DESCRIPTION

Title of Invention: DESIGN ASSISTANCE DEVICE

Technical Field

[0001] The technique described herein relates to a design assistance device that assists the designing of water treatment plants or power generation plants.

Background Art

[0002] In the designing of a water treatment plant, a power generation plant, or the like, drawings, documents, or programs used in similar projects implemented in the past are usually referenced and used as the starting point of the designing. The drawings, documents, programs, and the like that are associated with the designing work are hereinafter collectively referred to as "documentation".

[0003] For example, Patent Document 1 discloses a device that searches for documentation related to similar projects as mentioned above and uses the documentation as the starting point of the designing of, for example, a water treatment plant or a power generation plant.

[0004] A similar design case search device described in Patent Document 1 includes a requirement specification input means, a similar case search means, a design case base storage means, and a search result output means. In the similar case search device, with reference to a requirement specification input from the requirement specification input means, the similar case search means searches for a design case similar to the requirement specification. Then, design cases are extracted from the design case base storage means and are output as results by the search result output means.

Prior Art Document

Patent Document

[0005] Japanese Patent Application Laid-Open No. 08-221437 (1996)

Summary

Problem to be Solved by the Invention

[0006] The similar design case search device disclosed in Patent Document 1 mentioned above searches for design cases similar to the requirement specification that has been input, and then, extracts and outputs the design cases. This enables the designers to conduct design work using, as a starting point, the similar design cases that have been output. The design work can be conducted more smoothly in this manner than in newly designing a water treatment plant or a power generation plant.

[0007] However, the device described in Patent Document 1 has failed to ensure sufficient assistance in embodying the requirement specification based on the output design cases.

[0008] The technique described herein has been made to solve the above-mentioned problem, and relates to a design assistance device that appropriately assists the design work for a design target.

Means to Solve the Problem

[0009] A design assistance device according to one aspect of the technique mentioned herein includes: a plant specification storage unit to store, as past specifications, a plurality of specifications relevant to a design target; a plant documentation storage unit to store, as past documentation, documentation relevant to the design target and corresponding to the past specifications; a similar specification retrieval unit to retrieve, from the past specifications stored in the plant specification storage unit, a similar specification similar to an input specification being a newly input specification of the design target; a first difference calculation unit to calculate a difference between the input

specification and the similar specification and to determine a calculation result as a first difference; a second difference calculation unit to calculate a difference between the similar specification and each of the past specifications stored in the plant specification storage unit and to determine calculation results as second differences; a degree-of-association calculation unit to calculate a degree of association between the first difference and each of the second differences; an associated specification extraction unit to extract, as an associated specification, one of the past specifications corresponding to one of the second differences that is most closely associated with the first difference; a similar documentation extraction unit to extract, as similar documentation, the past documentation corresponding to one of the past specifications that is the similar specification, from the plant documentation storage unit; an associated documentation extraction unit to extract, as associated documentation, the past documentation that corresponds to the past specification being the associated specification, from the plant documentation storage unit; an inter-documentation difference extraction unit to calculate a difference between the similar documentation and the associated documentation and to extract a point of difference based on a calculation result; and a plant documentation display unit to display the similar documentation. The plant documentation display unit displays the point of difference on the similar documentation that is displayed.

Effects of the Invention

[0010] The design assistance device according to one aspect of the technique mentioned herein includes the plant specification storage unit, the plant documentation storage unit, the similar specification retrieval unit, the first difference calculation unit, the second difference calculation unit, the degree-of-association calculation unit, the associated specification extraction unit, the similar documentation extraction unit, the associated documentation extraction unit, the inter-documentation difference extraction

unit, and the plant documentation display unit.

[0011] The plant specification storage unit stores, as the past specifications, the plurality of specifications relevant to the design target. The plant documentation storage unit stores, as the past documentation, the documentation relevant to the design target and corresponding to the past specifications. The similar specification retrieval unit retrieves, from the past specifications stored in the plant specification storage unit, the similar specification similar to the input specification being the newly input specification of the design target. The first difference calculation unit calculates the difference between the input specification and the similar specification and determines the calculation result as the first difference. The second difference calculation unit calculates the difference between the similar specification and each of the past specifications stored in the plant specification storage unit and determines the calculation results as the second differences. The degree-of-association calculation unit calculates the degree of association between the first difference and each of the second differences. The associated specification extraction unit extracts, as the associated specification, one of the past specifications corresponding to one of the second differences that is most closely associated with the first difference. The similar documentation extraction unit extracts, as the similar documentation, the past documentation corresponding to one of the past specifications that is the similar specification, from the plant documentation storage unit. The associated documentation extraction unit extracts, as the associated documentation, the past documentation that corresponds to the past specification being the similar specification, from the plant documentation storage unit. The inter-documentation difference extraction unit calculates the difference between the similar documentation and the associated documentation and extracts the point of difference based on the calculation result. The plant documentation display unit displays the similar documentation. The

plant documentation display unit displays the point of difference on the similar documentation that is displayed.

[0012] In this configuration, the point of difference, which is the point to be changed correspondingly to the input specification, in the similar documentation can be indicated based on the accumulated specifications relevant to the design target and the differences among the pieces of documentation relevant to the design target and corresponding to the specifications concerned. Thus, the design work for the design target can be appropriately assisted.

[0013] These and other objects, features, aspects and advantages of the technique mentioned herein will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Brief Description of Drawings

[0014] [FIG. 1] A conceptual diagram showing a configuration of a design assistance device according to an embodiment.

[FIG. 2] A diagram showing a hardware configuration for the actual operation of the design assistance device according to the embodiment.

[FIG. 3] A flowchart showing an overview of an action performed by the design assistance device according to the embodiment.

[FIG. 4] A diagram showing an example in which information about past specifications stored by a plant specification storage unit is displayed on a screen according to the embodiment.

[FIG. 5] A diagram showing an example in which past documentation stored by a plant documentation storage unit is displayed on the screen according to the embodiment.

[FIG. 6] A diagram showing an example in which information about an input specification provided by a plant specification input unit is displayed on the screen according to the embodiment.

[FIG. 7] A diagram showing an example in which results obtained by calculating the difference between the input specification and a similar specification are displayed on the screen.

[FIG. 8] A diagram showing an example in which results obtained by calculating the difference between the similar specification and each of the past specifications are displayed on the screen.

[FIG. 9] A diagram showing an example in which the degree of association regarding the "difference in the municipality of interest" and the degree of association regarding the "difference in the standard high-water level" are displayed on the screen.

