United States Patent Application Publication	20250265272
Kind Code	A1
Publication Date	August 21, 2025
Inventor(s)	MORI; Takuro

INFORMATION PROCESSING DEVICE, INFORMATION PROCESSING METHOD, AND NON-TRANSITORY COMPUTER READABLE STORAGE MEDIUM

Abstract

An information processing device **100** includes: a specifying unit **132** that specifies search queries of a plurality of users who performs a predetermined action; a processing unit **133** that generates classification of the search queries and description content of each of a plurality of clusters by inputting, to a model having learned to output a character string following a character string input thereto, information regarding the search queries specified by the specifying unit **132** and a directive for clustering the search queries into the plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on a basis of search queries classified into each of the clusters; and a provision unit **144** that provides information for displaying the plurality of clusters clustered by the model and the description content.

Inventors: **MORI; Takuro (Tokyo, JP)**

Applicant: **LY Corporation** (Tokyo, JP)

Family ID: **1000008509955**

Appl. No.: **19/048663**

Filed: **February 07, 2025**

Foreign Application Priority Data

JP	2024-022680	Feb. 19, 2024

Publication Classification

Int. Cl.: **G06F16/28** (20190101); **G06F16/2455** (20190101)

U.S. Cl.:

CPC **G06F16/285** (20190101); **G06F16/2455** (20190101);

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] The present application claims priority to and incorporates by reference the entire contents of Japanese Patent Application No. 2024-022680 filed in Japan on Feb. 19, 2024.

BACKGROUND OF THE INVENTION
1. Field of the Invention
[0002] The present invention relates to an information processing device, an information processing method, and a non-transitory computer readable storage medium.
2. Description of the Related Art
[0003] In the related art, in query analysis devices, there is technology of generating an analysis graph that makes it possible to intuitively grasp a change in user's need with the lapse of time using queries input to a search site. As an example, there is known technology for generating an analysis graph that enables intuitive prehension by thinning out peripheral queries with respect to a main query serving as a reference.
Patent Literature 1: Japanese Patent No. 6983269
[0004] However, in the related art, for example, there is room for further improvement for appropriately grasping a change in user's need.
SUMMARY OF THE INVENTION
[0005] According to one aspect of an embodiment, it is possible to perform analysis for appropriately grasping a change in user's need.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0006] FIG. **1** is a diagram illustrating a configuration example of an information processing system according to an embodiment;
[0007] FIG. **2** is a diagram illustrating an example of information processing according to an embodiment;
[0008] FIG. **3** is a diagram illustrating an example of a prompt according to the embodiment;
[0009] FIG. **4** is a diagram illustrating an example of a clustering result according to the embodiment;
[0010] FIG. **5** is a diagram illustrating a configuration example of a terminal device according to the embodiment;
[0011] FIG. **6** is a diagram illustrating a configuration example of an information processing device according to the embodiment;
[0012] FIG. **7** is a table showing an example of a search action storing unit according to the embodiment;
[0013] FIG. **8** is a flowchart illustrating an example of information processing according to the embodiment; and
[0014] FIG. **9** is a hardware configuration diagram illustrating an example of a computer that implements functions of the information processing device.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS
[0015] Hereinafter, modes for carrying out the present invention (hereinafter referred to as

embodiments) will be described with reference to the drawings. Note that the present invention is not limited by the embodiments described below. Furthermore, in the description of the drawings, the same portions are denoted by the same reference numerals.

Embodiments

1. Configuration of Information Processing System

[0016] An information processing system **1** illustrated in FIG. **1** will be described. As illustrated in FIG. **1**, the information processing system **1** includes a terminal device **10** and an information processing device **100**. The terminal device **10** and the information processing device **100** are communicably connected in a wired or wireless manner via a predetermined communication network (network N). FIG. **1** is a diagram illustrating a configuration example of the information processing system **1** according to an embodiment.

[0017] The terminal device **10** is an information processing device used by an administrator who performs customer journey analysis and the like of users for marketing. The administrator appropriately grasps a change in user's need by performing, for example, a customer journey analysis. The terminal device **10** may be any device as long as the processing in the embodiment can be implemented. Furthermore, the terminal device **10** may be a device such as a smartphone, a tablet terminal, a lap-top PC, a desktop PC, a mobile phone, or a PDA. FIG. **2** illustrates a case where the terminal device **10** is a smartphone.

[0018] The terminal device **10** is, for example, a smart device such as a smartphone or a tablet and is a portable terminal device capable of communicating with any server device via a wireless communication network such as the 4th generation (4G) to 5G or Long Term Evolution (LTE). Furthermore, the terminal device **10** may have a screen such as a liquid crystal display and having a touch panel function and may receive various operations on display data such as content, such as a tap operation, a slide operation, and a scroll operation, from an administrator with a finger, a stylus, or the like. In FIG. **2**, the terminal device **10** is used by an administrator P**1**.

