG. 8 and the font changing process shown in the flowchart of FIG. 9 are implemented as a sequence of computer implemented modules. Then, the program-stored media can be delivered. The computer (CPU 21 [H]) of the information output apparatus reads the program stored in the medium of the external storage unit 28a (18a) into a storage unit (e.g., a flash ROM 23 [13] or a RAM 24 [14]). The computer is controlled by the read program, thereby realizing the font optimization changing function explained in each of the embodiments, which enables the same processes to be carried out by the aforementioned methods.

Furthermore, the data of the programs which realize the above methods can be transferred in the form of program code through a communication network (N). The program data can be loaded from a computer unit (or a program server) connected to the communication network (N) into a storage unit (e.g., a
flash ROM 23 \[13\] or a RAM 24 \[14\]), thereby realizing the font optimization changing function.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.
1. An information output apparatus comprising:
   a size setting module which presets the font sizes of text items included in display data to a specific font size;
   a size distribution extraction module which extracts the frequency of use for each of the font sizes of the text items included in the display data;
   a size decision module which determines a font size whose frequency of use is high in the frequencies of use for the individual font sizes extracted by the size distribution extraction module;
   a size change module which changes the font sizes of the text items included in the display data to the specific font size set by the size setting module; and
   a style change module which changes to a first font style the font styles of the text items included in the display data as a font size smaller than the font size whose frequency of use is determined to be high by the size decision module before the size change in the text items changed to the specific font size by the size change module and which further changes to a second font style the font styles of the text items included in the display data as a font size larger than the font size whose frequency of use is determined to be high by the size decision module.

2. The information output apparatus according to
claim 1, wherein the changing to the first font style
is the changing to an italic font and the changing to
the second font style is the changing to a bold font.

3. The information output apparatus according to
claim 1, wherein the changing to the first font style
is the changing to a blue font and the changing to the
second font style is the changing to a red font.

4. The information output apparatus according to
claim 1, wherein the changing to the first font style
is the changing to an italic, blue font and the
changing to the second font style is the changing to a
bold, red font.

5. A recording medium in which the process of
outputting display data has been recorded in the form
of a program and from which a computer of an
information output apparatus is capable of reading
instructions, the program including:

- a process of extracting the frequency of use for
each of the font sizes of the text items included in
the display data;

- a process of determining a font size whose
frequency of use is high in the frequencies of use for
the individual font sizes extracted;

- a process of changing the font sizes of the text
items included in the display data to a preset specific
font size; and

- a process of changing to a first font style the
font styles of the text items included in the display data as a font size smaller than the font size whose frequency of use is determined to be high before the size change in the text items changed to the specific font size and further changing to a second font style

6. An information output method of controlling a computer of an information output apparatus which outputs display data, the information output method comprising:

a process of extracting the frequency of use for each of the font sizes of the text items included in the display data;

a process of determining a font size whose frequency of use is high in the frequencies of use for the individual font sizes extracted;

a process of changing the font sizes of the text items included in the display data to a preset specific font size; and

a process of changing to a first font style the font styles of the text items included in the display data as a font size smaller than the font size whose frequency of use is determined to be high before the size change in the text items changed to the specific font size and further changing to a second font style
the font styles of the text items included in the display data as a font size larger than the font size whose frequency of use is determined to be high.
AMENDED CLAIMS

received by the International Bureau on 21 December 2009 (21.12.09)

X- (Amended) An information output apparatus comprising:

a size distribution extraction module which extracts the frequency of use for each of font sizes of text items included in the display data;

a size decision module which determines a font size whose frequency of use is high in the frequencies of use for the individual font sizes extracted by the size distribution extraction module;

a size change module which changes the font sizes of the text items included in the display data to the specific font size;

a first style change module which changes fonts of the text items judged as having a font size smaller than the font size whose frequency of use is high by the size decision module to a first font style before the size change occurs in the text items, in which the fonts have been changed to the specific font size by the size change module; and

a second style change module which changes the fonts of the text items judged as having a font size larger than the font size whose frequency of use is high by the size decision module to a second font style, which is different from the first font style, before the size change occurs in the text items, in which the fonts have been changed to the specific font style.
size by the size change module.

