US 20250258854A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0258854 A1**

HASHIMOTO (43) **Pub. Date: Aug. 14, 2025**

(54) **CONTENT PROCESSING METHOD AND COMPUTER-READABLE MEDIUM**

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(21) Appl. No.: **19/098,406**

(22) Filed: **Apr. 2, 2025**

Related U.S. Application Data

(63) Continuation of application No. 18/627,150, filed on Apr. 4, 2024, now Pat. No. 12,292,911, which is a continuation of application No. PCT/JP2022/034210, filed on Sep. 13, 2022.

(30) **Foreign Application Priority Data**

Oct. 8, 2021 (JP) 2021-166514

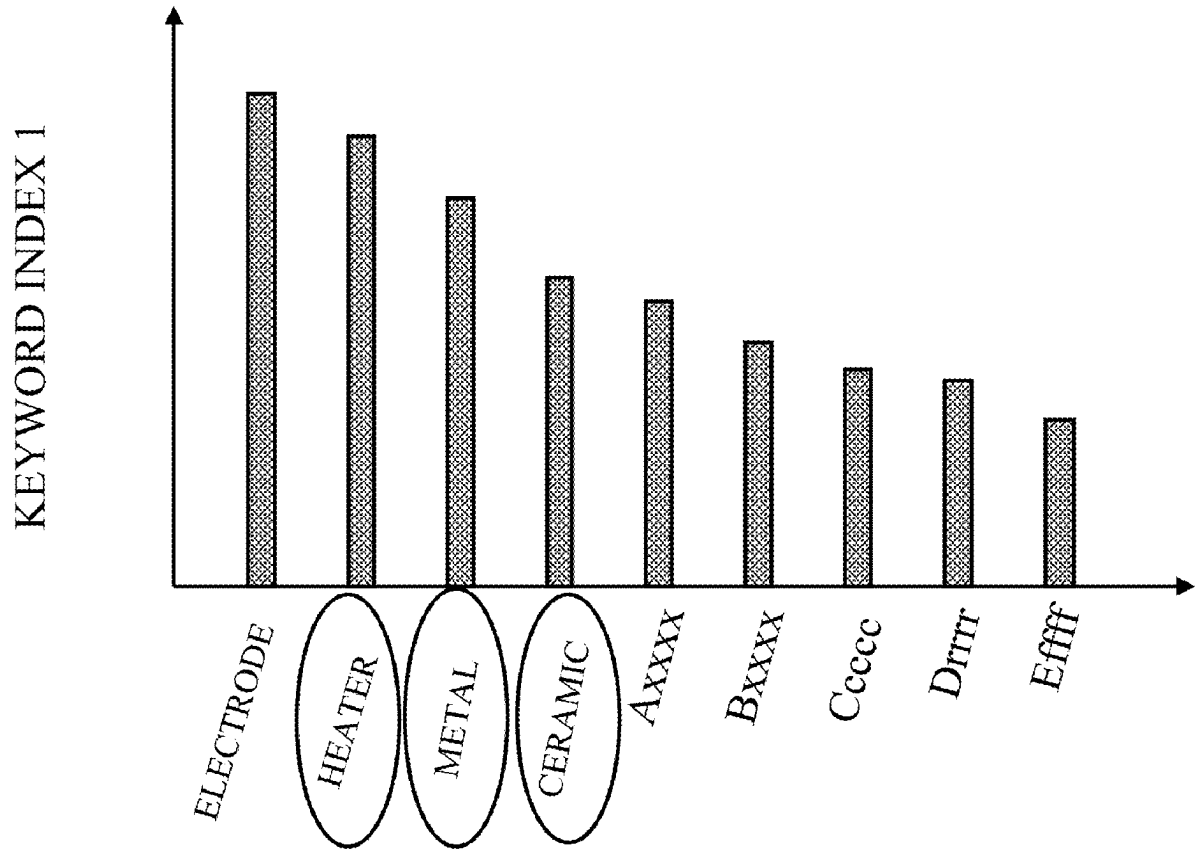
Publication Classification

(51) **Int. Cl.**
G06F 16/338 (2019.01)

(52) **U.S. Cl.**
CPC ***G06F 16/338*** (2019.01)

(57) **ABSTRACT**

Provided is a content processing method for determining a degree of priority of presentation of each of a plurality of contents, comprising: identifying the plurality of contents; receiving a first set including contents given positive evaluations and a second set including contents given negative evaluations from among the plurality of contents; extracting a first word set included in the first set and a second word set included in the second set; identifying a plurality of keywords including a plurality of positive keywords related to the first set and a plurality of negative keywords related to the second set according to a first evaluation criterion, the plurality of positive keywords being identified based on the first word set, the plurality of negative keywords being identified based on the second word set; giving weights to the plurality of keywords according to a second evaluation criterion so as to give a weight of zero or more to each of the plurality of positive keywords and give a weight of zero or less to each of the plurality of negative keywords; deriving a total for each of the plurality of contents by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and the given weight for the each of the plurality of keywords to obtain the total for each of the plurality of contents; and determining the degree of priority of presentation of each of the plurality of contents based on the total for the each of the plurality of contents.