[0019] The information processing device **100** is for the purpose of performing analysis for appropriately grasping changes in the user's need and may be any device as long as the processing in the embodiment can be implemented. The information processing device **100** inputs, to a model having learned to output a character string following a character string input thereto, for example, information regarding search queries and a directive for clustering the search queries into a plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on the basis of search queries classified into each of the clusters, thereby generating classification of the search queries and description content of each of the clusters to visualize the classification result on a graph. At this point, for example, the information processing device **100** performs visualization by determining a date and time when a predetermined action, which is a starting point of the time series, has been performed (such as input of a reference query or input of a reference action), specifying time-series information indicating the time series of searches in which preceding and subsequent search queries have been used and relevance information indicating relevance among search queries, and inputting, as the directive, the directive for clustering in consideration of the time series indicated by the time-series information and the relevance indicated by the relevance information to the model that has been learned in such a manner as to output a character string following a character string input thereto. In this manner, the information processing device **100** performs clustering of the search queries by, for example, determining the predetermined action and using the time series of the preceding and subsequent search queries. The information processing device **100**, for example, provides services such as behavior analysis for customer journey analysis. Note that, in the following embodiment, when the predetermined action is specified, the information processing device **100** performs processing using the specified predetermined action as the reference action. At this point, the predetermined action may be specified in any manner and, for example, may be specified by the administrator or the like. Alternatively, the predetermined action may be determined in advance by

the administrator or the like of the information processing device **100** or may be automatically set by the information processing device **100** on the basis of a predetermined rule. In FIG. **2**, a case where the predetermined action is specified by the administrator P**1** is described as an example.

[0020] Note that, although FIG. **1** illustrates a case where the terminal device **10** and the information processing device **100** are separate devices, the terminal device **10** and the information processing device **100** may be integrated.

2. Example of Information Processing

[0021] FIG. **2** is a diagram illustrating an example of information processing by the information processing system **1** according to the first embodiment. For example, when the administrator P**1** specifies a predetermined action, the information processing device **100** receives the designation of the predetermined action (step S**101**). For example, the information processing device **100** accepts designation of a search query, an accommodation reservation date, and others as the predetermined action. When the specified predetermined action is set as the reference action, the information processing device **100** specifies search queries used for another search by a plurality of users who has performed the reference action (step S**102**). For example, in a case where "accommodation reservation date" is the reference action, the information processing device **100** specifies other search queries of a plurality of users who has performed the reference action of "accommodation reservation". For example, in a case where a user U**1** has performed a search for "poles", "ski wear", or the like before or after the reference action of "accommodation reservation" and a user U**2** has performed a search for "leash cord", "long board", or the like before or after the reference action of "accommodation reservation", the information processing device **100** specifies search queries such as "poles", "ski wear", "leash cord", and "long board". Note that, in step S**102**, the information processing device **100** may specify search queries only for a plurality of users who has performed a search that satisfies a predetermined condition regarding the reference action. For example, the information processing device **100** may specify search queries by narrowing the reference action down to a plurality of users who has input the reference action within a predetermined period or may specify search queries by narrowing the reference action to a plurality of users who has input the reference action a predetermined number of times or more. Furthermore, the information processing device **100** may specify a search query satisfying a predetermined condition among the search queries specified in step S**101** and perform processing described later.

[0022] Furthermore, the information processing device **100** specifies time-series information indicating time series from the search dates and time when the search queries have been used for a search, with the date and time, when the predetermined action has been performed (which may be the search date and time), used as reference date and time (t=0) (step S**103**). At this point, the information processing device **100** specifies relative search dates and time of the search queries with respect to the reference date and time. For example, in a case where a search for "ski wear" has been performed one day prior to the day of inputting "accommodation reservation", the information processing device **100** specifies a relative search date and time such as "ski wear; t=−1" based on t=0. In this manner, the information processing device **100** specifies search dates and time of all the search queries specified in step S**102**. The information processing device **100** may further perform processing described later only on a search query in which a time difference between the date and time when the predetermined action has been performed and a search date and time of the search query satisfies a predetermined condition.

[0023] Moreover, in step S**103**, the information processing device **100** specifies relevance information indicating relevance among the search queries specified in step S**102** in addition to the time-series information (step S**103**). For example, the information processing device **100** specifies search queries having a deep relationship with the same purpose of action for each of the search queries, as the same purpose of action or seasonal relevance. Specifically, when the purpose of action is set to "skiing", the information processing device **100** specifies "ski wear" and "poles" related to this purpose of action (for example, supplies for skiing) as those having relevance. The

information processing device **100** may further perform processing described later only on a search query in which a relevance between the action of performing the predetermined action and a search for the search query satisfies a predetermined condition.