2. (Amended) The information output apparatus according to claim 1, wherein the changing to the first and second font styles by the first and second style change modules is the changing to an italic font and a bold font, the first font style being different from the second font style.

3. (Amended) The information output apparatus according to claim 1, wherein the changing to the first and second font styles by the first and second style change modules is the changing to a blue font and a red font, a color of a first font being different from a color of a second font.

4. (Amended) The information output apparatus according to claim 1, wherein the changing to the first and second font styles by the first and second style change modules is the changing in a typeface of the font and the changing to a color font, a first font being different from a second font in the typeface and color,

5. (Amended) A recording medium in which the process of outputting display data has been recorded in the form of a program and from which a computer of an information output apparatus is capable of reading instructions, the program including;

   a process of extracting the frequency of use for each of font sizes of text items included in the
display data;
    a process of determining a font size whose frequency of use is high in the frequencies of use for the individual font sizes extracted;
    a process of changing the font sizes of the text items included in the display data to a specific font size;
    a process of changing fonts of the text items, which are judged as having a font size smaller than the font size whose frequency of use is high, to a first font style before the size change occurs in the text items, in which the fonts have been changed to the specific font size; and
    a process of changing the fonts of the text items, which are judged as having a font size larger than the font size whose frequency of use is high, to a second font style different from the first font style, before the size change occurs in the text items, in which the fonts have been changed to the specific font size.

6. (Amended) An information output method of controlling a computer of an information output apparatus which outputs display data, the information output method comprising:
    a process of extracting the frequency of use for each of font sizes of text items included in the display data;
    a process of determining a font size whose
frequency of use is high in the frequencies of use for 
the individual font sizes extracted; 
a process of changing the font sizes of the text 
items included in the display data to a specific font 
size; 
a process of changing fonts of the text items, 
which are judged as having a font size smaller than the 
font size whose frequency of use is high, to a first 
font style before the size change occurs in the text 
items, in which the fonts have been changed to the 
specific font size; and 
a process of changing the fonts of the text items, 
which are judged as having a font size larger than the 
font size whose frequency of use is high, to a second 
font style before the size change occurs in the text 
items, in which the fonts have been changed to the 
specific font size.

AMENDED SHEET (ARTICLE 19)
FIG. 1

SERVER UNIT

COMMUNICATION NETWORK

CLIENT UNIT
FIG. 3

CPU (21) connected to:
- ROM (23)
  - PROGRAM MEMORY (23a)
  - FONT MEMORY (23b)
- RAM (24)
- FRAME BUFFER RAM (25)
- EXTERNAL STORAGE UNIT (28a)
- AUXILIARY STORAGE UNIT (28b)

Input Unit (27)
Display Unit (26)
Communication Interface (29)

FIG. 4

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>24a</td>
<td>FONT SIZE DISTRIBUTION (cnt [fs]: fs = 1 TO max)</td>
</tr>
<tr>
<td>24b</td>
<td>OPTIMUM FONT SIZE SETTING (Sopt)</td>
</tr>
<tr>
<td>24c</td>
<td>MOST-FREQUENCY-USED FONT SIZE (Sdominant)</td>
</tr>
<tr>
<td>24d</td>
<td>CHANGE TARGET FONT SIZE (t)</td>
</tr>
</tbody>
</table>

FIG. 5

```javascript
var fontSize = node.ownerDocument.defaultView.getComputedStyle(node, "").getPropertyValue("font-size");
```

FIG. 6

```javascript
node.style.fontSize = 16px;
```
FIG. 7

(a) node.style.fontStyle = "italic";

(b) node.style.fontWeight = "bold";

FIG. 8

FONT SIZE DISTRIBUTION EXTRACTION

A1

CLEAR ALL COUNTER VARIABLES

cnt[fs] = 0

fs IS AN INTEGER IN RANGE 1 TO fmax

A2

CHECK NODES

A3

TEXT DATA?