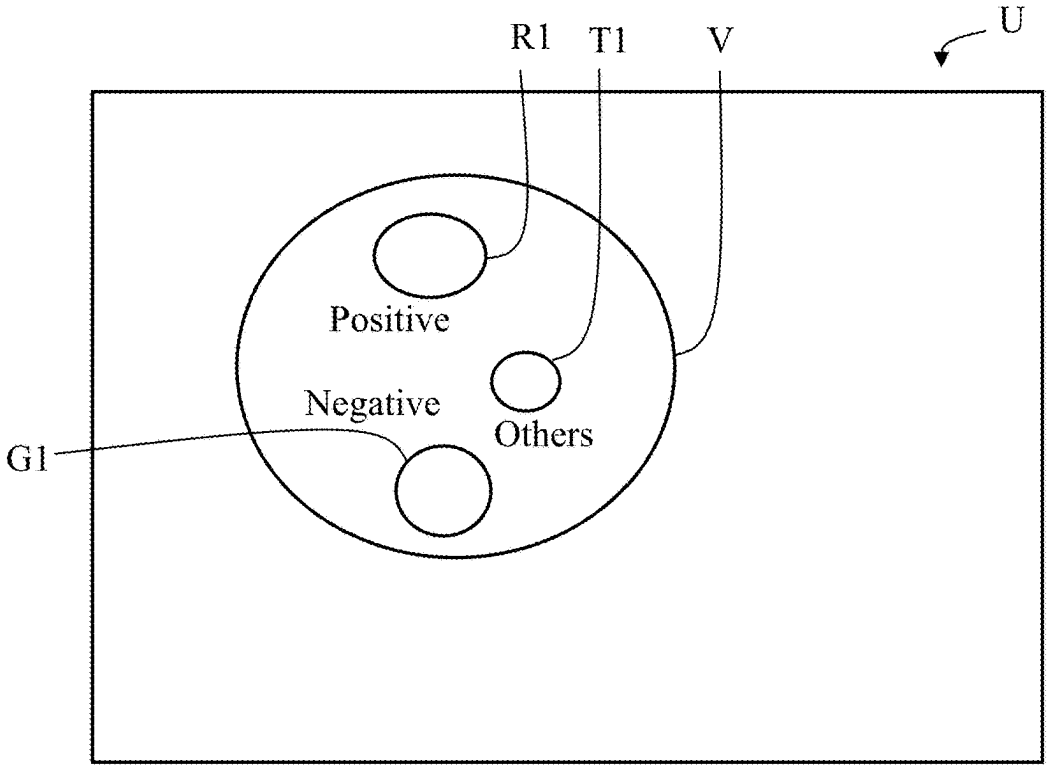

R1
T1
V
U
Positive
Negative
Others
G1

FIG.1A

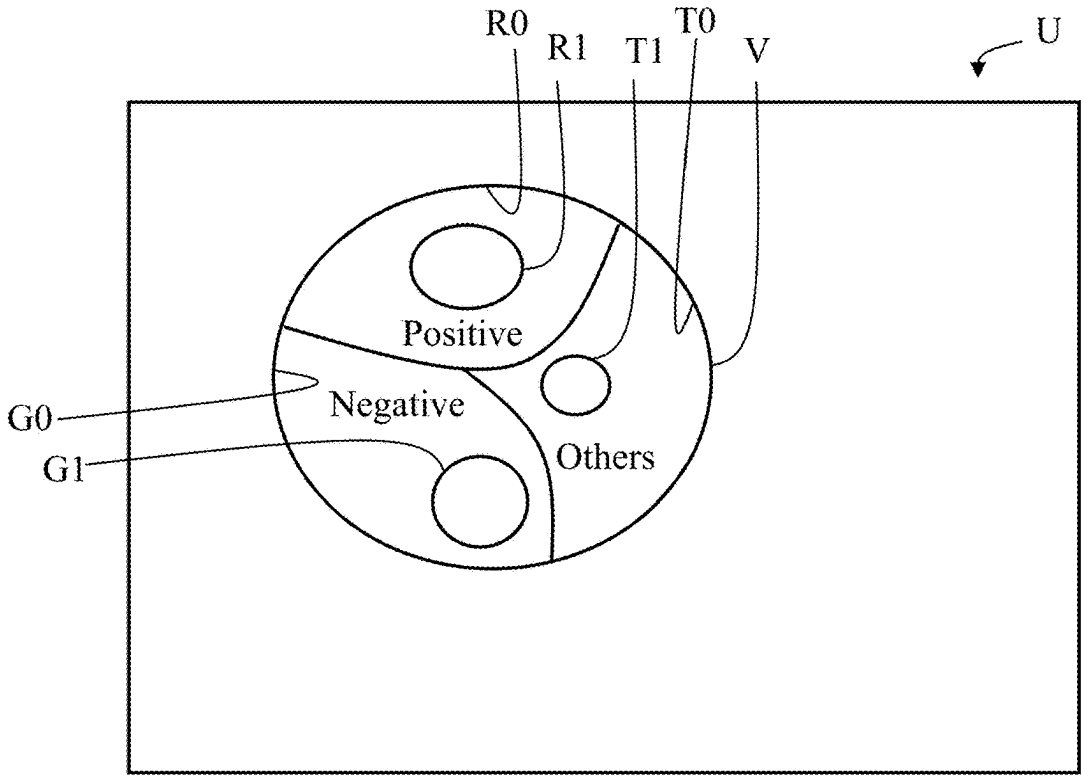

R0
R1
T1
T0
V
U
Positive
Negative
Others
G0
G1

FIG.1B

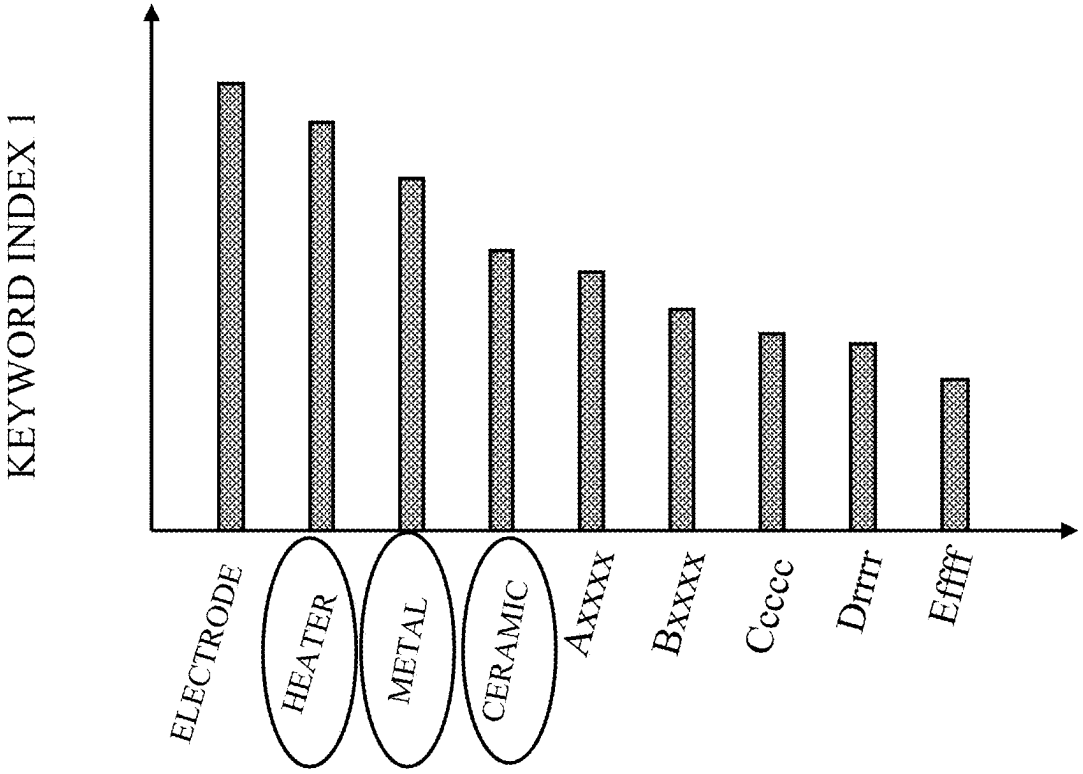


FIG.2A

No.	POSITIVE KEYWORD	SYNONYMS & VARIANT NOTATIONS	WEIGHT (r)
1	HEATER		5
2	METAL	COPPER, IRON	2
3	CERAMIC		1
4			

FIG.2B

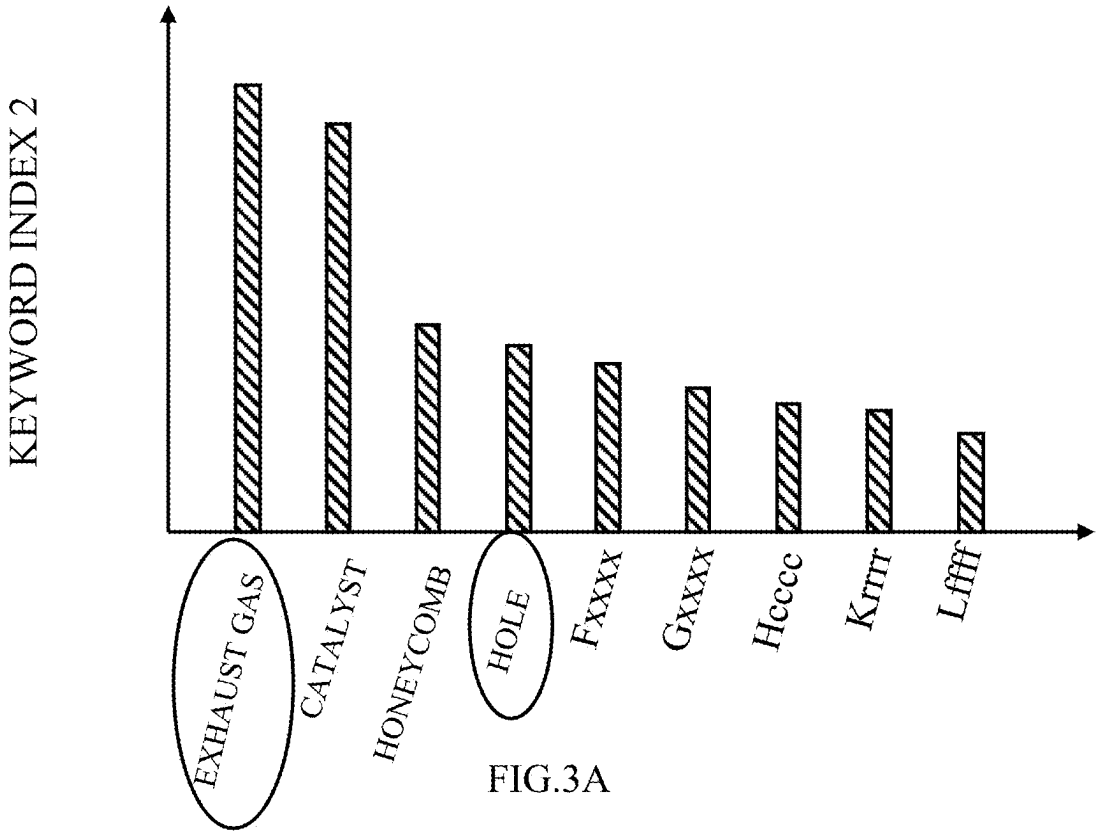


FIG.3A

No.	NEGATIVE KEYWORD	SYNONYMS & VARIANT NOTATIONS	WEIGHT (r)
1	EXHAUST GAS		-5
2	HOLE	GAP	-3
3			
4			

FIG.3B

400

No.	m	Total(m)	BELONGING SET
1	45	20124	R1
2	3	18415	R0
3	89	12441	R0
4	59	10020	R0
5	182	8920	G0
199	42	-6040	G1
200	5	-12001	T0

FIG.4A

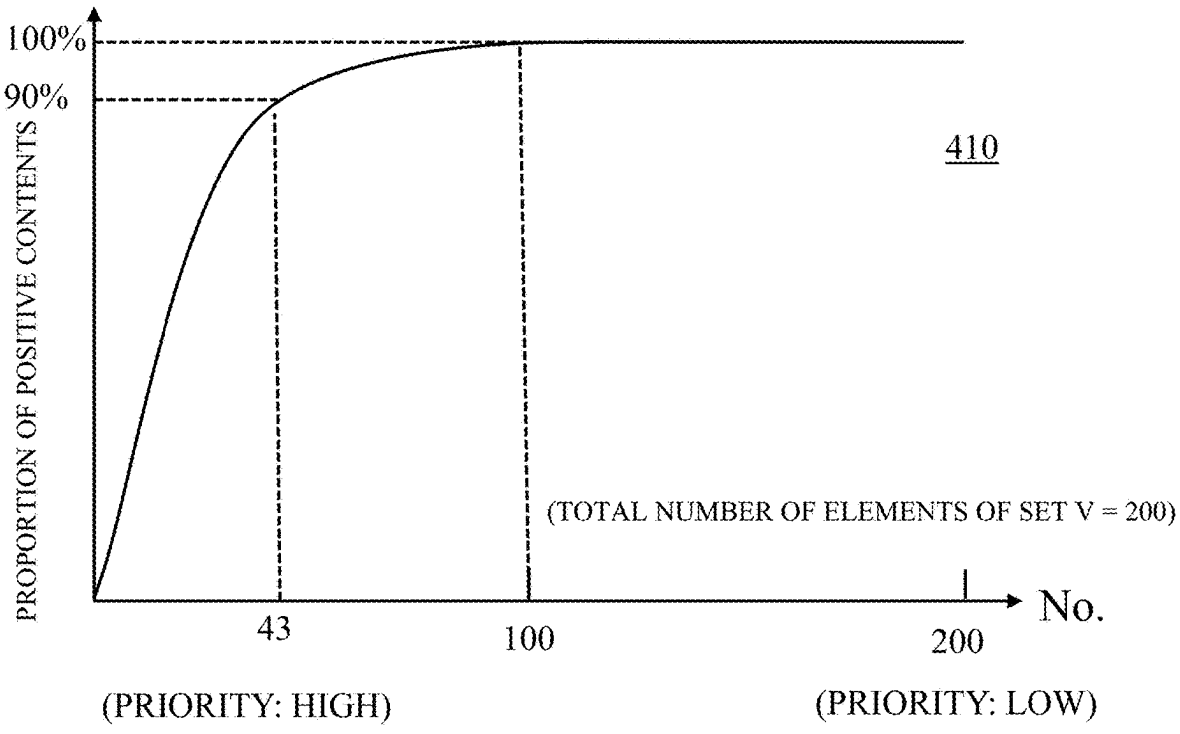


FIG.4B

No.	m	Total(m)	BELONGING SET	i
1	45	20124	R1	
2	56	20001	R1	
3	74	18410	G1	
4	158	15441	R1	
5	140	8950	G1	
6	5	5621	R1	
7	26	5552	G1	
8	21	4201	R1	
9	167	500	T1	
10	142	12	G1	
11	112	-41	R1	
12	103	-56	G1	
13	52	-543	G1	
14	42	-1512	T1	
15	22	-2201	T1	
16	86	-2540	G1	
17	66	-2901	G1	

520

522

500

502 504 506

No.	KEYWORD	WEIGHT (r)
1	HEATER	5
2	METAL	2
3	CERAMIC	1
4	EXHAUST GAS	-5
5	HOLE	-3
6		
7		

FIG.5A

No.	m	Total(m)	BELONGING SET	i
1	45	18200	R1	
2	56	17502	R1	
3	158	16410	R1	
4	74	15441	G1	
5	21	8950	R1	
6	5	5621	R1	
7	112	5552	R1	
8	140	4201	G1	
9	167	500	T1	
10	142	12	G1	
11	26	-41	R1	
12	103	-56	G1	
13	52	-543	G1	
14	42	-1512	T1	
15	22	-2201	T1	
16	86	-2540	G1	
17	66	-2901	G1	

521

522

501

512 506

No.	KEYWORD	WEIGHT (r)
1	HEATER	1
2	METAL	2
3	CERAMIC	1
4	EXHAUST GAS	-5
5	HOLE	-3
6		
7		

FIG.5B

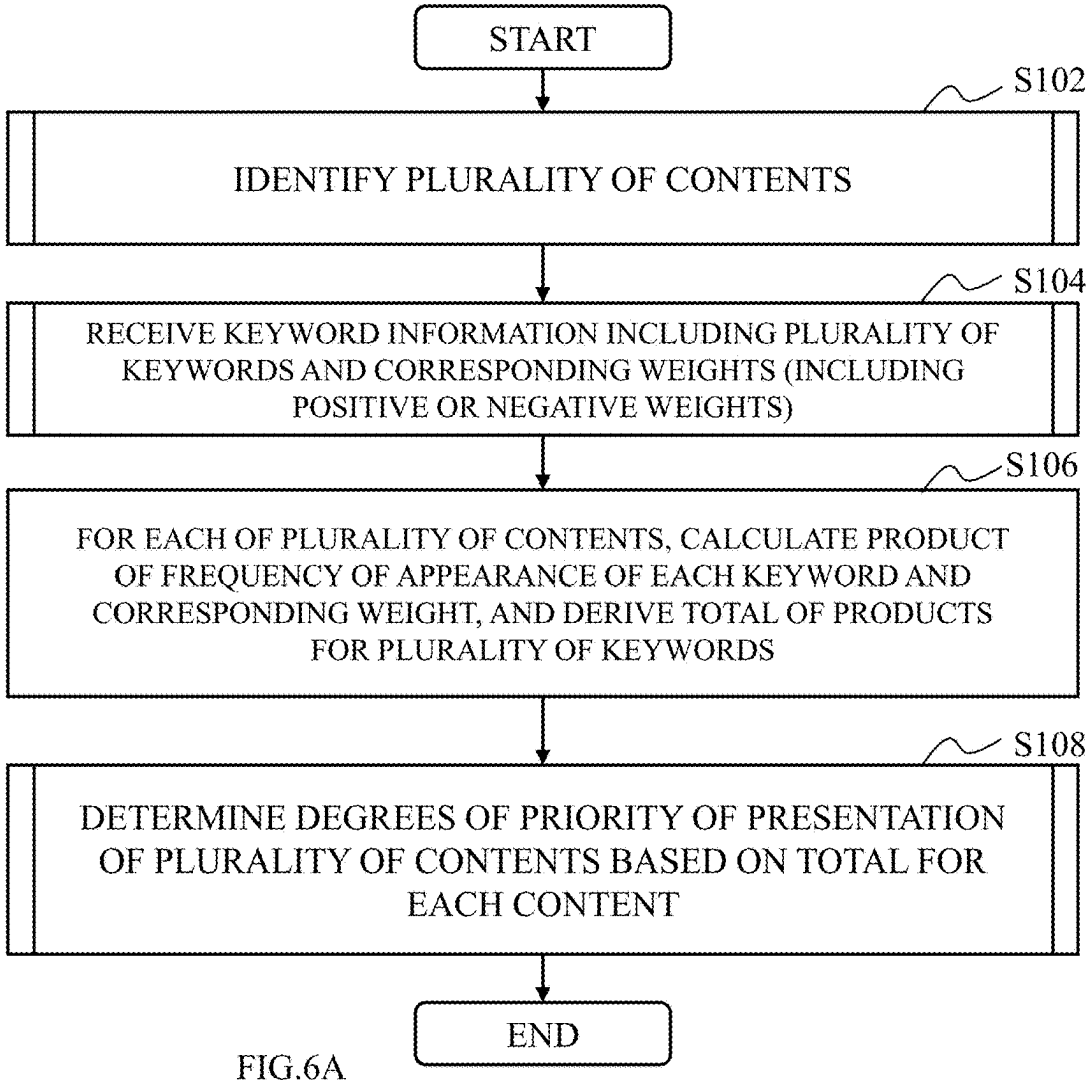

START
S102
IDENTIFY PLURALITY OF CONTENTS
S104
RECEIVE KEYWORD INFORMATION INCLUDING PLURALITY OF KEYWORDS AND CORRESPONDING WEIGHTS (INCLUDING POSITIVE OR NEGATIVE WEIGHTS)
S106
FOR EACH OF PLURALITY OF CONTENTS, CALCULATE PRODUCT OF FREQUENCY OF APPEARANCE OF EACH KEYWORD AND CORRESPONDING WEIGHT, AND DERIVE TOTAL OF PRODUCTS FOR PLURALITY OF KEYWORDS
S108
DETERMINE DEGREES OF PRIORITY OF PRESENTATION OF PLURALITY OF CONTENTS BASED ON TOTAL FOR EACH CONTENT
END

FIG.6A

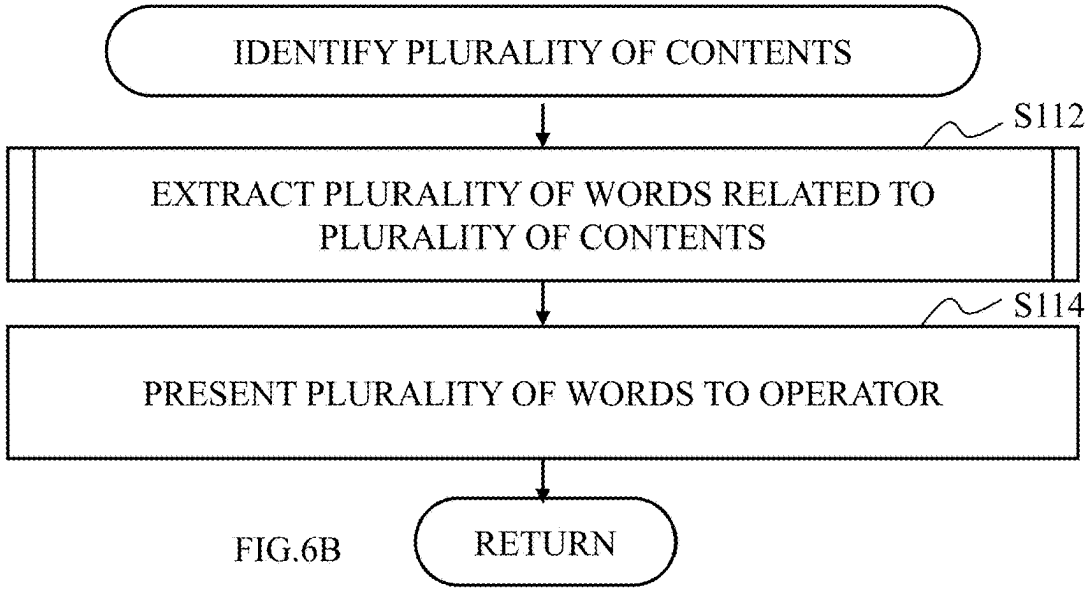

IDENTIFY PLURALITY OF CONTENTS
S112
EXTRACT PLURALITY OF WORDS RELATED TO PLURALITY OF CONTENTS
S114
PRESENT PLURALITY OF WORDS TO OPERATOR
RETURN