[FIG. 10] A diagram showing an example in which results obtained by calculating the difference between similar documentation and associated documentation are displayed on the screen.

[FIG. 11] A diagram showing an example of a screen display in the state in which a "part containing a difference" is explicitly indicated on the similar documentation on display.

[FIG. 12] A diagram showing an example in which the information about the past specifications stored by the plant specification storage unit is displayed on the screen according to another embodiment.

[FIG. 13] A diagram showing an example in which the past documentation stored by the plant documentation storage unit is displayed on the screen according to the embodiment.

[FIG. 14] A diagram showing an example in which the information about the

input specification provided by the plant specification input unit is displayed on the screen according to the embodiment.

[FIG. 15] A diagram showing an example in which results obtained by calculating the difference between the input specification and the similar specification are displayed on the screen.

[FIG. 16] A diagram showing an example in which results obtained by calculating the difference between the similar specification and each of the past specifications are displayed on the screen.

[FIG. 17] A diagram showing an example in which the degree of association regarding the "difference in the municipality of interest" and the degree of association regarding the "difference in the standard high-water level" are displayed on the screen.

[FIG. 18] A diagram showing an example in which results obtained by calculating the difference between the similar documentation and the associated documentation are displayed on the screen.

[FIG. 19] A diagram showing an example of the screen display in the state in which a "part containing a difference" is explicitly indicated on the similar documentation on display.

Description of Embodiments

[0015] Embodiments will be described below with reference to the drawings attached to the specifications. Each drawing is merely a schematic illustration, and thus, images in different drawings may not accurately represent the relation between the size and the position, which can be changed as appropriate. Similar constituent elements are denoted by the same reference signs throughout, which holds true for the names and functions thereof. Thus, some of them will not be further elaborated.

[0016] <First Embodiment>

<Configuration>

FIG. 1 is a conceptual diagram showing a configuration of a design assistance device according to the present embodiment. Although the embodiments which will be described below presuppose that a design target is a plant, these embodiments are also applicable to other object to be controlled through the use of documentation.

[0017] As shown in FIG. 1, the design assistance device includes a plant specification input unit 101, a plant specification storage unit 102, a similar specification retrieval unit 103, a plant documentation storage unit 104, a similar documentation extraction unit 105, a plant documentation display unit 106, a first difference calculation unit 107, a second difference calculation unit 108, a degree-of-association calculation unit 109, an associated specification extraction unit 110, an associated documentation extraction unit 111, and an inter-documentation difference extraction unit 112.

[0018] The plant specification input unit 101 inputs information about the specification (hereinafter also referred to as an input specification) of a plant being a design target, which is to be designed and developed. The plant specification storage unit 102 stores information about the accumulation of specifications of a plurality of plants designed in the past (hereinafter also referred to as past specifications).

[0019] The similar specification retrieval unit 103 retrieves a specification similar to the input specification (hereinafter also referred to as a similar specification) from among the past specifications that have been accumulated. The similar specification refers to the past specification that most closely resembles the details of the input specification, or, that is least different from the input specification. As long as the similar specification retrieval unit 103 can receive the input of the input specification from the outside, the design assistance device according to the present embodiment may eliminate the plant

specification input unit 101. The plant documentation storage unit 104 stores the accumulation of the documentation related to the plants designed in the past (hereinafter also referred to as past documentation).

[0020] Here, the term "similar" means having many commonalities and few dissimilarities.

[0021] The term "difference" refers to points of difference between two pieces of documentation and the like or the degree of dissimilarity.

[0022] The drawings, documents, or programs associated with the designing work are hereinafter collectively referred to as "documentation".

[0023] The similar documentation extraction unit 105 extracts the past documentation corresponding to the similar specification (hereinafter also referred to as similar documentation). The plant documentation display unit 106 displays the similar documentation and a point that needs to be changed in the documentation.

[0024] The first difference calculation unit 107 calculates the difference between the input specification and the similar specification. The second difference calculation unit 108 calculates the difference between each of the past specifications and the similar specification.

[0025] The degree-of-association calculation unit 109 calculates the degree of association among the differences. The associated specification extraction unit 110 extracts the past specification from which a strongly associated difference arises (hereinafter also referred to as an associated specification).

[0026] The associated documentation extraction unit 111 extracts documentation corresponding to the extracted associated specification (hereinafter also referred to as associated documentation). The inter-documentation difference extraction unit 112 extracts the difference between the associated documentation and the similar

documentation.

[0027] FIG. 2 shows a hardware configuration for the actual operation of the design assistance device shown in FIG. 1. In FIG. 2, a personal computer (PC) 1 is included as a hardware configuration for implementing the design assistance device in FIG. 1. The hardware configuration for implementing the design assistance device is not limited to the personal computer, and may be, for example, any ordinary calculator.

[0028] The personal computer 1 includes a central processing unit (CPU) 2 that performs a computation, a storage device 3 that can store information, an input device 4 such as a keyboard for use in inputting information, and an output device 5 such as a display that can output a signal. This configuration is applicable to another embodiment, which will be described below.

[0029] The plant specification storage unit 102 and the plant documentation storage unit 104 are implemented by the storage device 3 in the personal computer 1. The storage device 3 is, for example, memory (storage medium) including a hard disk (hard disk drive (HDD)), random access memory (RAM), read only memory (ROM), and the like.

[0030] Programs stored in the storage device 3 run on the central processing unit 2 to implement the similar specification retrieval unit 103, the similar documentation extraction unit 105, the first difference calculation unit 107, the second difference calculation unit 108, the degree-of-association calculation unit 109, the associated specification extraction unit 110, the associated documentation extraction unit 111, and the inter-documentation difference extraction unit 112. These functions may be implemented by, for example, a plurality of central processing units (CPUs) working in cooperation with one another.

[0031] The plant specification input unit 101 is implemented by the input device 4.

[0032] The plant documentation display unit 106 is implemented by the output device 5.

[0033] <Functions>

A simple plant will now be taken as an example to describe the functions of the design assistance device according to the present embodiment.

[0034] The plant taken as an example includes a pond that retains water flowing in from the outside, a measurement sensor that measures the water level of the pond, a drainage pump for discharging water retained in the pond to the outside, and an alarm. As to the action of the plant, the drainage pump assumedly starts up when the water level of the pond measured by the measurement sensor reaches or exceeds a predetermined value, and the alarm is assumedly activated when the water level of the pond measured by the measurement sensor reaches or exceeds another predetermined value.