[0024] Then, the information processing device **100** inputs, to a model having learned to output a character string following a character string input thereto, information regarding search queries specified by the specifying unit in step S**103** and a directive for clustering the search queries into a plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on the basis of search queries classified into each of the clusters, thereby generating classification of the search queries and description content of each of the clusters (step S**104**). For example, the information processing device **100** may use, as the model, generative AI such as a generative pre-trained transformer (GPT) model. Note that the time-series information may be taken into consideration in the directive in some cases.

[0025] Furthermore, in a case where a directive to consider the time-series information is generated, the information processing device **100** inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of the time series indicated by the time-series information and the relevance indicated by the relevance information. Furthermore, the information processing device **100** inputs, to the model, a directive instructing to output description content describing each of the clusters on the basis of search queries classified into the cluster. For example, the information processing device **100** generates the classification of the search queries in consideration of the time series and the relevance by taking the time-series information and the relevance information into consideration. Furthermore, the information processing device **100** generates the description content on the basis of the classification of the search queries. For example, the information processing device **100** generates the classification of the search queries and the description content for the purpose of classifying and displaying, on a graph in time series, searches using search queries classified into “ski equipment”, “marine sports”, or the like are performed at which timing before and after the reference action of “accommodation reservation”. Note that there may be a case where the classification of the search queries is generated without generating the description content.

[0026] Furthermore, the information processing device **100** inputs, to the model, as the directive, the directive instructing to perform clustering such that a cluster includes search queries belonging to the same purpose of action on the basis of relevance among the search queries indicated by the relevance information. For example, when the purpose of action is set to “skiing”, the information processing device **100** generates classification of the search queries by setting “ski wear” and “poles” related to this purpose of action (for example, supplies for skiing) as those having relevance.

[0027] The information processing device **100** further inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of relevance indicated by the relevance information and to perform clustering in consideration of relevance among the clusters that have been classified. For example, in a case where the clusters are “ski equipment”, “snowboard equipment”, “marine sports”, and “surfing equipment”, the information processing device **100** generates classification of the search queries in such a manner that “ski equipment” and “snowboard equipment” are arranged close to each other when displayed in the graph in consideration of relevance to winter sports. In addition, “marine sports” and “surfing equipment” have relevance to summer sports, and the information processing device **100** generates classification of the search queries in such a manner that they are arranged close to each other when displayed in the graph in consideration of the relevance.

[0028] FIG. **3** is a diagram illustrating an example of a prompt according to the embodiment. The information processing device **100** inputs, to the learned model, as a prompt, a directive of “The following is time series data of characteristic search keywords on the Internet starting from a search action using <“starting point keyword”>. On the basis of what can be read from this data, please

express in the format in consideration of the following steps and elements.", "Elements" specifying elements, "Output Format" specifying the format of output result, "Input Data Format" specifying the format of input information, and "input data" specifying the input information. The learned model outputs clusters clustered on the basis of these pieces of information.

[0029] As the directive, the directive is input to the model, the directive instructing to perform clustering in consideration of the time series indicated by the time-series information of a period specified by the user and a specified predetermined period and relevance indicated by the relevance information and, in a case where the description content in the period specified by the user and the description content in the specified predetermined period are different from each other in the period specified by the user, instructing to perform at least one of output of an alert or correction. For example, in a case where the period specified by the user is ten months, the information processing device **100** sets the specified predetermined period to a longer period, for example, fourteen months. In this case, in a case where description content for the period specified by the user (ten months) of description content generated from the specified predetermined period (fourteen months) is different from description content generated from the period specified by the user (ten months), at least one of output of an alert or correction is performed.

[0030] Then, the information processing device **100** provides information for displaying the plurality of clusters clustered by the model and the description content. For example, the information processing device **100** transmits the description content of the plurality of clusters to the terminal device **10** (step S**105**). Upon receiving the information transmitted from the information processing device **100**, the terminal device **10** displays the clustering result and the description content on the basis of the received information. Furthermore, the information processing device **100** transmits information for displaying the description content superimposed on the clustering result. For example, the information processing device **100** transmits information for superimposing and displaying each piece of description content generated for one of the clusters in association with the cluster. In the terminal device **10**, the description content is displayed superimposed on the clustering result. FIG. **4** is a diagram illustrating an example of a clustering result according to the embodiment. With reference to FIG. **4**, a case where six clusters are classified will be described as an example. In FIG. **4**, the horizontal axis represents the time series. In addition, a search date and time of a search query with respect to the reference date and time is reflected in the time series of the horizontal axis. In addition, since the information processing device **100** has generated the description content of "ski equipment", generated the description content of "ski wear", generated the description content of "wetsuit", generated the description content of "surf pants", generated the description content of "surfboard", and generated the description content of "marine sports (others)", "ski equipment" is displayed as the description content, "ski wear" is displayed as the description content, "wetsuit" is displayed as the description content, "surf pants" is displayed as the description content, "surfboard" is displayed as the description content, and "marine sports (others)" is displayed as the description content. Note that the clustering result illustrated in FIG. **4** is one example, and the number of regions classified into clusters or others may not be particularly limited.