FIG.6B

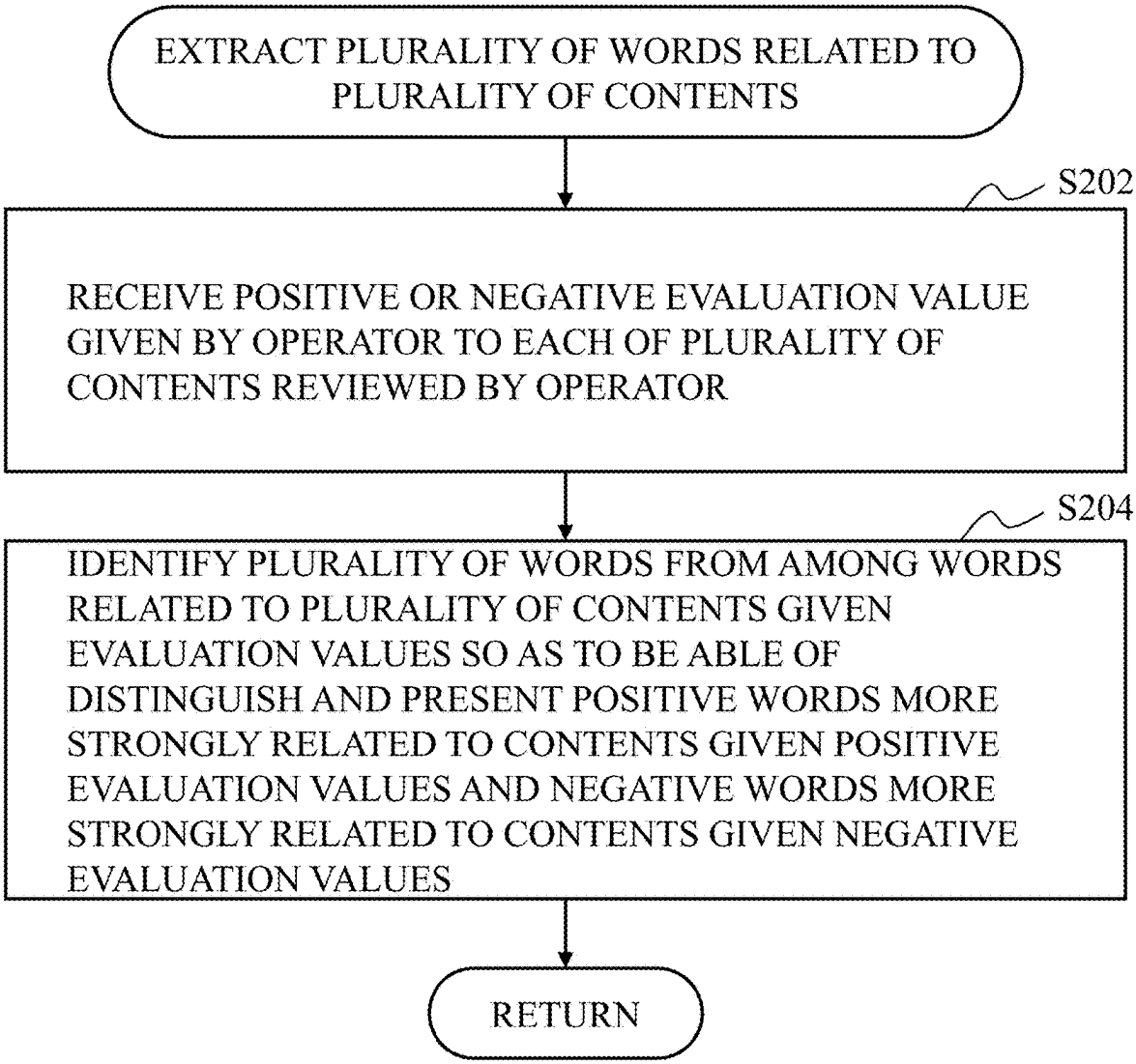

EXTRACT PLURALITY OF WORDS RELATED TO PLURALITY OF CONTENTS
S202
RECEIVE POSITIVE OR NEGATIVE EVALUATION VALUE GIVEN BY OPERATOR TO EACH OF PLURALITY OF CONTENTS REVIEWED BY OPERATOR
S204
IDENTIFY PLURALITY OF WORDS FROM AMONG WORDS RELATED TO PLURALITY OF CONTENTS GIVEN EVALUATION VALUES SO AS TO BE ABLE OF DISTINGUISH AND PRESENT POSITIVE WORDS MORE STRONGLY RELATED TO CONTENTS GIVEN POSITIVE EVALUATION VALUES AND NEGATIVE WORDS MORE STRONGLY RELATED TO CONTENTS GIVEN NEGATIVE EVALUATION VALUES
RETURN

FIG.7

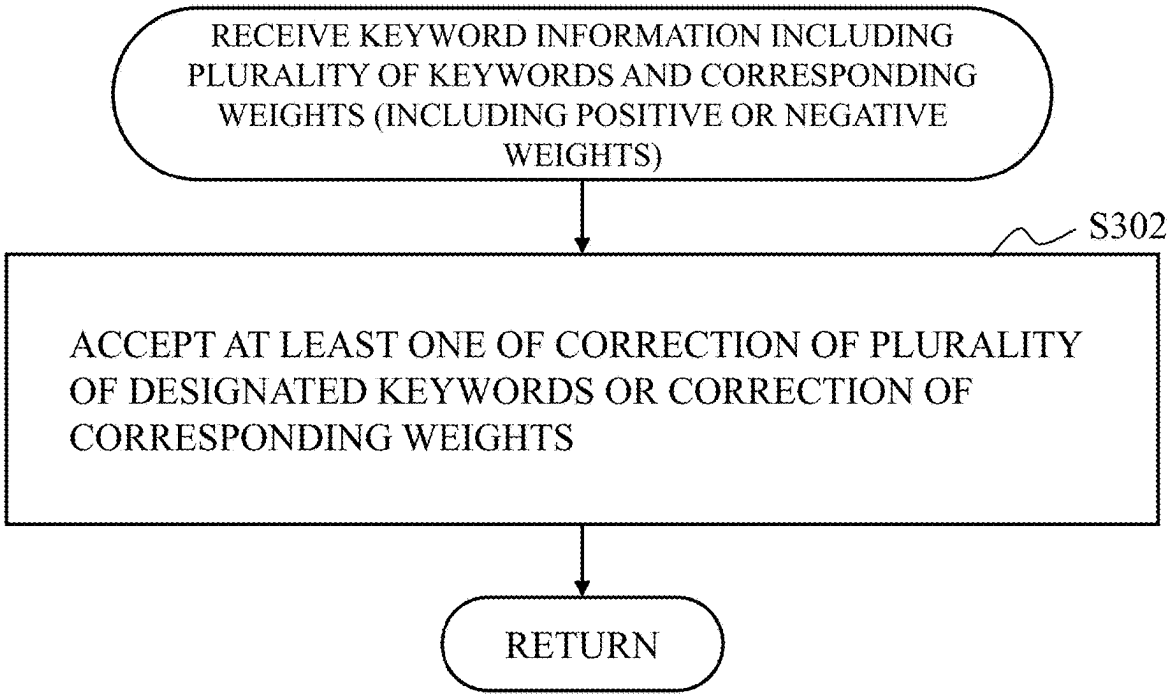

RECEIVE KEYWORD INFORMATION INCLUDING PLURALITY OF KEYWORDS AND CORRESPONDING WEIGHTS (INCLUDING POSITIVE OR NEGATIVE WEIGHTS)
S302
ACCEPT AT LEAST ONE OF CORRECTION OF PLURALITY OF DESIGNATED KEYWORDS OR CORRECTION OF CORRESPONDING WEIGHTS
RETURN

FIG.8A

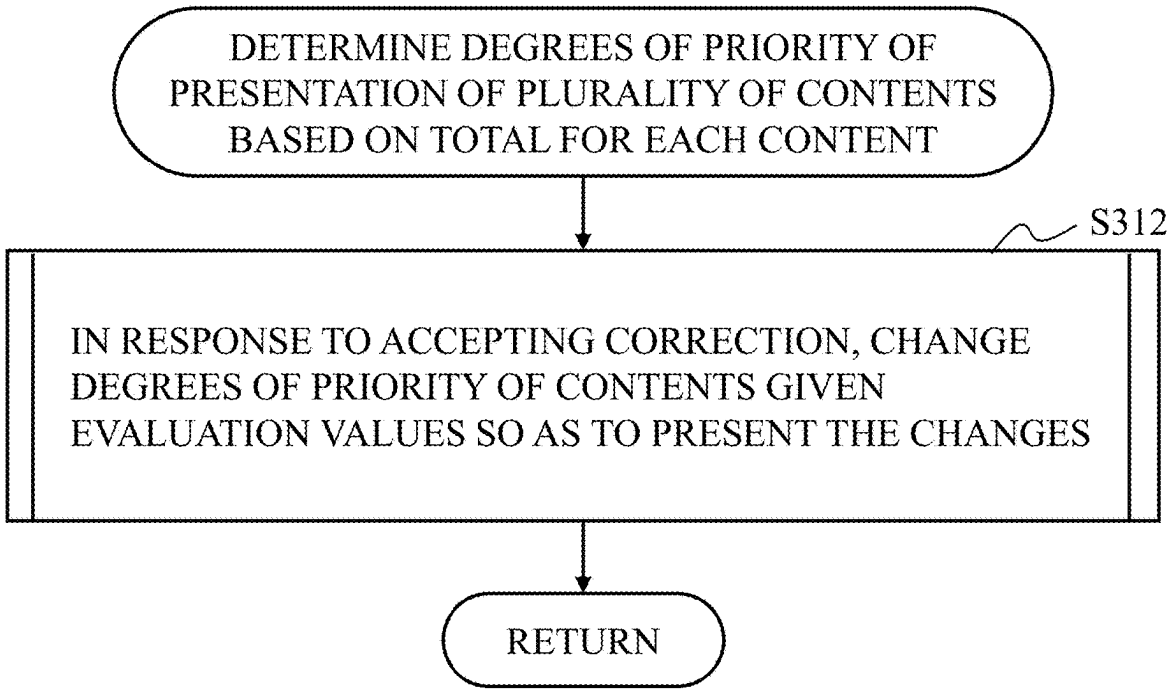

DETERMINE DEGREES OF PRIORITY OF PRESENTATION OF PLURALITY OF CONTENTS BASED ON TOTAL FOR EACH CONTENT
S312
IN RESPONSE TO ACCEPTING CORRECTION, CHANGE DEGREES OF PRIORITY OF CONTENTS GIVEN EVALUATION VALUES SO AS TO PRESENT THE CHANGES
RETURN

FIG.8B

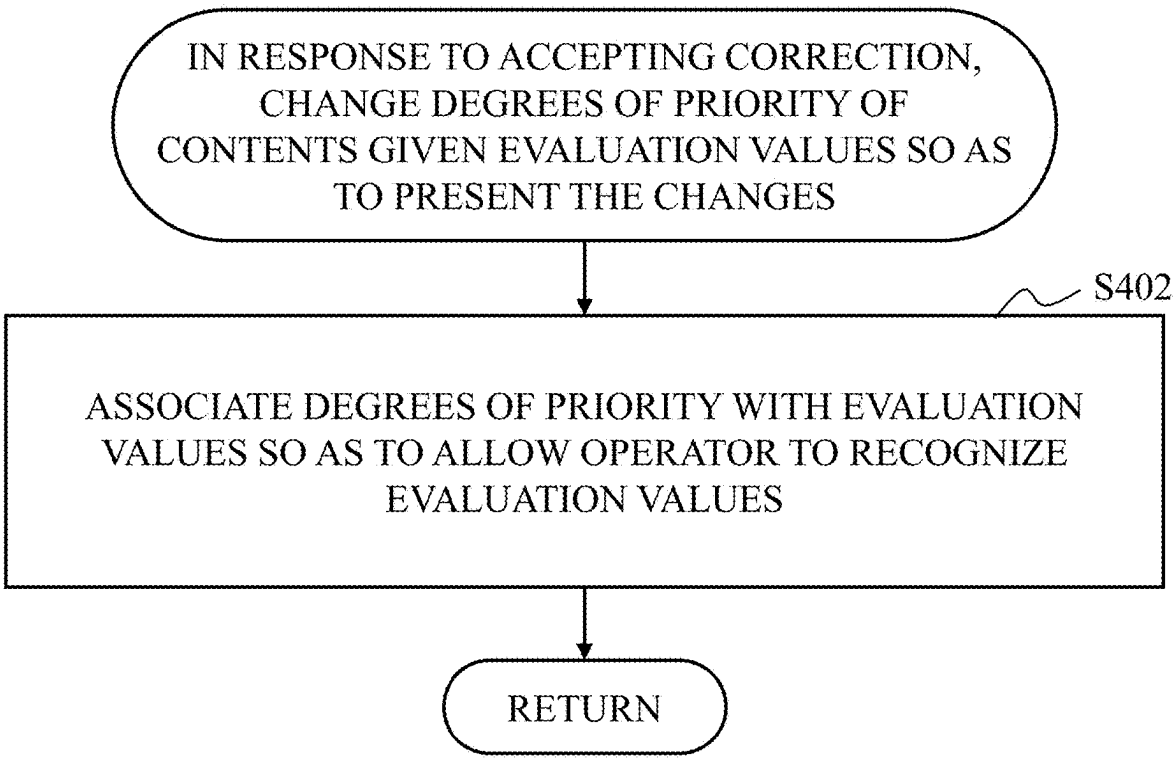

IN RESPONSE TO ACCEPTING CORRECTION, CHANGE DEGREES OF PRIORITY OF CONTENTS GIVEN EVALUATION VALUES SO AS TO PRESENT THE CHANGES
S402
ASSOCIATE DEGREES OF PRIORITY WITH EVALUATION VALUES SO AS TO ALLOW OPERATOR TO RECOGNIZE EVALUATION VALUES
RETURN