[0035] To begin with, an overview of the action performed by the design assistance device according to the present embodiment will be described with reference to FIG. 3. FIG. 3 is a flowchart showing brief descriptions of the action performed by the design assistance device according to the present embodiment.

[0036] Firstly, the plant specification input unit 101 inputs an input specification (see Step ST1). Then, the similar specification retrieval unit 103 retrieves, from past specifications, the one that most closely resembles the input specification (see Step ST2).

[0037] Subsequently, the first difference calculation unit 107 calculates the difference between the input specification and a similar specification (see Step ST3). Then, the second difference calculation unit 108 calculates the difference between the similar specification and each of the past specifications (see Step ST4).

[0038] After that, the degree-of-association calculation unit 109 calculates the degree of association between the difference provided by the first difference calculation unit 107

and the difference provided by the second difference calculation unit 108 (see Step ST5). Then, the associated specification extraction unit 110 extracts an associated specification based on the degree of association (see Step ST6).

[0039] The term "degree of association" is indicative of the "degree of increased commonalities and reduced dissimilarities", and the state in which there are many commonalities and few dissimilarities is expressed as, for example, "being closely associated" or "having a high degree of association".

[0040] Subsequently, the similar documentation extraction unit 105 extracts similar documentation (see Step ST7). Then, the associated documentation extraction unit 111 extracts associated documentation (see Step ST8).

[0041] After that, the inter-documentation difference extraction unit 112 extracts the difference between the similar documentation and the associated documentation (see Step ST9). Then, the plant documentation display unit 106 displays the similar documentation (see Step ST10).

[0042] Then, the plant documentation display unit 106 explicitly indicates a "part containing a difference" on the similar documentation on display (see Step ST11).

[0043] FIG. 4 is a diagram showing an example in which information about the past specifications stored by the plant specification storage unit 102 is displayed on a screen according to the present embodiment. Here, the plant specification assumedly includes information about which municipality the specification is tailored to and information on a numerical value referred to as a standard high-water level. The plant specification storage unit 102 assumedly stores information about four specifications (Specification 1, Specification 2, Specification 3, Specification 4) written in Japanese. The screen to which the information about the past specifications shown in FIG. 4 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of

another display unit, which is not shown in FIG. 1.

[0044] In FIG. 4, as to the information about which municipality the specification is tailored to, Specification 1 and Specification 2 are tailored to Municipality A, and Specification 3 and Specification 4 are tailored to Municipality B. In FIG. 4, as to the information on the numerical value referred to as the standard high-water level, the standard high-water level for Specification 1 is 90, the standard high-water level for Specification 2 is 60, the standard high-water level for Specification 3 is 50, and the standard high-water level for Specification 4 is 60.

[0045] FIG. 5 is a diagram showing an example in which the past documentation stored by the plant documentation storage unit 104 is displayed on the screen according to the present embodiment. Here, the plant documentation assumedly includes information about the relationship between the water level of the pond measured by the measurement sensor (regarded as the water level in the documentation) and the actions being the activation of the alarm and the startup of the drainage pump. The plant documentation storage unit 104 assumedly stores four pieces of documentation (Documentation 1, Documentation 2, Documentation 3, and Documentation 4) written in Japanese. The screen to which the information about the past documentation shown in FIG. 5 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of anther display, which is not shown in FIG. 1.

[0046] In FIG. 5, as to the information about the relationship between the water level of the pond and the actions being the activation of the alarm and the startup of the drainage pump, Documentation 1 indicates "when the water level reaches or exceeds 80, the alarm is activated" and "when the water level reaches or exceeds 80, the drainage pump starts up", Documentation 2 indicates "when the water level reaches or exceeds 80, the alarm is activated" and "when the water level reaches or exceeds 60, the drainage

pump starts up", Documentation 3 indicates "when the water level reaches or exceeds 90, the alarm is activated" and "when the water level reaches or exceeds 50, the drainage pump starts up", and Documentation 4 indicates "when the water level reaches or exceeds 90, the alarm is activated" and "when the water level reaches or exceeds 60, the drainage pump starts up".

[0047] Specification 1, Specification 2, Specification 3, and Specification 4 that are shown in FIG. 4 assumedly correspond to Documentation 1, Documentation 2, Documentation 3, and Documentation 4 that are shown in FIG. 5, respectively. That is, in the past, Documentation 1 was created according to Specification 1, Documentation 2 was created according to Specification 2, Documentation 3 was created according to Specification 3, and Documentation 4 was created according to Specification 4.

[0048] FIG. 6 is a diagram showing an example in which the information about the input specification provided by the plant specification input unit 101 is displayed on the screen according to the present embodiment (see Step ST1 of FIG. 3). As with the past specifications shown in FIG. 4, the information about the input specification includes information about which municipality the specification is tailored to and information on the numerical value referred to as the standard high-water level. The screen to which the information about the input specification shown in FIG. 6 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0049] In FIG. 6, as to the information about which municipality the specification is tailored to, the input specification is tailored to Municipality B. In FIG. 6, as to the information on the numerical value referred to as the standard high-water level, the standard high-water level for the input specification is 40.

[0050] The similar specification retrieval unit 103 retrieves, from the past

specifications stored by the plant specification storage unit 102, the one that most closely resembles the input specification provided by the plant specification input unit 101 (see Step ST2 of FIG. 3). Here, from among the past specifications shown in FIG. 4, Specification 3 is obtained as the similar specification being the past specification that mostly closely resembles the input specification shown in FIG. 6, on the basis of the information on the past specification about which municipality the specification is tailored to and the numerical information referred to as the standard high-water level.

[0051] The similar documentation extraction unit 105 extracts, from the past documentation stored by the plant documentation storage unit 104, the documentation related to the plant whose specification corresponds to the similar specification obtained by the similar specification retrieval unit 103. Here, from among the pieces of past documentation shown in FIG. 5, Documentation 3, which is the documentation corresponding to Specification 3 shown in FIG. 4, is extracted as the similar documentation (see Step ST7 of FIG. 3).

[0052] The plant documentation display unit 106 displays the similar documentation extracted by the similar documentation extraction unit 105. Here, Documentation 3 in FIG. 5, which has been extracted as the similar documentation, is displayed.