[0031] In this manner, the information processing device **100** inputs, to the model having learned to output a character string following the character string input thereto, the directive for clustering the search queries into the plurality of clusters in consideration of relevance among search queries and the time series and outputting the description content describing each of the clusters on the basis of search queries classified into each of the clusters, thereby visualizing the classification of the search queries and the description content of each of the clusters on the graph generated It is conceivable that visualization of the search queries in time series makes it possible to use the search queries for review of customer journey analysis and the like.

3. Configuration of Terminal Device

[0032] Next, the configuration of the terminal device **10** according to the embodiment will be

described with reference to FIG. **5**. FIG. **5** is a diagram illustrating a configuration example of the terminal device **10** according to the embodiment. As illustrated in FIG. **5**, the terminal device **10** includes a communication unit **11**, an input unit **12**, an output unit **13**, and a control unit **14**.

(Communication Unit **11**)

[0033] The communication unit **11** is implemented by, for example, a network interface card (NIC) or the like. The communication unit **11** is connected to a predetermined network N in a wired or wireless manner and transmits and acquires information to and from the information processing device **100** and others via the predetermined network N.

(Input Unit **12**)

[0034] The input unit **12** receives various operations from the administrator. In FIG. **2**, various operations from the administrator P**1** are received. For example, the input unit **12** may receive various operations from the administrator via a display plane by a touch panel function. Furthermore, the input unit **12** may receive various operations from a button provided to the terminal device **10** or a keyboard or a mouse connected to the terminal device **10**. For example, the input unit **12** receives an operation for specifying a predetermined action.

(Output Unit **13**)

[0035] The output unit **13** is a display screen of a tablet terminal or the like that is implemented by, for example, a liquid crystal display, an organic electro-luminescence (EL) display, or the like and is a display device for displaying various types of information. For example, the output unit **13** displays information transmitted from the information processing device **100**. For example, the output unit **13** displays a plurality of clusters clustered by the model and description content that are transmitted from the information processing device **100**.

(Control Unit **14**)

[0036] The control unit **14** is, for example, a controller and is implemented by executing various programs stored in a storage device inside the terminal device **10** using a random access memory (RAM) as a work area by a central processing unit (CPU), a micro processing unit (MPU), or the like. For example, the various programs include a program of an application installed in the terminal device **10**. For example, the various programs include an application program for displaying the information transmitted from the information processing device **100** (phase classification result, description content, and the like). Furthermore, the control unit **14** is implemented by, for example, an integrated circuit such as an application specific integrated circuit (ASIC) or a field programmable gate array (FPGA).

[0037] As illustrated in FIG. **5**, the control unit **14** includes a reception unit **141** and a transmission unit **142** and implements or executes the action of information processing described below.

(Reception Unit **141**)

[0038] The reception unit **141** receives, for example, information transmitted from the information processing device **100**. For example, the reception unit **141** receives information for displaying the classification result of the search queries and the description content output by the model, which have been transmitted from the information processing device **100**. For example, the reception unit **141** receives information for displaying the classification result of the search queries together with the description content. For example, the reception unit **141** receives information for superimposing and displaying the description content on the classification result of the search queries.

(Transmission Unit **142**)

[0039] The transmission unit **142** transmits, for example, operation information performed by the administrator. For example, the transmission unit **142** transmits information related to the predetermined action specified by the administrator (such as information indicating a predetermined query or an accommodation reservation date) in order to determine the predetermined action.

4. Configuration of Information Processing Device

[0040] Next, the configuration of the information processing device **100** according to the embodiment will be described with reference to FIG. **6**. FIG. **6** is a diagram illustrating a configuration example of the information processing device **100** according to the embodiment. As illustrated in FIG. **6**, the information processing device **100** includes a communication unit **110**, a storage unit **120**, and a control unit **130**. Note that the information processing device **100** may include an input unit (such as a keyboard and a mouse) that receives various operations from the administrator of the information processing device **100** and a display unit (such as a liquid crystal display) that displays various types of information.