FIG.9

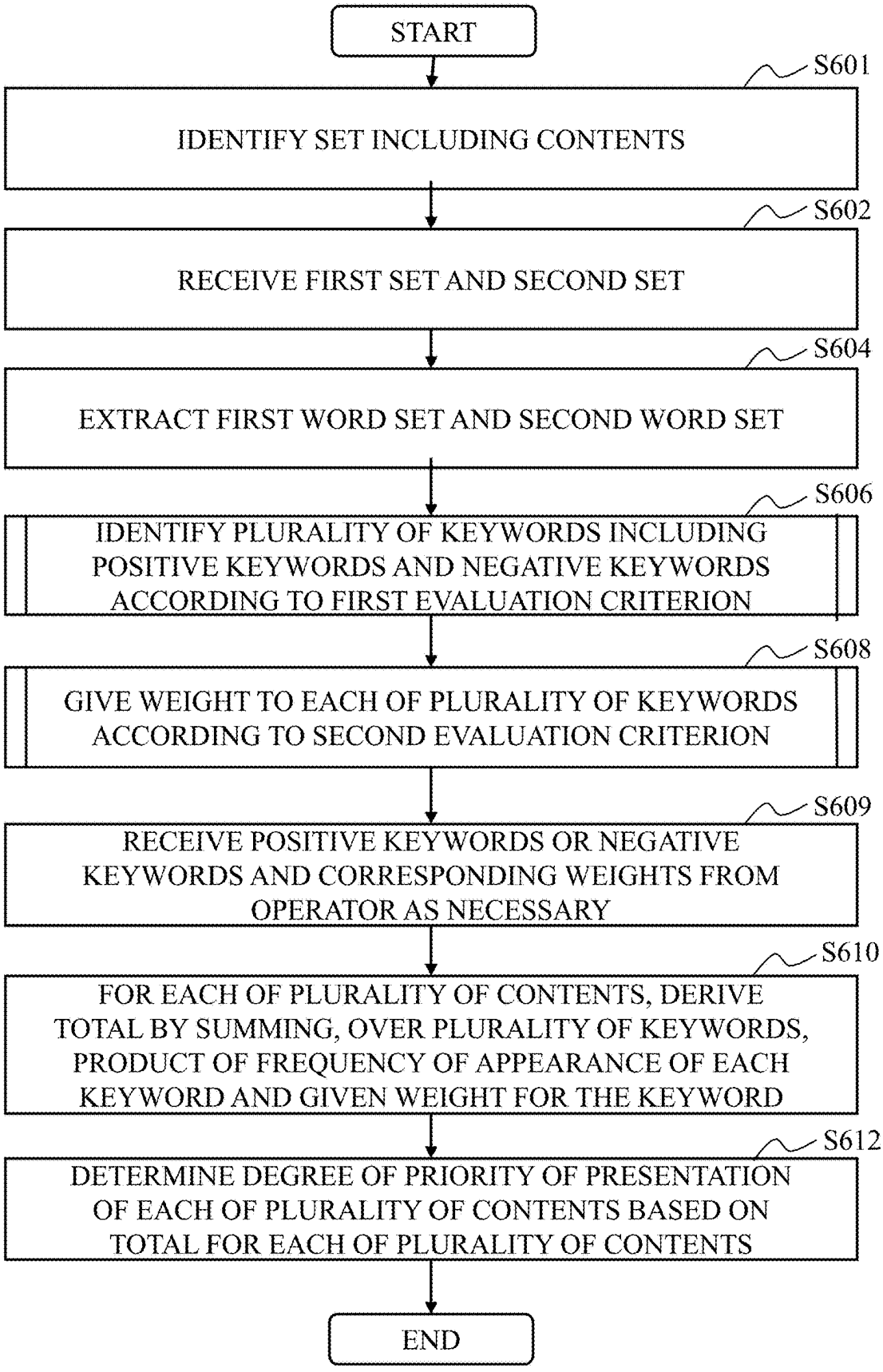

START
S601
IDENTIFY SET INCLUDING CONTENTS
S602
RECEIVE FIRST SET AND SECOND SET
S604
EXTRACT FIRST WORD SET AND SECOND WORD SET
S606
IDENTIFY PLURALITY OF KEYWORDS INCLUDING POSITIVE KEYWORDS AND NEGATIVE KEYWORDS ACCORDING TO FIRST EVALUATION CRITERION
S608
GIVE WEIGHT TO EACH OF PLURALITY OF KEYWORDS ACCORDING TO SECOND EVALUATION CRITERION
S609
RECEIVE POSITIVE KEYWORDS OR NEGATIVE KEYWORDS AND CORRESPONDING WEIGHTS FROM OPERATOR AS NECESSARY
S610
FOR EACH OF PLURALITY OF CONTENTS, DERIVE TOTAL BY SUMMING, OVER PLURALITY OF KEYWORDS, PRODUCT OF FREQUENCY OF APPEARANCE OF EACH KEYWORD AND GIVEN WEIGHT FOR THE KEYWORD
S612
DETERMINE DEGREE OF PRIORITY OF PRESENTATION OF EACH OF PLURALITY OF CONTENTS BASED ON TOTAL FOR EACH OF PLURALITY OF CONTENTS
END

FIG.10

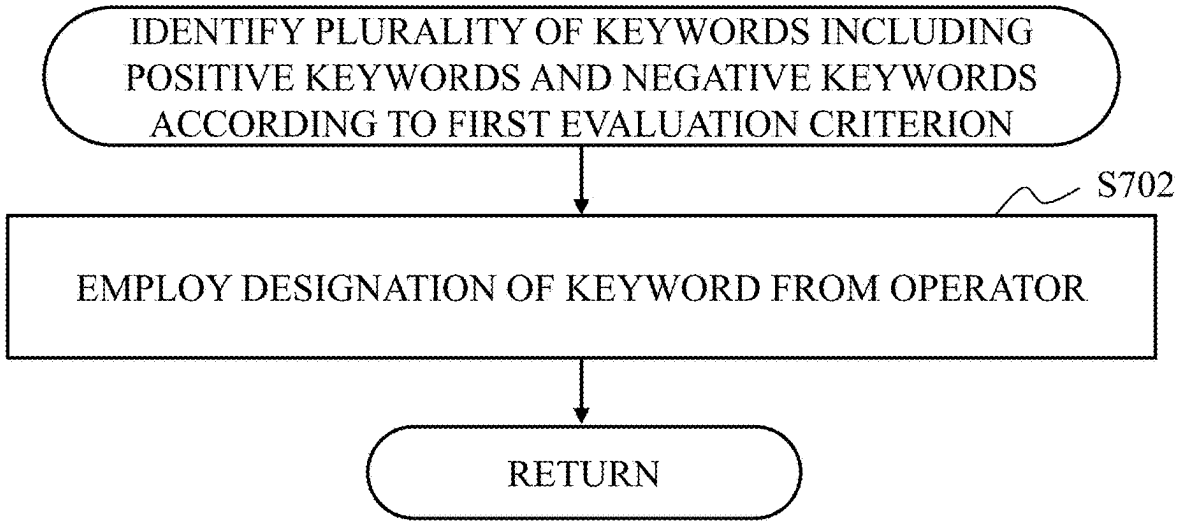

IDENTIFY PLURALITY OF KEYWORDS INCLUDING POSITIVE KEYWORDS AND NEGATIVE KEYWORDS ACCORDING TO FIRST EVALUATION CRITERION
S702
EMPLOY DESIGNATION OF KEYWORD FROM OPERATOR
RETURN