A4

YES

NEXT NODE EXISTS?

NO

END

A5

ACQUIRE FONT SIZE fs

A6

ACQUIRE NUMBER OF CHARACTERS tl

A7

INCREASE VALUE OF COUNTER
cnt[fs] FOR EACH FONT SIZE BY tl
FIG. 9

FONT CHANGE
B1

SET VARIABLE i TO 1

B2

NO
NODE WITH FONT SIZE = i EXISTS?

YES

B3

SET FONT SIZES OF ALL NODES WITH FONT SIZE = i TO Sopt

B4

i = Sdominat?

YES

B5

i < Sdominat?

NO

NO

B6

SET FONT STYLES OF ALL NODES WITH FONT SIZE = i TO AN ITALIC FONT STYLE

SET FONT STYLES OF ALL NODES WITH FONT SIZE = i TO A BOLD FONT STYLE

B7

IS i MAXIMUM FONT SIZE ON THIS PAGE?

YES

NO

B8

INCREMENT VARIABLE i

B9

END
FIG. 10

[Graph showing the number of characters at different sizes]

Sdominant

FIG. 11

<table>
<thead>
<tr>
<th>FONT SIZE BEFORE CONVERSION</th>
<th>FONT SIZE AFTER CONVERSION</th>
<th>FONT STYLE AFTER CONVERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMALLER THAN Sdominant</td>
<td>Sopt</td>
<td>ITALIC FACE</td>
</tr>
<tr>
<td>EQUAL TO Sdominant</td>
<td>Sopt</td>
<td>STANDARD FACE</td>
</tr>
<tr>
<td>LARGER THAN Sdominant</td>
<td>Sopt</td>
<td>BOLD FACE</td>
</tr>
</tbody>
</table>
FIG. 12

(a) BEFORE FONT CHANGE

(b) AFTER FONT CHANGE

FIG. 13

FIG. 14

node.style.color = "red" ;
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F 17/30

According to International Patent Classification (IPC) or to both national classification and IPC.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F G09G H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 2008/068385 A1 (KIM YOUNG-HO [KR])</td>
<td>1, 5, 6</td>
</tr>
<tr>
<td></td>
<td>20 March 2008 (2008-03-20) figures 1-3, 5AB, 5B paragraphs [0015], [0016], [0031], [0032]</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>WO 2005/008436 A (YAHOO INC [US]; KOECHLEY NATHANIEL E [US]; IMLER SEAN MICHAEL [US]; SW) 27 January 2005 (2005-01-27) figures 3-8 page 3, paragraph 3 page 8, paragraphs 3-4 page 9, paragraph 1-3 claims 1-4</td>
<td>1, 5, 6</td>
</tr>
</tbody>
</table>

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"A" document member of the same patent family

Date of the actual completion of the international search

14 October 2009

Date of mailing of the international search report

29/10/2009

Name and mailing address of the ISA/

European Patent Office, P B 5818 Patentlaan 2
NL- 2280 HV Rijswijk
Tel (+31-70) 340-2040, Fax (+31-70) 340-3016

Authorized officer

Maclu, Emanoil
### DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>WO 2006/090281 A (NOKIA CORP [FI]; KOIVISTO ANTTI J [US]; POPESCU ANDREI RADU [FI]; GRAS) 31 August 2006 (2006-08-31) figures 1-7 page 3, line 35 - page 4, line 7 page 5, lines 30-33 page 17, lines 27-31 page 17, line 39 - page 18, line 4</td>
<td>2-4</td>
</tr>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2007529051 T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR 20060054295 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 2005086599 A1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2006108804 A</td>
</tr>
<tr>
<td>WO 2006090281 A</td>
<td>31-08-2006</td>
<td>CN 101128826 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR 20070099670 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 2006195784 A1</td>
</tr>
</tbody>
</table>