(Communication Unit **110**)

[0041] The communication unit **110** is implemented by, for example, an NIC or the like. The communication unit **110** is connected with the network N in a wired or wireless manner and transmits and acquires information to and from the terminal device **10** and the like via the network N.

(Storage Unit **120**)

[0042] The storage unit **120** is implemented by, for example, a semiconductor memory element such as a RAM or a flash memory or a storage device such as a hard disk or an optical disk. As illustrated in FIG. **6**, the storage unit **120** includes a search action information storing unit **121**.

[0043] The search action information storing unit **121** stores information regarding the search action of the user. Illustrated in FIG. **7** is an example of the search action information storing unit **121** according to the embodiment. The information stored in the search action information storing unit **121** is used, for example, to generate the classification result of the search queries and the description content. As illustrated in FIG. **7**, the search action information storing unit **121** includes items such as “search action ID” and “search action information”.

[0044] The “search action ID” indicates identification information for identifying a search action. The “search action information” indicates search action information. In the example illustrated in FIG. **7**, although an example in which conceptual information such as “Search Action Information #1” and “Search Action Information #2” is stored in “Search Action Information” has been described, actually stored is information indicating which user has searched with what search query and when.

(Control Unit **130**)

[0045] The control unit **130** is a controller and is implemented by, for example, a CPU, an MPU, or the like executing various programs stored in a storage device inside the information processing device **100** using a RAM as a work area. Furthermore, the control unit **130** is implemented by, for example, an integrated circuit such as an ASIC or an FPGA.

[0046] As illustrated in FIG. **6**, the control unit **130** includes an acquisition unit **131**, a specifying unit **132**, a processing unit **133**, and a provision unit **134** and implements or executes the action of information processing described below. Note that the internal configuration of the control unit **130** is not limited to the configuration illustrated in FIG. **6** and may be another configuration as long as the information processing to be described later is performed.

(Acquisition Unit **131**)

[0047] The acquisition unit **131** acquires various types of information from the storage unit **120**. The acquisition unit **131** further stores the acquired various types of information in the storage unit **120**.

[0048] The acquisition unit **131** acquires various types of information from an external information processing device **100**. The acquisition unit **131** acquires various types of information from another information processing device **100** such as the terminal device **10**.

[0049] The acquisition unit **131** acquires, for example, operation information performed by the administrator. For example, the acquisition unit **131** acquires information regarding the predetermined action specified by the administrator (such as information indicating a predetermined query) to determine the reference action.

(Specifying Unit **132**)

[0050] The specifying unit **132** specifies search queries of a plurality of users who performs a predetermined action. For example, the specifying unit **132** specifies a search query, an accommodation reservation date, or others as the predetermined action. For example, the specifying unit **132** specifies search queries of a plurality of users who has performed the predetermined action on the basis of the information acquired by the acquisition unit **131**. In other words, for example, the specifying unit **132** specifies other search queries input for searches by a plurality of users who has input for performing the predetermined action on the basis of the predetermined action.

[0051] The specifying unit **132** specifies the time-series information indicating the time series of searches in which the search queries have been used, with the date and time when the predetermined action has been performed used as the reference date and time, and the relevance information indicating relevance among the search queries. For example, on the basis of the information acquired by the acquisition unit **131**, the specifying unit **132** specifies the search date and time when the search query has been used for a search, with the date and time when the predetermined action has been performed used as the reference date and time. For example, the specifying unit **132** specifies a relative search date and time of the search query with respect to the reference date and time. For example, the specifying unit **132** specifies time-series information from the relative search date and time of the search query with respect to the specified reference date and time. Note that the specifying unit **132** may specify only the relevance information without specifying the time-series information.

(Processing Unit **133**)

[0052] The processing unit **133** inputs, to the model having learned to output a character string following a character string input thereto, information regarding search queries specified by the specifying unit **132** and a directive for clustering the search queries into a plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on the basis of search queries classified into each of the clusters, thereby generating classification of the search queries and description content of each of the clusters. For example, the processing unit **133** inputs a directive considering relevance for each search query to the model, thereby generating one cluster with a search query related to ski equipment such as “skis” and “poles”, and generating a description of the ski equipment as description content describing the cluster. For example, the processing unit **133** may use, as the model, generative AI such as a generative pre-trained transformer (GPT) model.

[0053] Furthermore, the processing unit **133** inputs, to the model, as the directive, a directive instructing to perform clustering in consideration of time series indicated by the time-series information and relevance indicated by the relevance information. For example, the processing unit **133** inputs a directive in consideration of the relevance for each search query and the time-series information to the model, thereby generating the classification of the search queries including the time series of the clusters with respect to the reference date and time when the predetermined action has been performed, in addition to the clustering performed in consideration of the relevance.