FIG.11

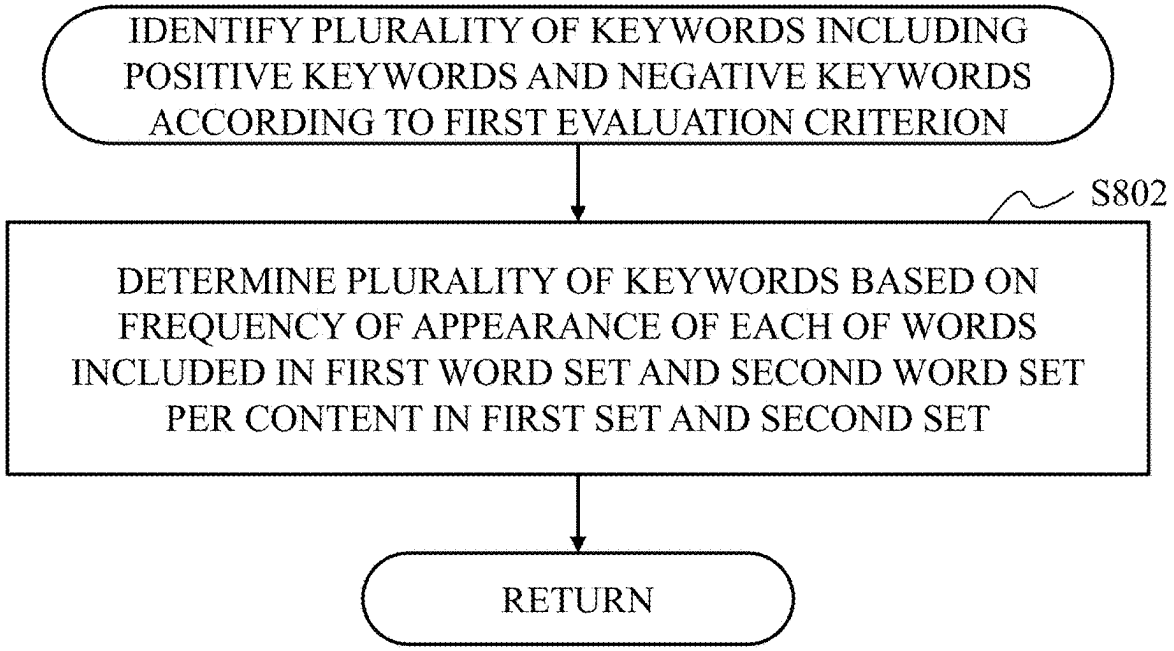


FIG.12A

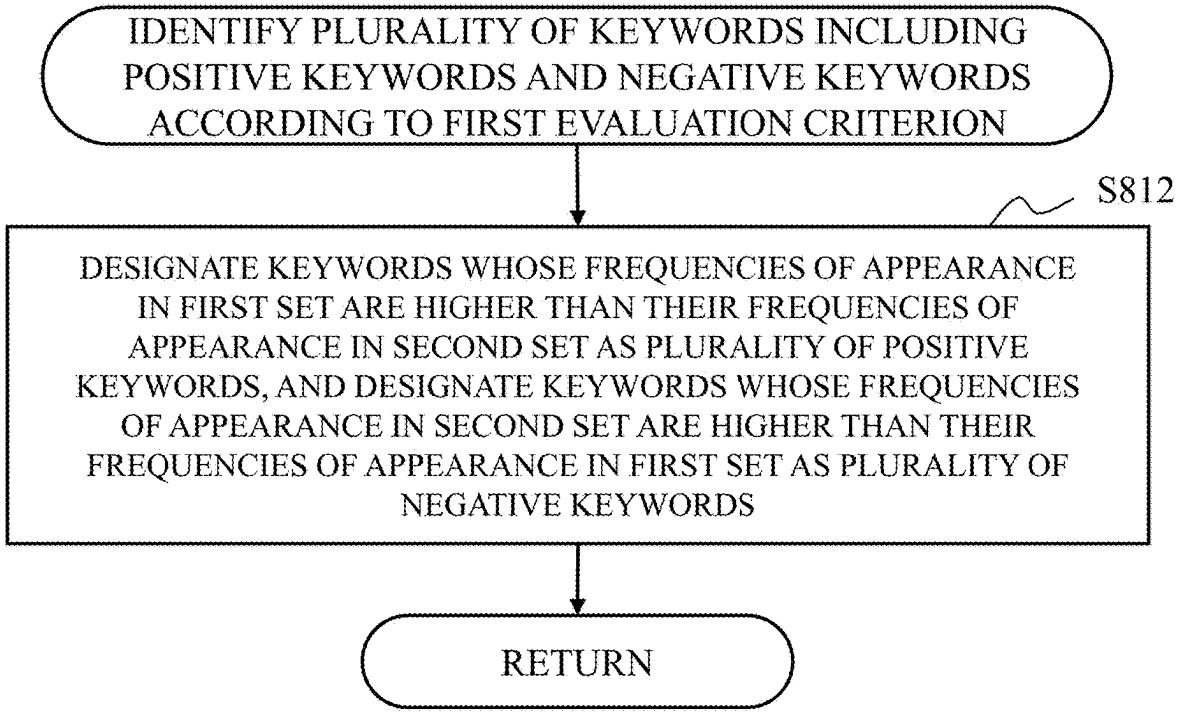


FIG.12B

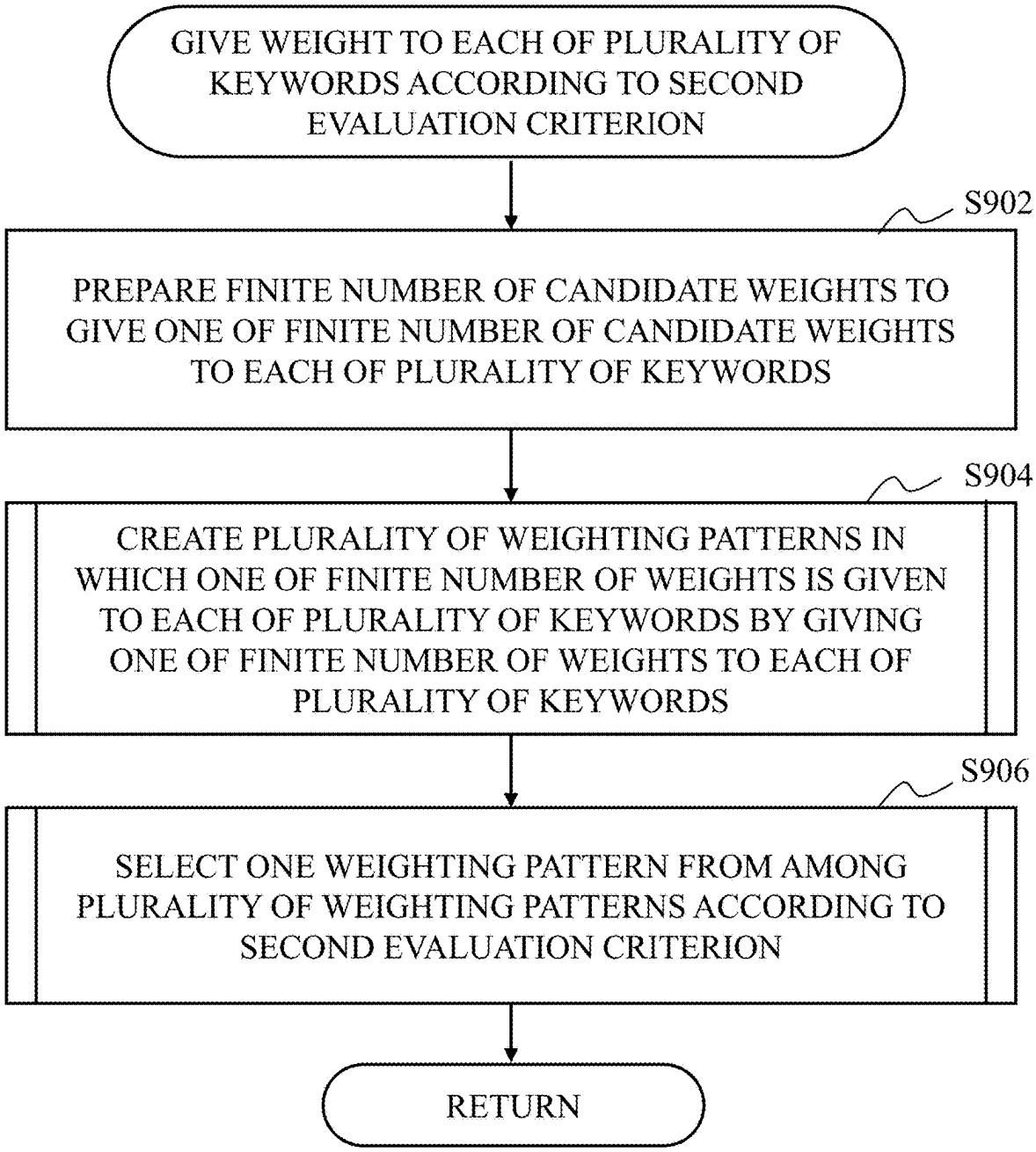

GIVE WEIGHT TO EACH OF PLURALITY OF KEYWORDS ACCORDING TO SECOND EVALUATION CRITERION
S902
PREPARE FINITE NUMBER OF CANDIDATE WEIGHTS TO GIVE ONE OF FINITE NUMBER OF CANDIDATE WEIGHTS TO EACH OF PLURALITY OF KEYWORDS
S904
CREATE PLURALITY OF WEIGHTING PATTERNS IN WHICH ONE OF FINITE NUMBER OF WEIGHTS IS GIVEN TO EACH OF PLURALITY OF KEYWORDS BY GIVING ONE OF FINITE NUMBER OF WEIGHTS TO EACH OF PLURALITY OF KEYWORDS
S906
SELECT ONE WEIGHTING PATTERN FROM AMONG PLURALITY OF WEIGHTING PATTERNS ACCORDING TO SECOND EVALUATION CRITERION
RETURN

FIG.13

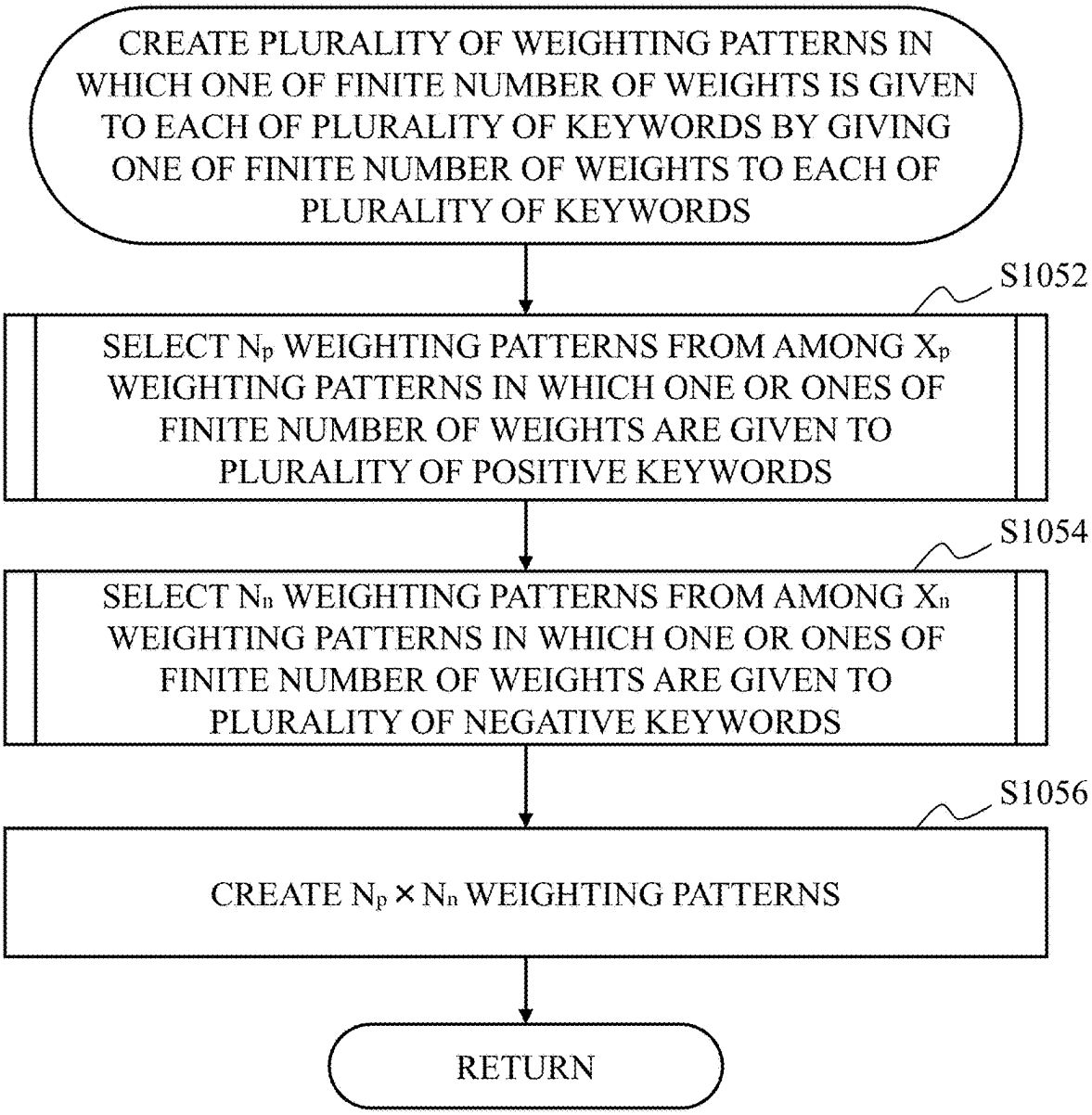

CREATE PLURALITY OF WEIGHTING PATTERNS IN WHICH ONE OF FINITE NUMBER OF WEIGHTS IS GIVEN TO EACH OF PLURALITY OF KEYWORDS BY GIVING ONE OF FINITE NUMBER OF WEIGHTS TO EACH OF PLURALITY OF KEYWORDS
S1052
SELECT N_p WEIGHTING PATTERNS FROM AMONG X_p WEIGHTING PATTERNS IN WHICH ONE OR ONES OF FINITE NUMBER OF WEIGHTS ARE GIVEN TO PLURALITY OF POSITIVE KEYWORDS
S1054
SELECT N_n WEIGHTING PATTERNS FROM AMONG X_n WEIGHTING PATTERNS IN WHICH ONE OR ONES OF FINITE NUMBER OF WEIGHTS ARE GIVEN TO PLURALITY OF NEGATIVE KEYWORDS
S1056
CREATE $N_p \times N_n$ WEIGHTING PATTERNS
RETURN