[0053] The first difference calculation unit 107 calculates the difference between the input specification provided by the plant specification input unit 101 and the similar specification provided by the similar specification retrieval unit 103 (see Step ST3 of FIG 3). Here, the difference between the input specification in FIG. 6 and Specification 3 in FIG. 2, which is the similar specification, is calculated, whereby the results shown in FIG. 7 are obtained. The screen to which the difference between the input specification and the similar specification shown in FIG. 7 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display,

which is not shown in FIG. 1. Specifically, the information about which municipality the specification is tailored to is identical, where there are no dissimilarities. Thus, "none" is indicated as the "difference in the municipality of interest". The numerical information referred to as the standard high-water level for the input specification is "40", whereas the numerical information for Specification 3 shown in FIG. 4 is "50". Thus, "10" is indicated as the "difference in the standard high-water level".

[0054] The second difference calculation unit 108 calculates the difference between the similar specification provided by the similar specification retrieval unit 103 and each of the past specifications stored in the plant specification storage unit 102 (see Step ST4 of FIG. 3). Here, the difference between Specification 3 in FIG. 4, which is the similar specification, and each of Specification 1, Specification 2, Specification 3, and Specification 4 in FIG. 4 is calculated.

[0055] FIG. 8 is a diagram showing an example in which calculation results of the above-mentioned calculation of difference, that is, results obtained by calculating the difference between the similar specification and each of the past specifications are displayed on the screen. In FIG. 8, Difference 1 indicates the difference between Specification 3 in FIG. 4, which is the similar specification, and Specification 1, Difference 2 indicates the difference between Specification 3 in FIG. 4, which is the similar specification, and Specification 2, Difference 3 indicates the difference between Specification 3 in FIG. 4, which is the similar specification, and Specification 3, and Difference 4 indicates the difference between Specification 3 in FIG. 4, which is the similar specification, and Specification 4. The screen to which the difference between the similar specification and each of the past specifications shown in FIG. 8 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0056] In FIG. 8, as to the "difference in the municipality of interest", Difference 1 and Difference 2 indicate "difference contained", and Difference 3 and Difference 4 indicate "no difference contained". In FIG. 8, as to the "difference in the standard high-water level", Difference 1 indicates 30, Difference 2 indicates 10, Difference 3 indicates none, and Difference 4 indicates 10.

[0057] The degree-of-association calculation unit 109 calculates the degree of association between the difference provided by the first difference calculation unit 107 and the difference provided by the second difference calculation unit 108 (see Step ST5 of FIG. 3). Here, the degree of association between the difference shown in FIG. 7 and each of Difference 1, Difference 2, Difference 3, and Difference 4 in FIG. 8 is calculated.

[0058] Here, as to the degree of association regarding the "difference in the municipality of interest", calculations are performed to determine whether there is a match on the presence or absence of difference. As to the degree of association regarding the "difference in the standard high-water level", calculations are performed to determine whether there is a match on the presence or absence of difference. Consequently, the results shown in FIG. 9 are obtained. Degree of Association 1 is obtained as the degree of association between the difference shown in FIG. 7 and Difference 1 shown in FIG. 8. Degree of Association 2 is obtained as the degree of association between the difference shown in FIG. 7 and Difference 2 shown in FIG. 8. Degree of Association 3 is obtained as the degree of association between the difference shown in FIG. 7 and Difference 3 shown in FIG. 8. Degree of Association 4 is obtained as the degree of association between the difference shown in FIG. 7 and Difference 4 shown in FIG. 8. The screen to which the degree of association regarding the "difference in the municipality of interest" and the degree of association regarding the "difference in the standard high-water level" that are shown in FIG. 9 are output may be

the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0059] Degree of Association 1 indicates that there is no match on the degree of association regarding the "difference in the municipality of interest", namely, the presence or absence of difference regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level", namely, the presence or absence of difference regarding the "difference in the standard high-water level". Degree of Association 2 indicates that there is no match on the degree of association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level". Degree of Association 3 indicates that there is a match on the degree of association regarding the "difference in the municipality of interest" and that there is no match on the degree of association regarding the "difference in the standard high-water level". Degree of Association 4 indicates that there is a match on the degree of association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level".

[0060] The associated specification extraction unit 110 extracts, as the associated specification, the past specification from which the most strongly associated difference arises, from the plant specification storage unit 102 on the basis of the degree of association calculated by the degree-of-association calculation unit 109 (see Step ST6 of FIG. 3). The degree of association increases with increasing number of pieces of information from which a "match" occurs. Here, from among Degree of Association 1, Degree of Association 2, Degree of Association 3, and Degree of Association 4 shown in FIG. 9, Degree of Association 4 indicating that there is a match on the degree of

association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level" is selected as the one having the highest degree of association, and then, Specification 4 is extracted as the past specification providing Degree of Association 4, from the specifications shown in FIG. 4.

[0061] The associated documentation extraction unit 111 extracts, as the associated documentation, the past documentation corresponding to the associated specification extracted by the associated specification extraction unit 110, from the plant documentation storage unit 104 (see Step ST8 of FIG. 3). Here, Documentation 4 in FIG. 5 corresponding to Specification 4 in FIG. 4 is extracted as the associated documentation.

[0062] The inter-documentation difference extraction unit 112 extracts the difference between the similar documentation provided by the similar documentation extraction unit 105 and the associated documentation provided by the associated documentation extraction unit 111 (see Step ST9 of FIG. 3). Here, the difference between Documentation 3 in FIG. 5, which is the similar documentation, and Documentation 4 in FIG. 5, which is the associated documentation, is extracted.

[0063] FIG. 10 is a diagram showing an example in which calculation results of the above-mentioned calculation of difference, that is, results obtained by calculating the difference between the similar documentation and the associated documentation are displayed on the screen. When the difference between Documentation 3 in FIG. 5 and Documentation 4 in FIG. 5 is extracted, it is revealed that no difference is contained in the part stating "when the water level reaches or exceeds 90, the alarm is activated" and that there is a difference between the part in Documentation 3 stating "when the water level reaches or exceeds 50, the drainage pump starts up" and the part in Documentation 4

stating "when the water level reaches or exceeds 60, the drainage pump starts up". In FIG. 10, the "part containing a difference" is indicated by a circle.

[0064] Besides displaying the similar documentation extracted by the similar documentation extraction unit 105 (see Step ST10 of FIG. 3), the plant documentation display unit 106 explicitly indicates the "part containing a difference" revealed by the inter-documentation difference extraction unit 112, on the similar documentation on display (see Step ST11 of FIG. 3). Here, the "part containing a difference" shown in FIG. 10 (the part indicated by a circle in FIG. 10) is explicitly indicated on Documentation 3 on display in FIG. 5, which is the similar documentation.