[0054] The processing unit **133** inputs, to the model, as the directive, the directive instructing to perform clustering such that a cluster includes search queries belonging to the same purpose of action on the basis of relevance among the search queries indicated by the relevance information. For example, the processing unit **133** inputs, to the model, a directive to take into consideration the relevance among search queries (such as “poles”, “skis”, and “surfboard”), thereby performing clustering with such a consideration that “poles” and “skis” having the same purpose of action of skiing are included in the same cluster, thereby generating classification of the search queries.

[0055] The processing unit **133** inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of relevance indicated by the relevance information and to

perform clustering in consideration of relevance among the clusters that have been classified. For example, in a case where the clusters are “ski equipment”, “snowboard equipment”, “marine sports”, and “surfing equipment”, the clusters of “ski equipment” and “snowboard equipment” have relevance to winter sports, and thus the processing unit **133** generates the classification of the search queries such that they are arranged close to each other when displayed in the graph in consideration of the relevance. In addition, for example, “marine sports” and “surfing equipment” have relevance to summer sports, and the information processing device **100** generates classification of the search queries in such a manner that they are arranged close to each other when displayed in the graph in consideration of the relevance.

[0056] The processing unit **133** further inputs, to the model, as the directive, the directive instructing to output description content describing each of the clusters on the basis of search queries classified to the cluster. The processing unit **133** performs clustering in consideration of the relevance information and the time-series information and generates the description content describing each of the clusters on the basis of search queries classified to the cluster. For example, the processing unit **133** generates the description content in which both the relevance information and the time-series information are taken into consideration by taking the time series indicated by the time-series information into consideration in addition to the relevance indicated by the relevance information. Furthermore, the processing unit **133** generates the description content describing each of the clusters on the basis of search queries classified to each of the clusters within a range specified by the user by taking the time-series information into consideration.

[0057] The processing unit **133** inputs, to the model, as the directive, a directive instructing to perform clustering in consideration of the time series indicated by the time-series information of the period specified by the user and the predetermined period specified by the specifying unit **132** and relevance indicated by the relevance information and, in a case where the description content in the period specified by the user and the description content in the predetermined period specified by the specifying unit **132** are different from each other in the period specified by the user, instructing to perform at least one of output of an alert or correction. For example, in a case where the period specified by the user is eight months, in a case where description content generated on the basis of search queries in eight months before and after the reference date and time when the predetermined action has been performed is different from description content for eight months of description content generated on the basis of search queries specified in a period longer than the period specified by the user (for example, ten months), the processing unit **133** outputs an alert indicating that the pieces of description content are different. Furthermore, in a case where the description content is different, the processing unit **133** corrects the description content to description content generated on the basis of search queries specified in a period longer than the period specified by the user. Note that an alert indicating that the description content is different or an alert indicating that the correction has been performed may be output simultaneously with the correction.

(Provision Unit **134**)

[0058] The provision unit **134** provides information for displaying a plurality of clusters classified by the model and the description content. For example, the provision unit **134** provides the plurality of clusters generated by the processing unit **133** and the description content to the administrator who has specified the predetermined action.

[0059] Furthermore, the provision unit **134** provides information for displaying the description content to be superimposed on the clustering result. For example, the provision unit **134** provides information for superimposing and displaying each piece of the description contents generated for one of the clusters in association with the cluster. For example, in the terminal device **10**, the description content is displayed superimposed on the clustering result.

5. Flow of Information Processing

[0060] Next, a procedure of information processing by the information processing system **1**

according to the embodiment will be described with reference to FIG. **8**. FIG. **8** is a flowchart illustrating the procedure of information processing by the information processing system **1** according to the embodiment.

[0061] As illustrated in FIG. **8**, the information processing device **100** specifies search queries of a plurality of users who has performed a predetermined action (step S**201**).

[0062] The information processing device **100** specifies time-series information and the relevance information of the search queries on the basis of the information regarding the specified search query (step S**202**).

[0063] The information processing device **100** performs clustering in consideration of the time series indicated by the time-series information and relevance indicated by the relevance information and inputs, to the model, a directive instructing to output the description content describing each of the clusters (step S**203**).

[0064] Furthermore, the information processing device **100** generates clusters and description content by inputting the directive to the model (step S**204**).

[0065] The information processing device **100** provides information for displaying the classification result of the search queries and the description content (step S**205**).

6. Effects

[0066] As described above, the information processing device **100** according to the embodiment includes: the specifying unit **132** that specifies search queries of a plurality of users who performs a predetermined action; the processing unit **133** that inputs, to a model having learned to output a character string following a character string input thereto, information regarding the search queries specified by the specifying unit **132** and a directive for clustering the search queries into a plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on the basis of search queries classified into each of the clusters to generate classification of the search queries and description content of each of the clusters; and the provision unit **134** that provides information for displaying the plurality of clusters clustered by the model and the description content.