FIG.14

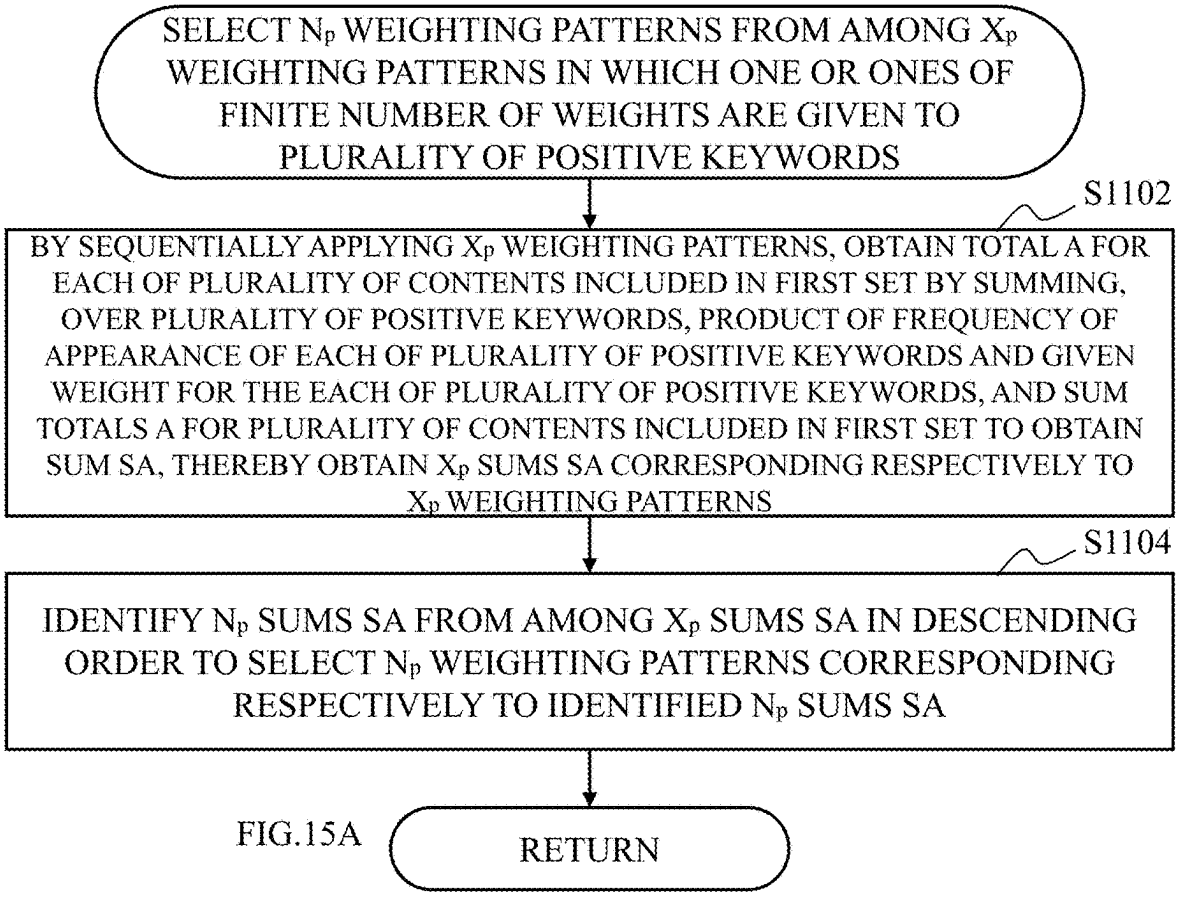


FIG.15A

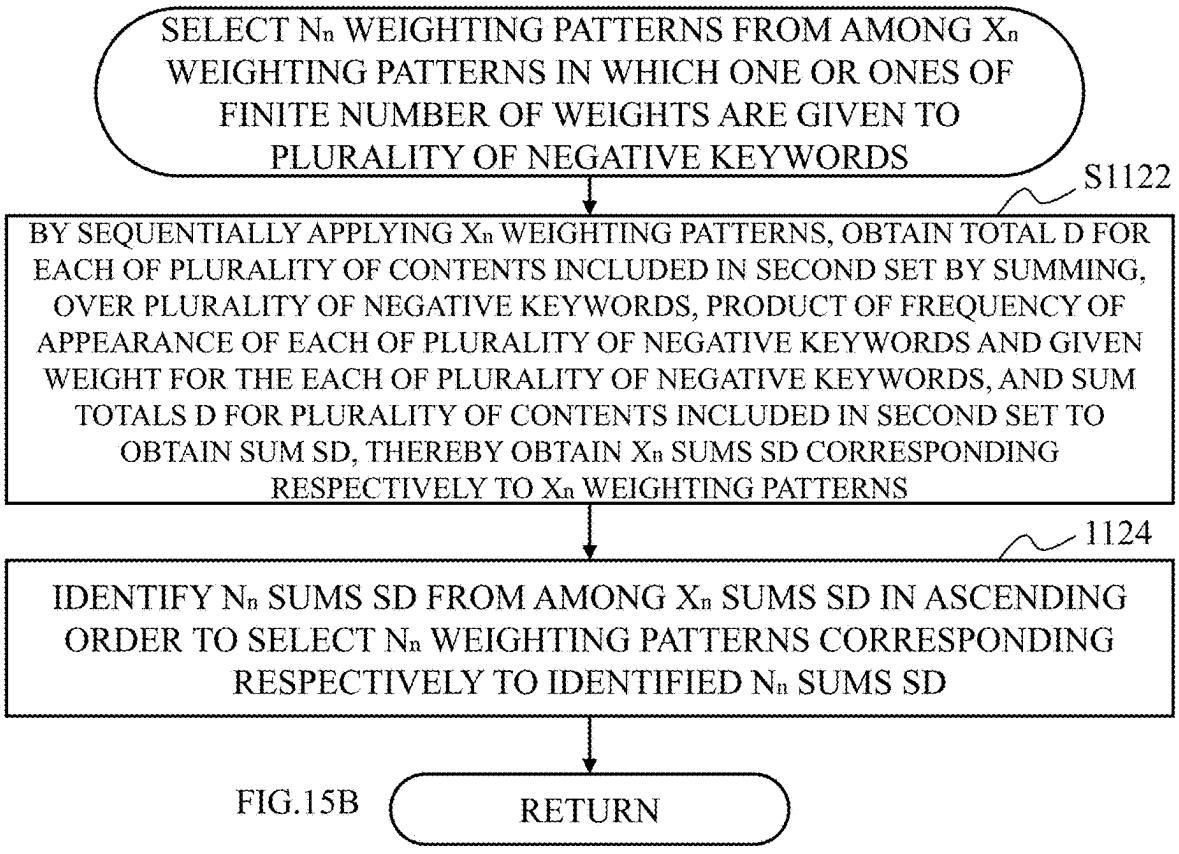


FIG.15B

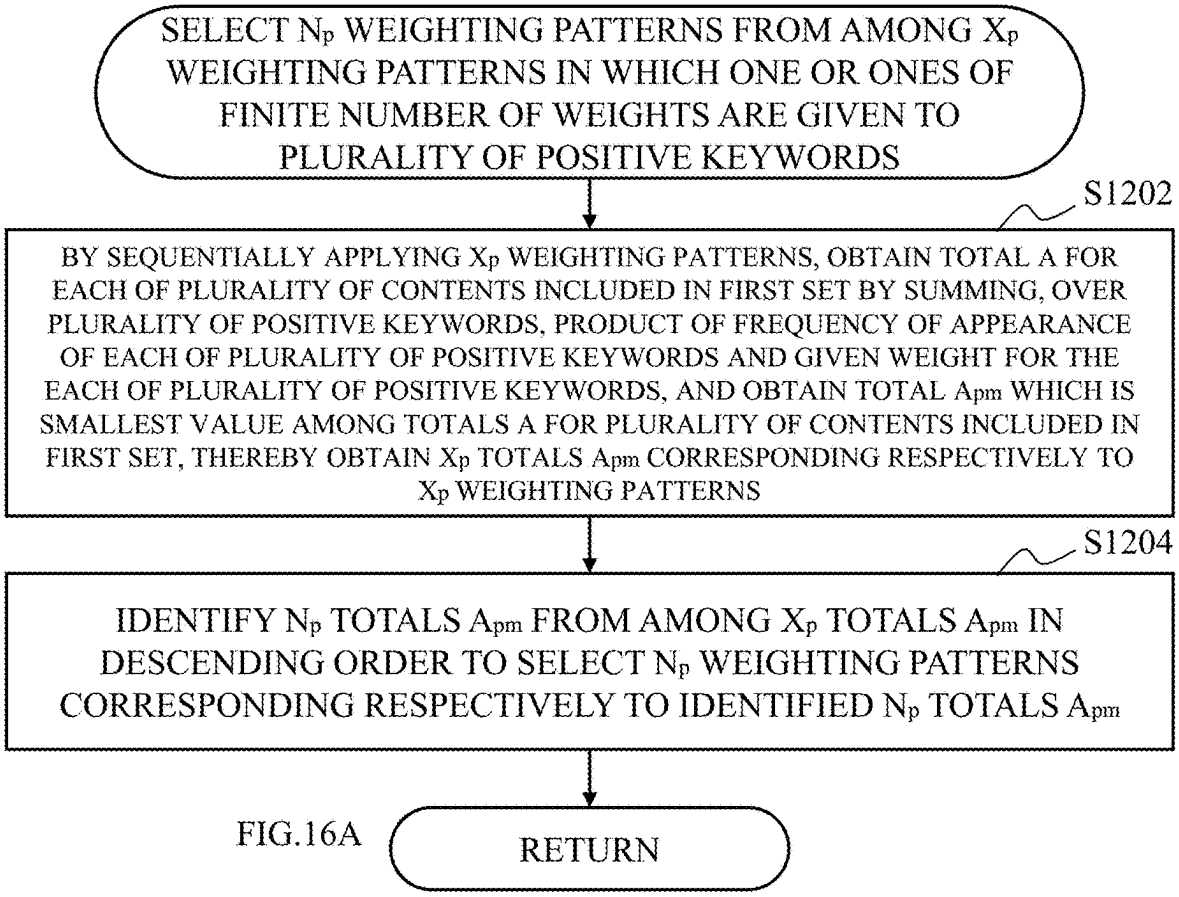


FIG.16A

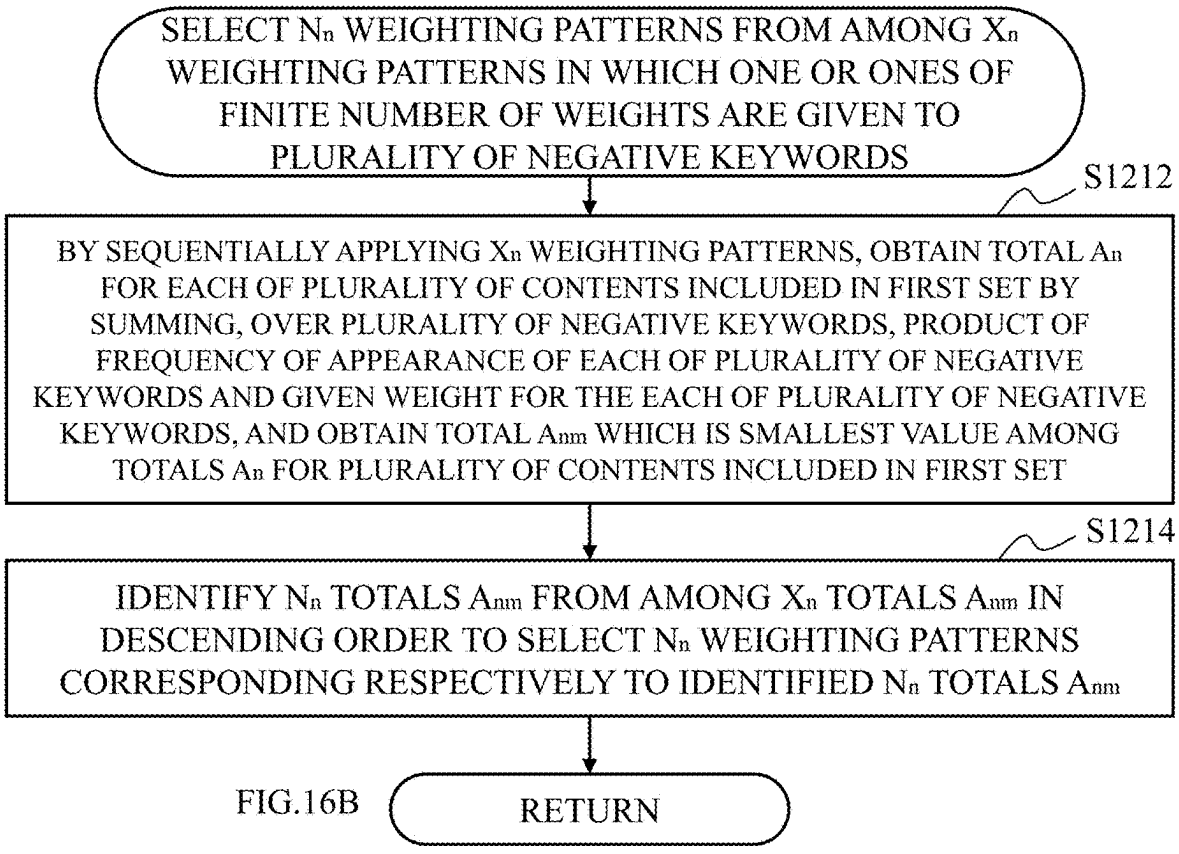


FIG.16B

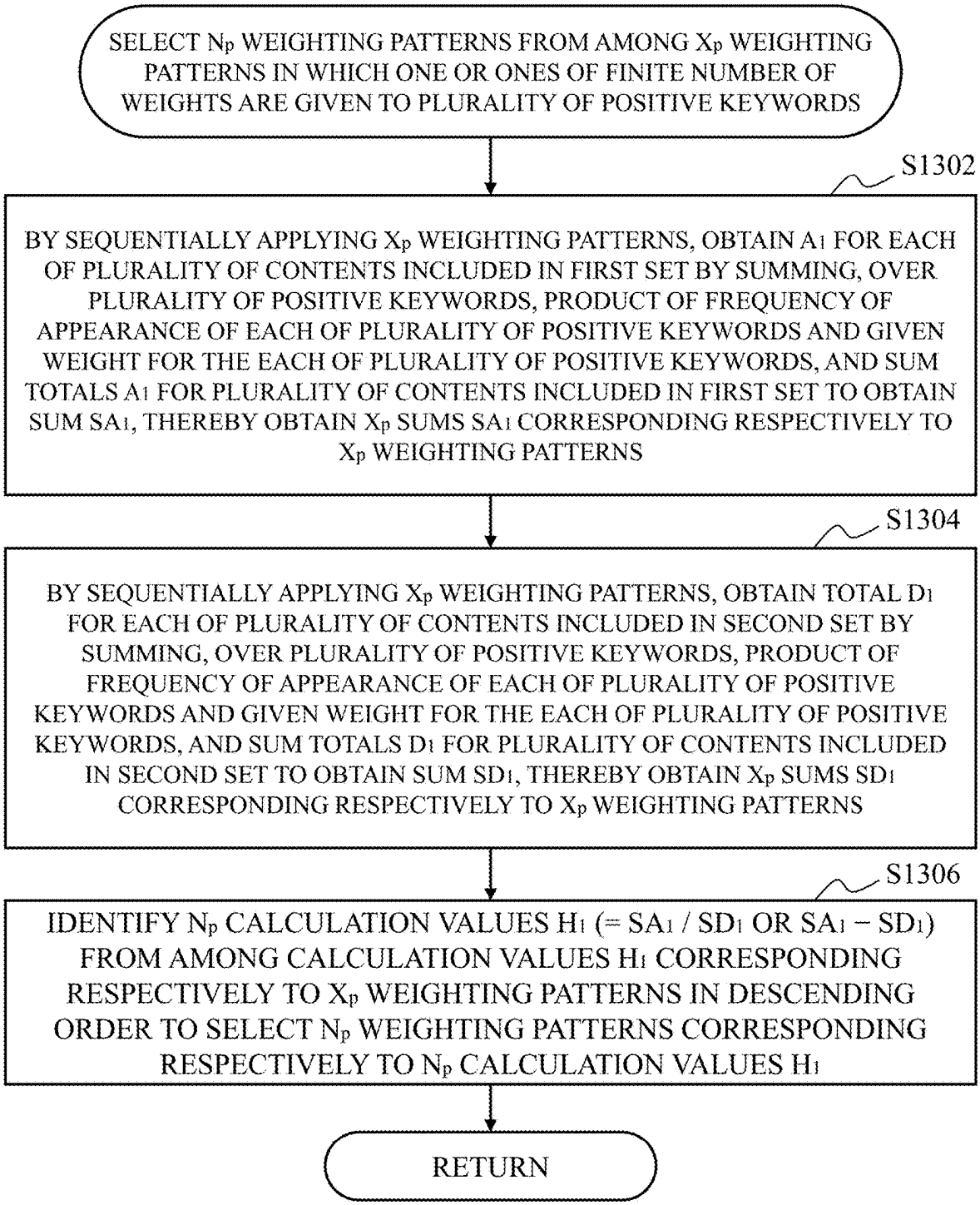

SELECT N_p WEIGHTING PATTERNS FROM AMONG X_p WEIGHTING PATTERNS IN WHICH ONE OR ONES OF FINITE NUMBER OF WEIGHTS ARE GIVEN TO PLURALITY OF POSITIVE KEYWORDS
S1302
BY SEQUENTIALLY APPLYING X_p WEIGHTING PATTERNS, OBTAIN A_i FOR EACH OF PLURALITY OF CONTENTS INCLUDED IN FIRST SET BY SUMMING, OVER PLURALITY OF POSITIVE KEYWORDS, PRODUCT OF FREQUENCY OF APPEARANCE OF EACH OF PLURALITY OF POSITIVE KEYWORDS AND GIVEN WEIGHT FOR THE EACH OF PLURALITY OF POSITIVE KEYWORDS, AND SUM TOTALS A_i FOR PLURALITY OF CONTENTS INCLUDED IN FIRST SET TO OBTAIN SUM SA_i, THEREBY OBTAIN X_p SUMS SA_i CORRESPONDING RESPECTIVELY TO X_p WEIGHTING PATTERNS
S1304
BY SEQUENTIALLY APPLYING X_p WEIGHTING PATTERNS, OBTAIN TOTAL D_i FOR EACH OF PLURALITY OF CONTENTS INCLUDED IN SECOND SET BY SUMMING, OVER PLURALITY OF POSITIVE KEYWORDS, PRODUCT OF FREQUENCY OF APPEARANCE OF EACH OF PLURALITY OF POSITIVE KEYWORDS AND GIVEN WEIGHT FOR THE EACH OF PLURALITY OF POSITIVE KEYWORDS, AND SUM TOTALS D_i FOR PLURALITY OF CONTENTS INCLUDED IN SECOND SET TO OBTAIN SUM SD_i, THEREBY OBTAIN X_p SUMS SD_i CORRESPONDING RESPECTIVELY TO X_p WEIGHTING PATTERNS
S1306
IDENTIFY N_p CALCULATION VALUES H_i (= SA_i / SD_i OR $SA_i - SD_i$) FROM AMONG CALCULATION VALUES H_i CORRESPONDING RESPECTIVELY TO X_p WEIGHTING PATTERNS IN DESCENDING ORDER TO SELECT N_p WEIGHTING PATTERNS CORRESPONDING RESPECTIVELY TO N_p CALCULATION VALUES H_i
RETURN

FIG.17

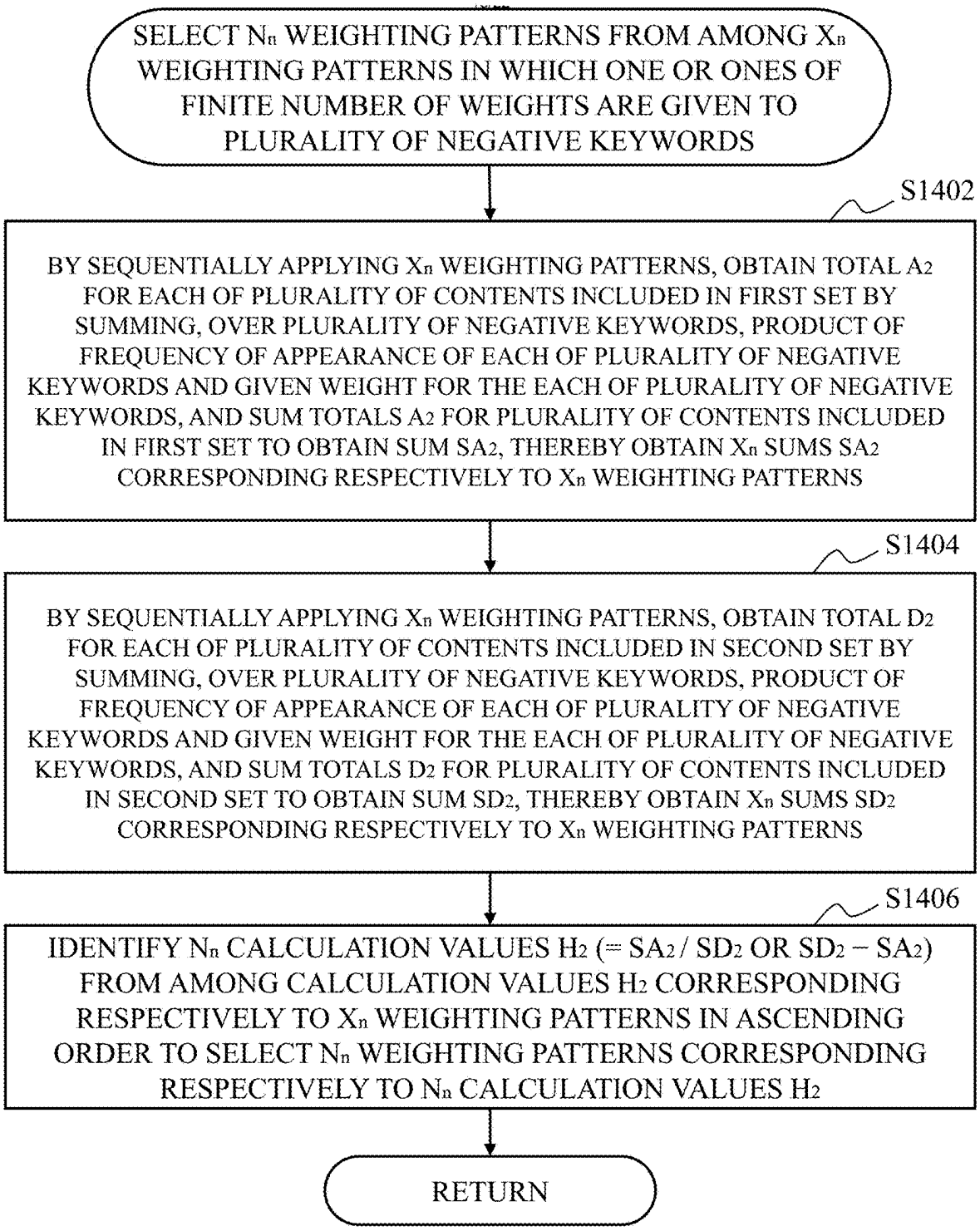

SELECT N_n WEIGHTING PATTERNS FROM AMONG X_n WEIGHTING PATTERNS IN WHICH ONE OR ONES OF FINITE NUMBER OF WEIGHTS ARE GIVEN TO PLURALITY OF NEGATIVE KEYWORDS
S1402
BY SEQUENTIALLY APPLYING X_n WEIGHTING PATTERNS, OBTAIN TOTAL A_2 FOR EACH OF PLURALITY OF CONTENTS INCLUDED IN FIRST SET BY SUMMING, OVER PLURALITY OF NEGATIVE KEYWORDS, PRODUCT OF FREQUENCY OF APPEARANCE OF EACH OF PLURALITY OF NEGATIVE KEYWORDS AND GIVEN WEIGHT FOR THE EACH OF PLURALITY OF NEGATIVE KEYWORDS, AND SUM TOTALS A_2 FOR PLURALITY OF CONTENTS INCLUDED IN FIRST SET TO OBTAIN SUM SA_2, THEREBY OBTAIN X_n SUMS SA_2 CORRESPONDING RESPECTIVELY TO X_n WEIGHTING PATTERNS
S1404
