METHOD AND ELECTRONIC DATABASE SEARCH ENGINE FOR EXPOSING THE CONTENT OF AN ELECTRONIC DATABASE

The invention relates to an electronic database search engine comprising an electronic memory device suitable for storing and releasing elements from the database, a display unit, a user interface for selecting and displaying at least one element from the database on the display unit, and control means for controlling the user interface, which user interface allocates icons to the elements of the database, which icons are suitable for display on the display unit at mutual distances that depend on the elements' degree of dissimilarity, wherein the user interface at initial utilization displays at least some icons on the display unit. With the control means any arbitrary position can be selected on the display unit and, depending on the control means, the user interface displays or removes an icon that relates to an element of the database and of which the degree of dissimilarity, in respect of the elements whose corresponding icons are displayed elsewhere on the display unit, corresponds with the distance taken up by the selected position in relation to the icons displayed elsewhere on the display unit.
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METHOD AND ELECTRONIC DATABASE SEARCH ENGINE FOR EXPOSING THE CONTENT OF AN ELECTRONIC DATABASE

The invention relates to a method and an electronic database search engine for disclosing an electronic database comprising an electronic memory device suitable for storing and releasing elements from the database, a display unit, a user interface for selecting and displaying at least one element from the database on the display unit, and control means for controlling the user interface, which user interface allocates icons to the elements of the database, which icons are suitable for display on the display unit at mutual distances that depend on the elements' degree of dissimilarity, wherein the user interface at initial utilization displays at least some icons on the display unit.

Such a method and device are disclosed in the article "Interactive Layout Mechanisms for Image Database Retrieval" by John MacCuish et al. dated 29 January 1996, published in SPIE, vol. 2656, pp. 104-115. This article discloses an electronic database search engine, which uses a display unit showing objects from a database by means of icons or images in a two-dimensional plane. The mutual distance of the icons on the display area is a measure for the objects' dissimilarity. The electronic database search engine according to the article makes it possible by clicking on an image, to have the neighbouring images displayed on the display unit.

The disadvantage of the known device and method is that the spatial positioning of the elements is determined beforehand. All elements then have a fixed mutual positioning and orientation. This asks for compromises with respect to the visual presentation of the elements and their respective distances in relation to each other. Another disadvantage is that searching in the database is a rather slow process, which is partly due to
the long computing time required by the known system, but
more specifically to the rigid structures in which the
elements are contained. This is especially true when the
database requires a search strategy based on criteria that
are subjective or that cannot readily, or not at all be
objectified.

This is important since nowadays more and more
collections and catalogues are indexed electronically.
Examples of this are not only libraries and museum
collections, but also catalogues of wines, films, music,
paint colours, holiday destinations, and other products
that are often assessed subjectively. State of the art
search systems can help the user to (re)locate an exactly
described element. However, it remains difficult for users
to find the correct element in a collection of subjective
criteria.

The state of the art solves the problem searching
on a subjective criterion) by having the user select
search terms from lists (menu selection, or indicating
linguistic search profiles. This works well if the user
searches an already known element, and he or she is
familiar with the name or the desired attributes. In many
situations, such as when searching new elements based on
"taste" or intuition, the effectiveness of these search
profiles is inadequate. Often laborious verbal dialogues
in specialist jargon have to take place in order to try
and obtain examples from the collection on the display.
The dialogue requires that the user have knowledge of the
definitions for the attributes stored with the elements
(for example in the case of music: the genre, price, and
performers).

It is the object of the invention to improve
this. To this end the electronic database device and
method according to the invention are characterized in
that with the control means any arbitrary position can be
selected on the display unit and in that, depending on the
control means, the user interface displays or removes an
icon that relates to an element of the database and of
which the degree of dissimilarity, in respect of the elements whose corresponding icons are displayed elsewhere on the display unit, corresponds with the distance taken up by the selected position in relation to the icons displayed elsewhere on the display unit.

In this way it becomes possible to search in a database on the basis of criteria that are subjective or that cannot readily, or not at all, be objectified.

According to the invention an interactive manner of searching in the automated databank is provided, in which the user spatially indicates the relationship between his searched-for element and the selected examples from the collection. The dialogue may be graphical with a two- or three-dimensional display, in which a selection of elements is shown. The mutual distance between the elements displayed by means of icons demonstrates the similarity between the elements according to a criterion, which preferably is selected by the user. The user may search by asking for further information from selected icons, by removing icons, or by calling up a new element at positions between the icons. When searching in this manner, it is not necessary to know the attributed name. It is, however, possible to extend the method, in order to also support linguistic interaction.