[0065] FIG. 11 is a diagram showing an example of the screen display in the state in which the above-mentioned display result, namely, the "part containing a difference" is explicitly indicated on the similar documentation on display. The "part containing a difference" indicated on Documentation 3 on display is enclosed by a rectangle and explicitly indicated accordingly.

[0066] The following will describe the validity of the display result in FIG. 11. The pieces of past documentation in FIG. 5 were derived from the past specifications in FIG. 4 by the following simple rule.

[0067] According to the rule, "for Municipality A, when the water level reaches or exceeds 80, the alarm is activated", "for Municipality B, when the water level reaches or exceeds 90, the alarm is activated", and "when the water level reaches or exceeds the standard high-water level, the drainage pump starts up".

[0068] By this rule, the documentation corresponding to the specification of the plant being the design target is obtained by changing the numerical value explicitly indicated by the rectangle in FIG. 11 from "50" to "40". This reveals that the present embodiment offers an advantage of explicitly indicating the point that needs to be changed.

[0069] In actuality, designing plants involves specifications and documentation with high degrees of complexity, where rules such as the one mentioned above are uncertain in many cases. Even if the similar specification is identified on the basis of the input specification, it is often uncertain which part of the similar documentation corresponding to the similar specification needs to be changed. The present embodiment focuses on the differences among the accumulation of the plant specifications created in the past and the difference among plant documentation corresponding thereto. Thus, even if the rules are uncertain, a "part containing a difference" in the similar documentation is indicated, and thus, the point that needs to be changed correspondingly to the input specification is explicitly indicated.

[0070] The present embodiment presupposes that the changes in the specifications are reflected in changes in the documentation and thus the part of the documentation changed correspondingly to the past specification change probably needs to be changed again correspondingly to the similar specification change concerned. The functional units shown in FIG. 1 have the function of extracting the differences among the pieces of documentation.

[0071] As mentioned above, according to the present embodiment, in the case where the past specifications shown in FIG. 4 and the pieces of past documentation corresponding thereto and shown in FIG. 5 are stored in a storage device, when the plant specification shown in FIG. 6 is given, the documentation to be used as the starting point of design and development and points in the documentation that need to be changed correspondingly to the input specification shown in FIG. 6 are explicitly indicated. This allows the plant designers to smoothly design and develop a plant with reference to the display.

[0072] <Second Embodiment>

The constituent elements similar to those described in the above embodiment are hereinafter denoted by the same reference signs, and detailed descriptions thereof will be omitted as appropriate.

[0073] A simple plant will now be taken as an example to describe the functions of the design assistance device according to the present embodiment.

[0074] As in the case described in the first embodiment, the plant taken here as an example includes a pond that retains water flowing in from the outside, a measurement sensor that measures the water level of the pond, a drainage pump for discharging water retained in the pond to the outside, and an alarm. As to the action of the plant, the drainage pump assumedly starts up when the water level of the pond measured by the measurement sensor reaches or exceeds a predetermined value, and the alarm is assumedly activated when the water level of the pond measured by the measurement sensor reaches or exceeds another predetermined value.

[0075] FIG. 12 is a diagram illustrating an example in which the information about the past specifications stored by the plant specification storage unit 102 is displayed on the screen according to the present embodiment. Here, the plant specification assumedly includes the information about which municipality the specification is tailored to and the information on the numerical value referred to as the standard high-water level. The plant specification storage unit 102 assumedly stores information about four specifications (Specification Number 1, Specification Number 2, Specification Number 3, and Specification Number 4) in tabular form. The screen to which the information about the past specifications shown in FIG. 12 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display unit, which is not shown in FIG. 1.

[0076] In FIG. 12, as to the information about which municipality the specification is

tailored to, Specification Number 1 and Specification Number 2 are tailored to Municipality A, and Specification Number 3 and Specification Number 4 are tailored to Municipality B. In FIG. 12, as to the information on the numerical value referred to as the standard high-water level, the standard high-water level for Specification Number 1 is 80, the standard high-water level for Specification Number 2 is 60, the standard high-water level for Specification Number 3 is 50, and the standard high-water level for Specification Number 4 is 60.

[0077] FIG. 13 is a diagram showing an example in which the past documentation stored by the plant documentation storage unit 104 is displayed on the screen according to the present embodiment. Here, the plant documentation assumedly includes information about the relationship between the water level of the pond measured by the measurement sensor (regarded as the water level in the documentation) and the actions being the activation of the alarm and the startup of the drainage pump. The plant documentation storage unit 104 assumedly stores four pieces of documentation (Documentation Number 1, Documentation Number 2, Documentation Number 3, and Documentation Number 4) in tabular form. The screen to which the information about the past documentation shown in FIG. 13 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0078] In FIG. 13, as to the information about the relationship between the water level of the pond and the actions being the activation of the alarm and the startup of the drainage pump, Documentation Number 1 indicates that "the alarm activation water level is 80" and "the drainage pump startup water level is 80", Documentation Number 2 indicates that "the alarm activation water level is 80" and "the drainage pump startup water level is 60", Documentation Number 3 indicates that "the alarm activation water level is 90" and "the drainage pump startup water level is 50", and Documentation

Number 4 indicates that "the alarm activation water level is 90" and "the drainage pump startup water level is 60".

[0079] Specification Number 1, Specification Number 2, Specification Number 3, and Specification Number 4 that are shown in FIG. 12 assumedly correspond to Documentation Number 1, Documentation Number 2, Documentation Number 3, and Documentation Number 4 that are shown in FIG. 13, respectively. That is, in the past, Documentation Number 1 was created according to Specification Number 1, Documentation Number 2 was created according to Specification Number 2, Documentation Number 3 was created according to Specification Number 3, and Documentation Number 4 was created according to Specification Number 4.

[0080] FIG. 14 is a diagram showing an example in which the information about the input specification provided by the plant specification input unit 101 is displayed on the screen according to the present embodiment (see Step ST1 of FIG. 3). As with the past specifications shown in FIG. 12, the information about the input specification includes information about which municipality the specification is tailored to and information on the numerical value referred to as the standard high-water level. The screen to which the information about the input specification shown in FIG. 14 is output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0081] In FIG. 14, as to the information about which municipality the specification is tailored to, the input specification is tailored to Municipality B. In FIG. 14, as to the information on the numerical value referred to as the standard high-water level, the standard high-water level for the input specification is 40.