[0067] As a result, the information processing device **100** according to the embodiment can, for example, display the description content together with the classification result of the search queries and thus can appropriately visualize the classification result of the search queries. Furthermore, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need by, for example, classifying the search queries in consideration of relevance among search queries.

[0068] In addition, the specifying unit **132** specifies the time-series information indicating time series of searches in which the search queries have been used and relevance information indicating relevance of the search queries, with a date and time when the predetermined action has been performed used as the reference date and time, and the processing unit **133** inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of time series indicated by the time-series information and relevance indicated by the relevance information.

[0069] As a result, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need by, for example, generating the plurality of clusters and the description content in time series.

[0070] The specifying unit **132** specifies the relevance information indicating relevance among the search queries, and the processing unit **133** inputs, to the model, as the directive, the directive instructing to perform clustering such that a cluster includes search queries belonging to the same purpose of action on the basis of relevance among the search queries indicated by the relevance information.

[0071] As a result, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need by, for example, classifying into clusters each including search queries belonging to the same purpose of action and visualizing

the clusters on the graph.
[0072] Furthermore, the specifying unit **132** specifies the relevance information indicating relevance among the search queries, and the processing unit **133** inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of relevance indicated by the relevance information and to perform clustering in consideration of relevance among the clusters that have been classified.
[0073] As a result, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need since, for example, clustering is performed in consideration of the relevance of the clusters, and thus clusters having relevance to each other are collectively displayed when displayed in the graph.
[0074] The processing unit **133** further inputs, to the model, as the directive, the directive instructing to output description content describing each of the clusters on the basis of search queries classified to the cluster.
[0075] As a result, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need since, for example, the description content can be displayed for each of the clusters.
[0076] In addition, as the directive, the directive is input to the model, the directive instructing to perform clustering in consideration of the time series indicated by the time-series information of the period specified by the user and the predetermined period specified by the specifying unit **132** and relevance indicated by the relevance information and, in a case where the description content in the period specified by the user and the description content in the predetermined period specified by the specifying unit **132** are different from each other in the period specified by the user, instructing to perform at least one of output of an alert or correction.
[0077] As a result, the information processing device **100** according to the embodiment can perform analysis for appropriately grasping changes in the user's need even in a case where the user cannot specify an appropriate period since, for example, the alert is output or correction is made in a case where the description content is different between the period specified by the user and the predetermined period specified by the specifying unit **132**.
7. Hardware Configuration
[0078] Furthermore, the information processing device **100** according to the above-described embodiment is implemented by, for example, a computer **1000** having a configuration as illustrated in FIG. **9**. FIG. **9** is a hardware configuration diagram illustrating an example of a computer that implements functions of the information processing device **100**. The computer **1000** includes a CPU **1100**, a RAM **1200**, a ROM **1300**, an HDD **1400**, a communication interface (I/F) **1500**, an input and output interface (I/F) **1600**, and a media interface (I/F) **1700**.
[0079] The CPU **1100** operates on the basis of a program stored in the ROM **1300** or the HDD **1400** and controls each unit. The ROM **1300** stores a boot program executed by the CPU **1100** when the computer **1000** is activated, a program dependent on the hardware of the computer **1000**, and others.
[0080] The HDD **1400** stores a program executed by the CPU **1100**, data used by the program, and others. The communication interface **1500** acquires data from another device via a predetermined communication network, sends the data to the CPU **1100**, and transmits data generated by the CPU **1100** to another device via a predetermined communication network.
[0081] The CPU **1100** controls output devices such as a display and a printer and input devices such as a keyboard and a mouse via the input and output interface **1600**. The CPU **1100** acquires data from an input device via the input and output interface **1600**. In addition, the CPU**1100** outputs generated data to an output device via the input and output interface **1600**.
[0082] The media interface **1700** reads a program or data stored in a recording medium **1800** and provides the program or data to the CPU **1100** via the RAM **1200**. The CPU**1100** loads the program from the recording medium **1800** onto the RAM **1200** via the media interface **1700** and executes

the loaded program. The recording medium **1800** is, for example, an optical recording medium such as a digital versatile disc (DVD) or a phase change rewritable disk (PD), a magneto-optical recording medium such as a magneto-optical disk (MO), a tape medium, a magnetic recording medium, a semiconductor memory, or the like.