An important advantage of the invention is that it allows rapid and direct search in a database comprising very different elements, without the necessity of going to the desired sub-collection via related characteristics or attributes of a preceding sub-collection.

After the addition or removal of icons, it is desirable according to the invention, for the user interface to adjust the mutual positioning of the icons on the display unit in concurrence with the mutual dissimilarity of the elements from the database such as to concur with the displayed icons, in order to optimize the display area usable on the display unit. Visually, such adjustments may take place both instantaneously and gradually. It should be noted, that the positioning of the
displayed elements on the display unit is always scaled such that the possibility of reaching elements of greater dissimilarity remains open by calling up such an element at the periphery of the display unit.

Under certain search conditions it may be convenient that the user interface provides means for placing a selected icon permanently in the centre of the display unit, while the remaining displayed icons are subsequently grouped around it.

In the method and device according to the invention, use may be made of a conventional graphical display unit, where the user, by means of a mouse, pen or by application of a touch screen, is able to "touch" positions on a display. At the beginning of the search, the display shows a small number of examples from the database. The elements shown on the display exhibit simulated, "self-organizing" behaviour: they endeavour to position at mutual distances that correspond to the degree of dissimilarity of the attributes stored per element.

When the user "clicks" on a position on the display, the user interface determines the distances between the click position and the positions of the elements already displayed. It then searches in the database for an element that exhibits the same degree of dissimilarity regarding said elements. That element then appears at the clicked-on position on the display. By clicking on the display closely to a particular element, the user searches a new element that closely resembles that particular element. By clicking on a far-removed portion, the user obtains a very dissimilar new element. When a new element has appeared, the user interface ensures that the elements adjust their mutual positions, thereby changing the visual configuration. The user can also remove elements by "dragging" them off the display. This creates more space on the display so that it is possible, as it were, to zoom in. It is also possible to call up further information for each displayed element, for example, by clicking on twice or by dragging it to a specific position on the
display. This dialogue allows the user to navigate through the database in order to arrive at those elements, which best answer his search.

The invention optimally takes into account the capacity that users have of intuitively assessing the vague relationships between elements from the database, instead of using the less developed capacity of comparison to compare abstractly described ideas relating to said elements.

It may be desirable to add to the elements of the database characteristics that are involved when determining the elements' degree of dissimilarity, and to make the assessment of the dissimilarities between the various characteristics of the elements adjustable. This would provide the user with a simple manner to adjust the search to his requirements.

The electronic database search engine according to the invention can be applied in various ways. It would be conceivable to apply the device as taste searcher for consumers trying to make a selection from wines, holiday destinations, recipes, herbs, paint colours, music, films, and the like, so that the device with such a goal may find application in shops. The device according to the invention may also be used as remotely positioned databank, presented on the information supply market by publishers or other service providers.

The invention will now be elucidated with reference to a drawing, which in the Figs. 1 to 5 shows a non-limitative example of the application of the electronic database search engine according to the invention.

The Figs. 1 to 5 schematically show a display such as will be observed by the user of a database search engine. The display unit 1 co-operates with an electronic memory device, suitable for storing and releasing elements from the database. To this end the display unit 1 is coupled to a user interface serving as intermediary between the display unit and the database, and serving for
the selection and display of elements from the database on
the display unit 1.

To this end the user interface allocates icons to
elements from the database such as shown, for example, in
Fig. 1, in the form of a chair 2, a vacuum cleaner 3, and
a coffee maker 4. In the case illustrated, the database is
formed by elements that are found in a domestic situation.
Starting with the elements as shown in Fig. 1, a user can
now touch any arbitrary location 5 on the display unit as
shown in Fig 2. At this location 5, an element from the
database will then be shown by means of an icon relating
to said element, whose degree of dissimilarity in relation
to the elements 2, 3 and 4 already displayed on the
display unit 1, corresponds with the distance assumed by
the various elements and the touched area 5 on the display
unit.

Fig. 3 shows a similar action, where in the left
top corner of the display unit 1 an arbitrary area 6 is
touched.

Fig. 4 shows that the icon 3, relating to the
vacuum cleaner, is removed from the display after which,
as is clearly shown in Fig. 4, the elements 2, 4, 5 and 6
remaining on the display unit 1, regroup with respect to
their mutual positioning.