[0082] The similar specification retrieval unit 103 retrieves, from the past specifications stored by the plant specification storage unit 102, the one that most closely

resembles the input specification provided by the plant specification input unit 101 (see Step ST2 of FIG. 3). Here, from among the past specifications shown in FIG. 12, Specification Number 3 is obtained as the similar specification being the past specification that most closely resembles the input specification shown in FIG. 14, on the basis of the information on the past specification about which municipality the specification is tailored to and the numerical information referred to as the standard high-water level.

[0083] The similar documentation extraction unit 105 extracts, from the past documentation stored by the plant documentation storage unit 104, the documentation related to the plant whose specification corresponds to the similar specification obtained by the similar specification retrieval unit 103. Here, from among pieces of past documentation shown in FIG. 13, Documentation Number 3, which is the documentation corresponding to Specification Number 3 shown in FIG. 12, is extracted as the similar documentation (see Step ST7 of FIG. 3).

[0084] The plant documentation display unit 106 displays the similar documentation extracted by the similar documentation extraction unit 105. Here, Documentation Number 3 in FIG. 13, which has been extracted as the similar documentation, is displayed.

[0085] The first difference calculation unit 107 calculates the difference between the input specification provided by the plant specification input unit 101 and the similar specification provided by the similar specification retrieval unit 103 (see Step ST3 of FIG. 3). Here, the difference between the input specification shown in FIG. 14 and Specification Number 3 shown in FIG. 12 as the similar specification is calculated, whereby the results shown in FIG. 15 are obtained. The screen to which the difference between the input specification and the similar specification shown in FIG. 15 is output

may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1. Specifically, the information about which municipality the specification is tailored to is identical, where there are no dissimilarities. Thus, "none" is indicated as the "difference in the municipality of interest". The numerical information referred to as the standard high-water level for the input specification is "40", whereas the numerical information for Specification Number 3 shown in FIG. 12 is "50". Thus, "difference contained" is indicated as to the "presence or absence of difference" regarding the "difference in the standard high-water level", and "10" is indicated as the "difference value" regarding the "difference in the standard high-water level".

[0086] The second difference calculation unit 108 calculates the difference between the similar specification provided by the similar specification retrieval unit 103 and each of the past specifications stored in the plant specification storage unit 102 (see Step ST4 of FIG. 3). Here, the difference between Specification Number 3 in FIG. 12, which is the similar specification, and each of Specification Number 1, Specification Number 2, Specification Number 3, and Specification Number 4 in FIG. 12 is calculated.

[0087] FIG. 16 is a diagram showing an example in which calculation results of the above-mentioned calculation of difference, that is, results obtained by calculating the difference between the similar specification and each of the past specifications are displayed on the screen. In FIG. 16, Difference Number 1 indicates the difference between Specification Number 3 in FIG. 12, which is the similar specification, and Specification Number 1, Difference Number 2 indicates the difference between Specification 3 in FIG. 12, which is the similar specification, and Specification Number 2, Difference Number 3 indicates the difference between Specification Number in FIG. 12, which is the similar specification, and Specification Number 3, and Difference Number 4

indicates the difference between Specification Number 3 in FIG.12, which is the similar specification, and Specification Number 4. The screen to which the difference between the similar specification and each of the past specifications shown in FIG. 16 is output may be the screen of the plant documentation display unit 106, or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0088] In FIG. 16, as to the "difference in the municipality of interest", Difference Number 1 and Difference Number 2 indicate "difference contained", and Difference Number 3 and Difference Number 4 indicate "no difference contained". In FIG. 16, as to the "presence or absence of difference" regarding the "difference in the standard high-water level", Difference Number 1, Difference Number 2, and Difference Number 4 indicate "difference contained", and Difference Number 3 indicates "no difference contained". In FIG. 16, as to the "difference value" regarding the "difference in the standard high-water level", Difference Number 1 indicates 30, Difference Number 2 indicates 10, Difference Number 3 indicates 0, and Difference Number 4 indicates 10.

[0089] The degree-of-association calculation unit 109 calculates the degree of association between the difference provided by the first difference calculation unit 107 and the difference provided by the second difference calculation unit 108 (see Step ST5 of FIG. 3). Here, the degree of association between the difference shown in FIG. 15 and each of Difference Number 1, Difference Number 2, Difference Number 3, and Difference Number 4 shown in FIG. 16 is calculated.

[0090] Here, as to the degree of association regarding the "difference in the municipality of interest", calculations are performed to determine whether there is a match on the presence or absence of difference. As to the degree of association regarding the "difference in the standard high-water level", calculations are performed to determine whether there is a match on the presence or absence of difference.

Consequently, the results shown in FIG. 17 are obtained. Degree of Association Number 1 is obtained as the degree of association between the difference shown in FIG. 15 and Difference Number 1 shown in FIG. 16. Degree of Association Number 2 is obtained as the degree of association between the difference shown in FIG. 15 and Difference Number 2 shown in FIG. 16. Degree of Association Number 3 is obtained as the degree of association between the difference shown in FIG. 15 and Difference Number 3 shown in FIG. 16. Degree of Association Number 4 is obtained as the degree of association between the difference shown in FIG. 15 and Difference Number 4 shown in FIG. 16. The screen to which the degree of association regarding the "difference in the municipality of interest" and the degree of association regarding the "difference in the standard high-water level" that are shown in FIG. 17 are output may be the screen of the plant documentation display unit 106 or may be, for example, a screen of another display, which is not shown in FIG. 1.

[0091] Degree of Association Number 1 indicates that there is no match on the degree of association regarding the "difference in the municipality of interest", namely, the presence or absence of difference regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level", namely, the presence or absence of the "difference in the standard high-water level". Degree of Association Number 2 indicates that there is no match on the degree of association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level". Degree of Association Number 3 indicates that there is a match on the degree of association regarding the "difference in the municipality of interest" and that there is no match on the degree of association regarding the "difference in the standard high-water level". Degree of Association Number 4 indicates that there

is a match on the degree of association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level".