[0083] For example, in a case where the computer **1000** functions as the information processing device **100** according to the embodiment, the CPU **1100** of the computer **1000** implements the function of the control unit **130** by executing a program loaded on the RAM **1200**. The CPU **1100** of the computer **1000** reads and executes these programs from the recording medium **1800**; however, as another example, these programs may be acquired from another device via a predetermined communication network.

8. Others

[0084] Among the processing described in the above embodiments, the whole or a part of the processing described as being performed automatically can be performed manually, or the whole or a part of the processing described as being performed manually can be performed automatically by a known method. In addition, the processing procedure, specific names, and information including various types of data and parameters described herein or illustrated in the drawings can be modified as desired unless otherwise specified. For example, the various types of information illustrated in the drawings are not limited to the illustrated information.

[0085] In addition, each component of each device illustrated in the drawings is functionally conceptual and is not necessarily physically configured as illustrated in the drawings. That is, a specific form of distribution and integration of each device is not limited to the illustrated form, and all or a part thereof can be functionally or physically distributed and integrated in any unit depending on various loads, use conditions, and others.

[0086] In addition, the above-described embodiments can be combined as appropriate within a range in which the processing contents do not contradict each other.

[0087] Although some of the embodiments of the present application have been described in detail with reference to the drawings, these are merely examples, and the present invention can be implemented in other forms in which various modifications or improvements are made on the basis of the knowledge of those skilled in the art in addition to the modes described in the disclosure of the invention.

[0088] In addition, the terms of “section, module, and unit” can be rephrased as “means”, “circuit”, or the like. For example, the acquisition unit can be rephrased as an acquisition means or an acquisition circuit.

Claims

1. The information processing device comprising: a specifying unit that specifies search queries of a plurality of users who performs a predetermined action; a processing unit that generates classification of the search queries and description content of each of a plurality of clusters by inputting, to a model having learned to output a character string following a character string input to the model, information regarding the search queries specified by the specifying unit and a directive, the directive for clustering the search queries into the plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on a basis of search queries classified into each of the clusters; and a provision unit that provides information for displaying the plurality of clusters clustered by the model and the description content.

2. The information processing device according to claim 1, wherein the specifying unit specifies time-series information indicating time series of searches in which the search queries have been used and relevance information indicating relevance of the search queries, with a date and time when the predetermined action has been performed used as a reference date and time, and the

processing unit inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of time series indicated by the time-series information and relevance indicated by the relevance information.

3. The information processing device according to claim 1, wherein the specifying unit specifies relevance information indicating relevance among the search queries, and the processing unit inputs, to the model, as the directive, the directive instructing to perform clustering such that a cluster includes search queries belonging to a same purpose of action on a basis of relevance among the search queries indicated by the relevance information.

4. The information processing device according to claim 1, wherein the specifying unit specifies relevance information indicating relevance among the search queries, and the processing unit inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of relevance indicated by the relevance information and to perform clustering in consideration of relevance among the clusters that have been classified.

5. The information processing device according to claim 2, wherein the processing unit further inputs, to the model, as the directive, the directive instructing to output the description content describing each of the clusters on a basis of search queries classified into each of the clusters.

6. The information processing device according to claim 1, wherein the specifying unit specifies time-series information indicating time series of searches in which the search queries have been used and relevance information indicating relevance of the search queries, with a date and time when the predetermined action has been performed used as a reference date and time, and the processing unit inputs, to the model, as the directive, the directive instructing to perform clustering in consideration of the time series indicated by the time-series information of a period specified by the user and a predetermined period specified by the specifying unit and relevance indicated by the relevance information and, in a case where description content in the period specified by the user and description content in the predetermined period specified by the specifying unit are different from each other in the period specified by the user, instructing to perform at least one of output of an alert or correction.

7. An information processing method executed by a computer, the method comprising: a specifying step of specifying search queries of a plurality of users who has input a predetermined action; a processing method of generating classification of the search queries and description content of each of a plurality of clusters by inputting, to a model having learned to output a character string following a character string input to the model, information regarding the search queries specified in the specifying step and a directive, the directive for clustering the search queries into the plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on a basis of search queries classified into each of the clusters; and a provision method of providing information for displaying the plurality of clusters clustered by the model and the description content.

8. A non-transitory computer readable storage medium having stored therein an information processing program that causes a computer to execute: a specifying step of specifying search queries of a plurality of users who has input a predetermined action; a processing step of generating classification of the search queries and description content of each of a plurality of clusters by inputting, to a model having learned to output a character string following a character string input to the model, information regarding the search queries specified in the specifying step and a directive, the directive for clustering the search queries into the plurality of clusters in consideration of relevance among search queries and outputting description content describing each of the clusters on a basis of search queries classified into each of the clusters; and a provision step of providing information for displaying the plurality of clusters clustered by the model and the description content.