BY SEQUENTIALLY APPLYING X_n WEIGHTING PATTERNS, OBTAIN TOTAL D_2 FOR EACH OF PLURALITY OF CONTENTS INCLUDED IN SECOND SET BY SUMMING, OVER PLURALITY OF NEGATIVE KEYWORDS, PRODUCT OF FREQUENCY OF APPEARANCE OF EACH OF PLURALITY OF NEGATIVE KEYWORDS AND GIVEN WEIGHT FOR THE EACH OF PLURALITY OF NEGATIVE KEYWORDS, AND SUM TOTALS D_2 FOR PLURALITY OF CONTENTS INCLUDED IN SECOND SET TO OBTAIN SUM SD_2, THEREBY OBTAIN X_n SUMS SD_2 CORRESPONDING RESPECTIVELY TO X_n WEIGHTING PATTERNS
S1406
IDENTIFY N_n CALCULATION VALUES H_2 (= SA_2 / SD_2 OR $SD_2 - SA_2$) FROM AMONG CALCULATION VALUES H_2 CORRESPONDING RESPECTIVELY TO X_n WEIGHTING PATTERNS IN ASCENDING ORDER TO SELECT N_n WEIGHTING PATTERNS CORRESPONDING RESPECTIVELY TO N_n CALCULATION VALUES H_2
RETURN

FIG.18

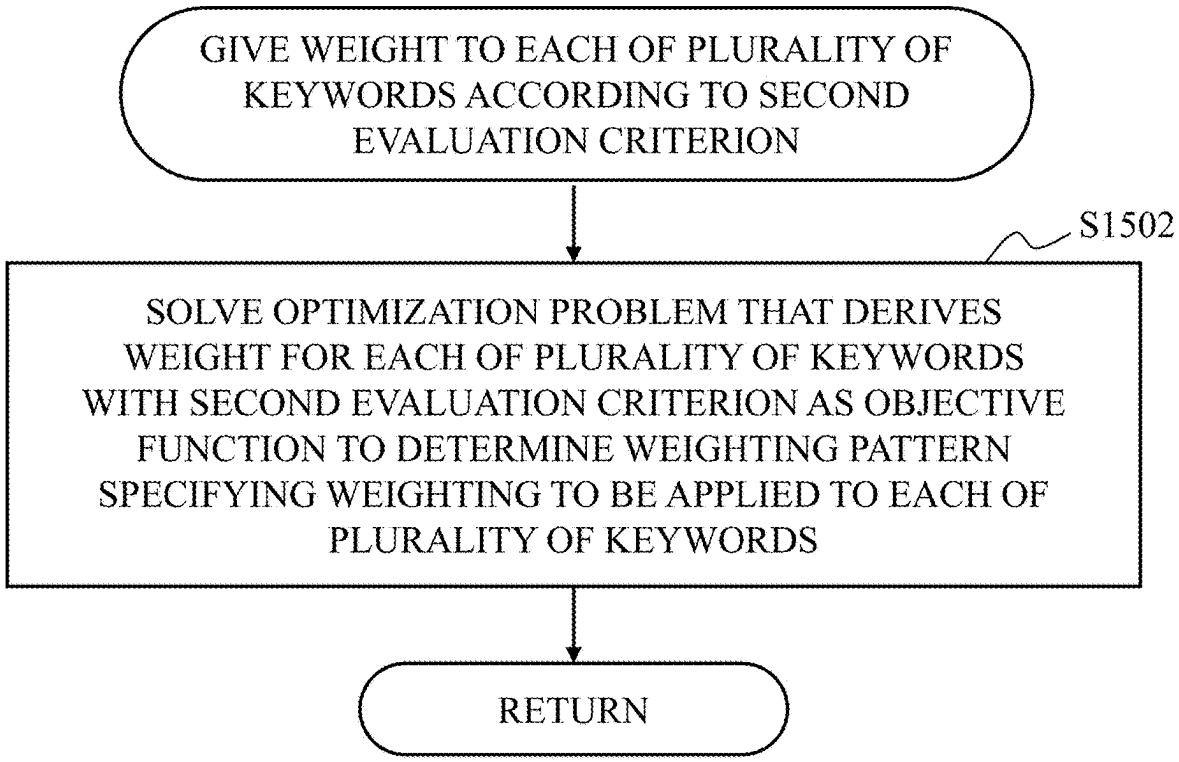

GIVE WEIGHT TO EACH OF PLURALITY OF KEYWORDS ACCORDING TO SECOND EVALUATION CRITERION
S1502
SOLVE OPTIMIZATION PROBLEM THAT DERIVES WEIGHT FOR EACH OF PLURALITY OF KEYWORDS WITH SECOND EVALUATION CRITERION AS OBJECTIVE FUNCTION TO DETERMINE WEIGHTING PATTERN SPECIFYING WEIGHTING TO BE APPLIED TO EACH OF PLURALITY OF KEYWORDS
RETURN

FIG.19

1600

VARIATION	SECOND EVALUATION CRITERION
1	A criterion being a weighting pattern with which a sum SA_3 obtained by summing totals A_3 for the plurality of contents included in the first set is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing , over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.
2	A criterion being a weighting pattern with which a total A_{3m} being a smallest value among totals A_3 is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.
3	A criterion being a weighting pattern with which, when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set is a highest position or a position close to the highest position, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.
4-1	A criterion being a weighting pattern with which a value of P/Q calculated by using a position P and a number Q is a largest value or a value larger than a predetermined value, where when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, the position P is a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight, and the number Q is such a number of the plurality of contents included in the first set and the second set that a sum SA_4 obtained by summing the totals A_4 for the plurality of contents included in the first set is larger than a predetermined threshold.
4-2	(In addition to Variation 4-1) A criterion being a weighting pattern with which the number Q is a smallest value or a value close to the smallest value.