[0092] The associated specification extraction unit 110 extracts, as the associated specification, the past specification from which the most strongly associated difference arises, from the plant specification storage unit 102 on the basis of the degree of association calculated by the degree-of-association calculation unit 109 (see Step ST6 of FIG. 3). The degree of association increases with increasing number of pieces of information from which a "match" occurs. Here, from among Degree of Association Number 1, Degree of Association Number 2, Degree of Association Number 3, and Degree of Association Number 4 shown in FIG. 17, Degree of Association Number 4 indicating that there is a match on the degree of association regarding the "difference in the municipality of interest" and that there is a match on the degree of association regarding the "difference in the standard high-water level" is selected as the one having the highest degree of association, and then, Specification Number 4 is extracted as the past specification providing Degree of Association Number 4, from the specifications shown in FIG. 12.

[0093] The associated documentation extraction unit 111 extracts, as the associated documentation, the past documentation corresponding to the associated specification extracted by the associated specification extraction unit 110, from the plant documentation storage unit 104 (see Step ST8 of FIG. 3). Here, Documentation Number 4 in FIG. 13 corresponding to Specification Number 4 in FIG. 12 is extracted as the associated documentation.

[0094] The inter-documentation difference extraction unit 112 extracts the difference between the similar documentation provided by the similar documentation extraction unit

105 and the associated documentation provided by the associated documentation extraction unit 111 (see Step ST9 of FIG. 3). Here, the difference between Documentation Number 3 in FIG. 13, which is the similar documentation, and the documentation denoted by Documentation Number 4 in FIG. 13, which is the associated documentation, is extracted.

[0095] FIG. 18 is a diagram showing an example in which calculation results of the above-mentioned calculation of difference, that is, results obtained by calculating the difference between the similar documentation and the associated documentation are displayed on the screen. When the difference between Documentation Number 3 in FIG. 13 and Documentation Number 4 in FIG. 13 is extracted, it is revealed that no difference is contained in the part stating "the alarm activation water level is 90" and that there is a difference between the part in Documentation Number 3 stating "the drainage pump startup water level is 50" and the part in Documentation Number 4 stating "the drainage pump startup water level is 60". In FIG. 18, the "part containing a difference" is denoted by an asterisk.

[0096] Besides displaying the similar documentation extracted by the similar documentation extraction unit 105 (see Step ST10 of FIG. 3), the plant documentation display unit 106 explicitly indicates the "part containing a difference" revealed by the inter-documentation difference extraction unit 112, on the similar documentation on display (see Step ST11 of FIG. 3). Here, the "part containing a difference" in FIG. 18 (the point indicated by an asterisk in FIG. 18) is explicitly indicated on Documentation Number 3 on display in FIG. 13, which is the similar documentation.

[0097] FIG. 19 is a diagram showing an example of the screen display in the state in which the above-mentioned display result, namely, the "part containing a difference" is explicitly indicated on the similar documentation on display. An asterisk is

supplementarily shown on the left side of the "part containing a difference" indicated on Documentation Number 3 on display.

[0098] The validity of the display result in FIG. 19 is as in the first embodiment, and thus, the description thereof will not be further elaborated.

[0099] As mentioned above, according to the present embodiment, in the case where the past specifications shown in FIG. 12 and the pieces of past documentation corresponding thereto and shown in FIG. 13 are stored in a storage device, when the plant specification shown in FIG. 14 is given, the documentation to be used as the starting point of design and development and points in the documentation that need to be changed correspondingly to the input specification shown in FIG. 14 are explicitly indicated. This allows the plant designers to smoothly design and develop a plant with reference to the display.

[0100] The point that needs to be changed may be explicitly indicated by a display method using flashing, a different color, a different font, animation, or the like.

[0101] <Effects>

The effects of the above-mentioned embodiments will now be exemplified.

[0102] According to the above-mentioned embodiments, the design assistance device includes the plant specification storage unit 102, the plant documentation storage unit 104, the similar specification retrieval unit 103, the first difference calculation unit 107, the second difference calculation unit 108, the degree-of-association calculation unit 109, the associated specification extraction unit 110, the similar documentation extraction unit 105, the associated documentation extraction unit 111, the inter-documentation difference extraction unit 112, and the plant documentation display unit 106.

[0103] The plant specification storage unit 102 stores a plurality of past specifications relevant to a design target. The plant documentation storage unit 104 stores past

documentation relevant to the design target and corresponding to the past specifications.

[0104] The similar specification retrieval unit 103 retrieves, from the past specifications stored in the plant specification storage unit 102, a similar specification similar to the input specification being the newly input specification of the design target.

[0105] The first difference calculation unit 107 calculates the difference between the input specification and the similar specification and determines a calculation result as a first difference. The second difference calculation unit 108 calculates the difference between the similar specification and each of the past specifications stored in the plant specification storage unit 102 and determines calculation results as second differences.

[0106] The degree-of-association calculation unit 109 calculates the degree of association between the first difference and each of the second differences. The associated specification extraction unit 110 extracts, as the associated specification, one of the past specifications corresponding to one of the second differences that is most closely associated with the first difference.

[0107] The similar documentation extraction unit 105 extracts, as the similar documentation, the past documentation corresponding to one of the past specifications that is the similar specification, from the plant documentation storage unit 104. The associated documentation extraction unit 111 extracts, as the associated documentation, the past documentation corresponding to one of the past specifications that is the associated specification, from the plant documentation storage unit 104.

[0108] The inter-documentation difference extraction unit 112 calculates the difference between the similar documentation and the associated documentation and extracts a point of difference based on a calculation result. The plant documentation display unit 106 displays the similar documentation.

[0109] The plant documentation display unit 106 displays the point of difference on the

similar documentation that is displayed.

[0110] In this configuration, the point of difference, which is the point to be changed correspondingly to the input specification, in the similar documentation can be indicated based on the accumulated specifications relevant to the design target and the differences among the pieces of documentation relevant to the design target and corresponding to the specifications concerned. Thus, the design work for the design target can be appropriately assisted.

[0111] Although the other configurations mentioned herein may be eliminated as appropriate, the above-mentioned effects can be produced by adding at least one of the other configurations mentioned herein when necessary.

[0112] According to the above-mentioned embodiments, the degree-of-association calculation unit 109 calculates the degree of association between the first difference and each of the second differences based on whether there is a match on the presence or absence of difference.

[0113] In this configuration, the specification in which no difference is contained in the part corresponding to the part of the similar specification that does not differ from the input specification and a difference is contained in the part corresponding to the part of the similar specification that differs from the input specification can be extracted as the specification having a high degree of association.

[0114] According to the above-mentioned embodiments, the plant documentation display unit 106 performs display in a manner to enclose the point of difference on the similar documentation that is displayed.