Fig. 5 indicates that the criterion, by which the
degree of dissimilarity of the displayed elements is
assessed, can be influenced. For example, in the case
shown this involves a style aspect. By allowing this
style aspect, which is controllable with a slide control
7, to carry more weight, style-related elements can be
clustered on the display unit 1. This relates to the
vacuum cleaner 3, the coffee maker 4, the chair 5, and
the vacuum cleaner 8, shown in Fig. 5. The chairs 2 and 6
show obvious style differences, and are displayed at a
greater distance from chain 5.
CLAIMS

1. An electronic database search engine comprising an electronic memory device suitable for storing and releasing elements from the database, a display unit, a user interface for selecting and displaying at least one element from the database on the display unit, and control means for controlling the user interface, which user interface allocates icons to the elements of the database, which icons are suitable for display on the display unit at mutual distances that depend on the elements' degree of dissimilarity, wherein the user interface at initial utilization displays at least some icons on the display unit, characterized in that with the control means any arbitrary position can be selected on the display unit and in that, depending on the control means, the user interface displays or removes an icon that relates to an element of the database and of which the degree of dissimilarity, in respect of the elements whose corresponding icons are displayed elsewhere on the display unit, corresponds with the distance taken up by the selected position in relation to the icons displayed elsewhere on the display unit.

2. An electronic database search engine according to claim 1, characterized in that the user interface adjusts the mutual positioning of the icons on the display unit in concurrence with the mutual dissimilarity of the elements from the database such as to concur with the displayed icons, in order to optimize the display area usable on the display unit.

3. An electronic database search engine according to claim 1 or 2, characterized in that the user interface provides means for placing a selected icon permanently in the centre of the display unit, while the remaining misplayed icons

4. An electronic database search engine according to one of the claims 1-3, characterized in that to the
elements of the database characteristics are added that are involved in determining the elements' degree of dissimilarity, and that the assessment of the dissimilarities between the various characteristics of the elements is adjustable.

5. A method for disclosing an electronic database using an electronic database search engine, comprising an electronic memory device, a display unit and a user interface for selecting and displaying at least one element from the database on the display unit, and further control means for controlling the user interface, which user interface allocates icons to the elements of the database, and at initial utilization displays at least some icons on the display unit at mutual distances that depend on the degree of dissimilarity of the elements of the database that are represented by said icons, characterized in that with the control means any arbitrary position can be selected on the display unit and in that, depending on the control means, the user interface displays or removes an icon that relates to an element of the database and of which the degree of dissimilarity, in respect of the elements whose corresponding icons are displayed elsewhere on the display unit, corresponds with the distance taken up by the selected position in relation to the icons displayed elsewhere on the display unit.

6. A method according to claim 5, characterized in that the user interface adjusts the mutual positioning of the icons on the display unit in concurrence with the mutual dissimilarity of the elements from the database such as to concur with the displayed icons, in order to optimize the display area usable on the display unit.

7. A method according to claim 5 or 6, characterized in that the user interface provides means for placing a selected icon permanently in the centre of the display unit, while the remaining displayed icons are subsequently grouped around it.

8. A method according to one of the claims 5-7, characterized in that to the elements of the database
characteristics are added that are involved when determining the elements' degree of dissimilarity, and that the assessment of the dissimilarities between the various characteristics of the elements is adjustable.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   IPC 7 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)
   IPC 7 G06F

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>VISUAL DATA EXPLORATION AND ANALYSIS III, SAN JOSE, CA, USA, 31 JAN.-2 FEB. 1996,</td>
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| X          | Patent family members are listed in annex.                                      |

* Special categories of cited documents:

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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
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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
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Date of the actual completion of the international search: 18 February 2000
Date of mailing of the international search report: 25/02/2000

Name and mailing address of the ISA
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Fournier, C
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<td>OLSEN K A ET AL: &quot;VISUALIZATION OF A DOCUMENT COLLECTION: THE VIBE SYSTEM&quot; INFORMATION PROCESSING &amp; MANAGEMENT (INCORPORATING INFORMATION TECHNOLOGY), vol. 29, no. 1, 1 January 1993 (1993-01-01), pages 69-81, XP000574984 ISSN: 0306-4573 page 73, line 6 - page 77, paragraph 6; figures</td>
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