[0115] In this configuration, the point that needs to be changed in the similar documentation correspondingly to the input specification can be explicitly indicated in an appropriate manner.

[0116] According to the above-mentioned embodiments, the plant documentation display unit 106 gives a supplementary indication to the point of difference on the similar documentation that is displayed.

[0117] In this configuration, the point in the similar documentation that needs to be changed in the similar documentation correspondingly to the input specification can be explicitly indicated in an appropriate manner.

[0118] According to the above-mentioned embodiments, the plurality of specifications relevant to the design target and/or the documentation relevant to the design target are presented in text or tabular form.

[0119] In this configuration, the documentation corresponding to the input specification and output in text or tabular form can be designed by using the specification output in text or tabular form.

[0120] <Modification>

Although the description of the cases in which the plant specifications and the plant documentation are presented in text or tabular form has been given in the above-mentioned embodiments, the form of presenting the specifications and the documentation is not limited thereto. That is, besides texts and tables, other forms of presentation such as diagrams and programs and combinations thereof that can be used to calculate the differences in specification and the degree of association between the differences, and furthermore, to calculate the difference among the pieces of documentation are applicable. The specifications and the documentation are not necessarily presented in the same form, and may be presented in different forms in which they can be associated with each other or the documentation can be extracted from the specifications.

[0121] The dimensions, shapes, relative positional relations, and implementation

conditions of the constituent elements, which may have been mentioned in the above-mentioned embodiments, are in all aspects illustrative and not restrictive. It is therefore understood that numerous modifications which have not been exemplified can be devised without departing from the scope of the technique mentioned herein. For example, at least one of the constituent elements may be modified, added, or eliminated. At least one of the constituent elements mentioned in at least one of the embodiments may be selected and combined with the constituent elements mentioned in another embodiment.

[0122] Any constituent element in the singular in the above-mentioned embodiments may be replaced by the plural, as long as no contradiction arises. Each constituent element is a conceptual unit. Each constituent element may be composed of a plurality of structures or may be part of one structure, or a plurality of constituent elements may be included in one structure. Each constituent element may have a different structure or shape, as long as it can perform the same function.

[0123] The description given herein may be referenced for any purpose related to the technique mentioned herein and should not be construed as being prior art.

[0124] The functions of the constituent elements mentioned in the embodiments above can be implemented in at least one processing circuit or electric circuit. That is, a plurality of processing circuits or electric circuits conceivably cooperate with one another to implement these functions. Each of the processing circuits and electric circuits includes a programmed arithmetic processing unit. In this case, the processing circuit or the electric circuit operates in accordance with the preset programs to implement the functions of the constituent elements mentioned in the embodiments above. The programs for implementing the functions of the constituent elements are stored in a storage device that is, for example, memory (storage medium) including a hard disk (hard

disk drive (HDD)), random access memory (RAM), read only memory (ROM), and the like. The processing circuit includes, for example, an application specific integrated circuit (ASIC) or a conventional circuit element modified to implement the functions mentioned in the embodiments above. The processing circuit and the electric circuit each include a hardware circuit. In this case, the processing circuit or the electric circuit processes a signal to implement the functions of the constituent elements mentioned in the embodiments above.

[0125] Under the concept that each of the constituent components mentioned in the embodiments above is assumed to be software or hardware corresponding to the software, each of the constituent elements is referred to as a "unit", a "processing circuit", or the like.

[0126] The technique mentioned herein permits distributed placement of the constituent elements, which are provided in different devices (in the form of system). For example, in the illustration of FIG. 1, the plant specification storage unit 102 and the plant documentation storage unit 104 are mounted in the design assistance device. However, at least one of the plant specification storage unit 102 and the plant documentation storage unit 104 may be an external functional unit. In this case, the external unit and the other functional units in the design assistance device interact with one another to collectively achieve the function of the design assistance device.

Explanation of Reference Numerals

[0127] 1 personal computer, 2 central processing unit, 3 storage device, 4 input device, 5 output device, 101 plant specification input unit, 102 plant specification storage unit, 103 similar specification retrieval unit, 104 plant documentation storage unit, 105 similar documentation extraction unit, 106 plant documentation display unit, 107 first difference

calculation unit, 108 second difference calculation unit, 109 degree-of-association calculation unit, 110 associated specification extraction unit, 111 associated documentation extraction unit, 112 inter-documentation difference extraction unit.

CLAIMS

1. A design assistance device comprising:

a plant specification storage unit to store, as past specifications, a plurality of specifications relevant to a design target;

a plant documentation storage unit to store, as past documentation, documentation relevant to said design target and corresponding to said past specifications;

a similar specification retrieval unit to retrieve, from said past specifications stored in said plant specification storage unit, a similar specification similar to an input specification being a newly input specification of said design target;

a first difference calculation unit to calculate a difference between said input specification and said similar specification and to determine a calculation result as a first difference;

a second difference calculation unit to calculate a difference between said similar specification and each of said past specifications stored in said plant specification storage unit and to determine calculation results as second differences;

a degree-of-association calculation unit to calculate a degree of association between said first difference and each of said second differences;

an associated specification extraction unit to extract, as an associated specification, one of said past specifications corresponding to one of said second differences that is most closely associated with said first difference;

a similar documentation extraction unit to extract, as similar documentation, said past documentation corresponding to one of said past specifications that is said similar specification, from said plant documentation storage unit;

an associated documentation extraction unit to extract, as associated documentation, said past documentation that corresponds to said past specification being

said associated specification, from said plant documentation storage unit;

an inter-documentation difference extraction unit to calculate a difference between said similar documentation and said associated documentation and to extract a point of difference based on a calculation result; and

a plant documentation display unit to display said similar documentation,

wherein said plant documentation display unit displays said point of difference on said similar documentation that is displayed.

2. The design assistance device according to claim 1,

wherein said degree-of-association calculation unit calculates said degree of association between said first difference and each of the second differences based on whether there is a match on presence or absence of difference.

3. The design assistance device according to claim 1 or 2,

wherein said plant documentation display unit performs display in a manner to enclose said point of difference on said similar documentation that is displayed.

4. The design assistance device according to claim 1 or 2,

wherein said plant documentation display unit gives a supplementary indication to said point of difference on said similar documentation that is displayed.

5. The design assistance device according to claim 1 or 2,

wherein said plurality of specifications relevant to said design target and/or said documentation relevant to said design target are presented in text or tabular form.