FIG.20

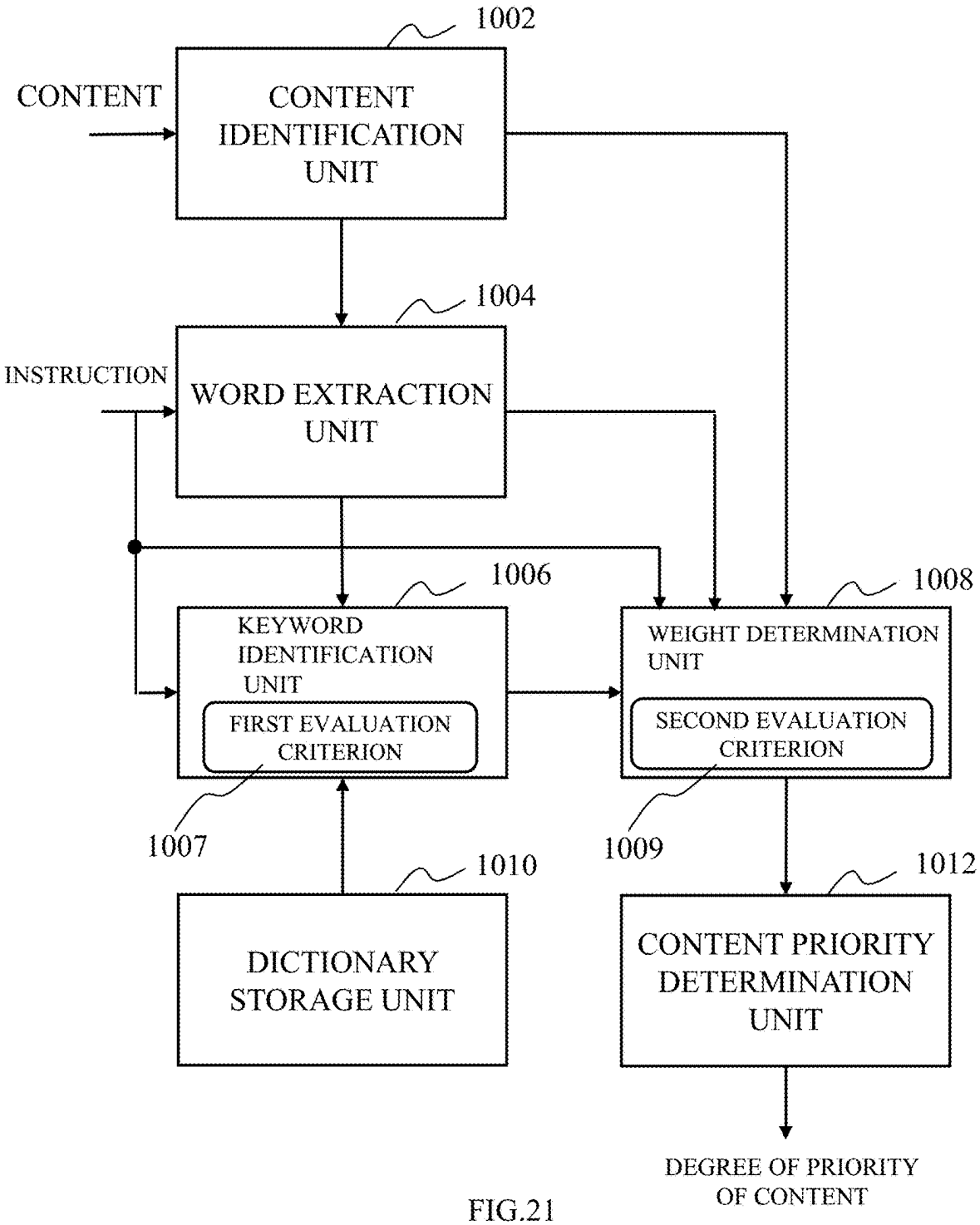

1002
CONTENT
CONTENT IDENTIFICATION UNIT
1004
INSTRUCTION
WORD EXTRACTION UNIT
1006
1008
KEYWORD IDENTIFICATION UNIT
FIRST EVALUATION CRITERION
WEIGHT DETERMINATION UNIT
SECOND EVALUATION CRITERION
1007
1009
1010
1012
DICTIONARY STORAGE UNIT
CONTENT PRIORITY DETERMINATION UNIT
DEGREE OF PRIORITY OF CONTENT

FIG.21

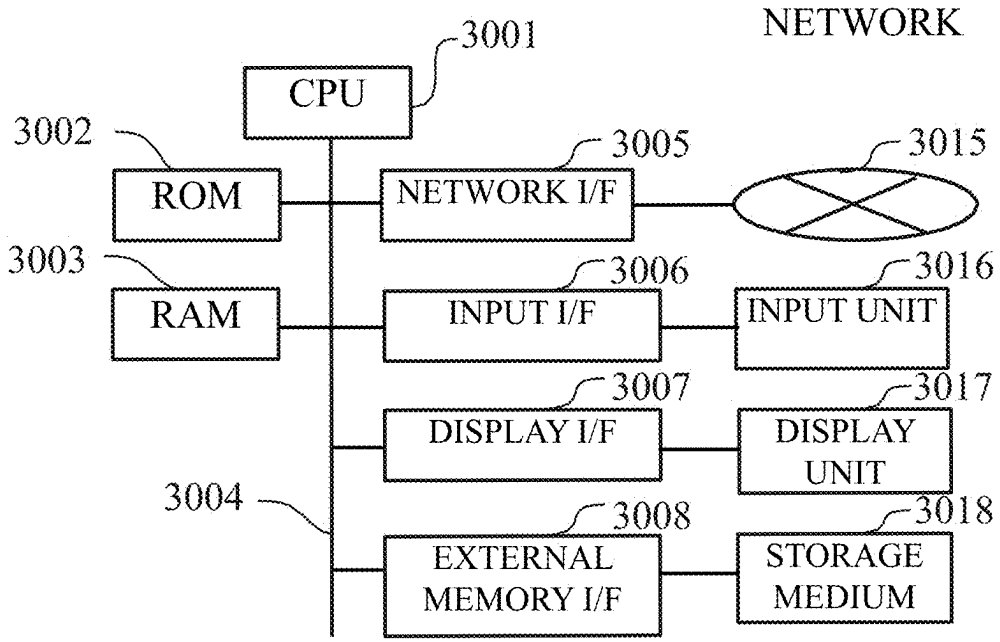

NETWORK
3001
CPU
3002
ROM
3005
NETWORK I/F
3015
3003
RAM
3006
INPUT I/F
3016
INPUT UNIT
3007
DISPLAY I/F
3017
DISPLAY UNIT
3004
3008
EXTERNAL MEMORY I/F
3018
STORAGE MEDIUM

FIG.22

CONTENT PROCESSING METHOD AND COMPUTER-READABLE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. application Ser. No. 18/627,150, filed Apr. 4, 2024, which is a continuation of International Application Serial No. PCT/JP2022/034210, filed Sep. 13, 2022, which claims priority to Japanese Patent Application No. 2021-166514, filed Oct. 8, 2021. The contents of these applications are incorporated herein by reference in their entirety.

BACKGROUND

Technical Field

[0002] The present disclosure relates to a content processing method and a non-transitory computer-readable medium storing a content processing program.

Background Art

[0003] Companies, research institutes, and so on need technology to efficiently search for contents including technical documents in order to promote research and development and pursue intellectual property strategies and marketing strategies for their products and services. For prevention of patent infringement, acquisition of rights, understanding of other companies' technologies, and so on, it has become important to efficiently obtain information without search omissions, especially in patent document searches.

[0004] The following are conventional technologies.

[0005] For example, there is a technology (see Japanese Patent No. 5424393, for example) in which each of a plurality of documents to be evaluated including a plurality of words is evaluated by a user regarding whether it is a positively evaluated document related to the target theme or a negatively evaluated document not related to the target theme; words are extracted from each evaluation target document, and also positive words appearing only in the positively evaluated documents, negative words appearing only in the negatively evaluated documents, and words categorized as common words appearing in both the positively evaluated documents and the negatively evaluated documents are extracted; and the degree of thematic relevance of each common word to the target theme based on the frequency of appearance of the word and its adjacency to other words.

[0006] Also, there is a technology (see Japanese Patent No. 3736564, for example) that involves: inputting unread information and pairing informational data and a training signal indicating whether one or more pieces of information consisting of one or more keywords are necessary with each other to prepare training data in advance; and based on one or more keywords attached to newly input unread information and the paired keywords and training signals, deriving a necessity signal for predicting the necessity of the unread information for the user which has a large value when the number of paired training signals indicating necessity for the keywords attached to the unread information is large and which has a small value when the number of paired training signals indicating unnecessity is small.

SUMMARY

[0007] An object of the technique of the present disclosure is to reduce operator's work by assisting the operator to more efficiently understand each of contents included in a set of contents that are obtained by performing a search of contents containing text or the like when the operator is provided with the set of contents.

[0008] The technique of the present disclosure provides a content processing method for determining a degree of priority of presentation of each of a plurality of contents, comprising: identifying the plurality of contents; receiving a first set including contents given positive evaluations from an operator and a second set including contents given negative evaluations from the operator from among the plurality of contents; extracting a first word set included in the first set and a second word set included in the second set; identifying a plurality of keywords including a plurality of positive keywords related to the first set and a plurality of negative keywords related to the second set according to a first evaluation criterion, the plurality of positive keywords being identified based on the first word set, the plurality of negative keywords being identified based on the second word set; giving weights to the plurality of keywords according to a second evaluation criterion so as to give a weight of zero or more to each of the plurality of positive keywords and give a weight of zero or less to each of the plurality of negative keywords; deriving a total for each of the plurality of contents by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and the given weight for the each of the plurality of keywords to obtain the total for each of the plurality of contents; and determining the degree of priority of presentation of each of the plurality of contents based on the total for the each of the plurality of contents.

[0009] The first evaluation criterion in the technique of the present disclosure may include a criterion of employing designation of a keyword from the operator.

[0010] Note that keywords and corresponding weights may be received from the operator as necessary.

[0011] The first evaluation criterion in the technique of the present disclosure may include a criterion of determining the plurality of keywords based on a frequency of appearance of each of words included in the first word set and the second word set per content in the first set and the second set.

[0012] The first evaluation criterion in the technique of the present disclosure may include a criterion of designating keywords whose frequencies of appearance in the first set are higher than frequencies of appearance thereof in the second set as the plurality of positive keywords, and designating keywords whose frequencies of appearance in the second set are higher than frequencies of appearance thereof in the first set as the plurality of negative keywords.

[0013] The giving weights in the technique of the present disclosure may include: preparing a finite number of candidate weights to give one of the finite number of candidate weights to each of the plurality of keywords; creating a plurality of weighting patterns in which one of the finite number of weights is given to each of the plurality of keywords by giving one of the finite number of weights to each of the plurality of keywords; and selecting one weighting pattern from among the plurality of weighting patterns according to the second evaluation criterion.

[0014] The creating a plurality of weighting pattern in the technique of the present disclosure may include: selecting

N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords; selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights are given to the plurality of negative keywords; and creating $N_p \times N_n$ weighting patterns as the plurality of weighting patterns by comprehensively pairing the N_p weighting patterns and the N_n weighting patterns with one another.

[0015] The selecting N_p weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_p weighting patterns, obtaining a total A for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals A for the plurality of contents included in the first set to obtain a sum SA, thereby obtaining X_p sums SA corresponding respectively to the X_p weighting patterns; and identifying N_p sums SA from among the X_p sums SA in descending order to select N_p weighting patterns corresponding respectively to the identified N_p sums SA.

[0016] The selecting N_n weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_n weighting patterns, obtaining a total D for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals D for the plurality of contents included in the second set to obtain a sum SD, thereby obtaining X_n sums SD corresponding respectively to the X_n weighting patterns; and identifying N_n sums SD from among the X_n sums SD in ascending order to select N_n weighting patterns corresponding respectively to the identified N_n sums SD.

[0017] The selecting N_p weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_p weighting patterns, obtaining a total A for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and obtaining a total A_{pm} which is a smallest value among the totals A for the plurality of contents included in the first set, thereby obtaining X_p totals A_{pm} corresponding respectively to the X_p weighting patterns; and identifying N_p totals A_{pm} from among the X_p totals A_{pm} in descending order to select N_p weighting patterns corresponding respectively to the identified N_p totals A_{pm}.

[0018] The selecting N_n weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_n weighting patterns, obtaining a total A_n for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and obtaining a total A_{nm} which is a smallest value among the totals A_n for the plurality of contents included in the first set; and identifying N_n totals A_{nm} from among the X_n totals A_{nm} in descending order to select N_n weighting patterns corresponding respectively to the identified N_n totals A_{nm}.

[0019] The selecting N_p weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_p weighting patterns, obtaining a total A_1 for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals A_1 for the plurality of contents included in the first set to obtain a sum SA_1, thereby obtaining X_p sums SA_1 corresponding respectively to the X_p weighting patterns; by sequentially applying the X_p weighting patterns, obtaining a total D_1 for each of the plurality of contents included in the second set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals D_1 for the plurality of contents included in the second set to obtain a sum SD_1, thereby obtaining X_p sums SD_1 corresponding respectively to the X_p weighting patterns; and identifying N_p calculation values H_1 ($=SA_1/SD_1$ or SA_1-SD_1) from among the calculation values H_1 corresponding respectively to the X_p weighting patterns in descending order to select N_p weighting patterns corresponding respectively to the N_p calculation values H_1.

[0020] The selecting N_n weighting patterns in the technique of the present disclosure may include: by sequentially applying the X_n weighting patterns, obtaining a total A_2 for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals A_2 for the plurality of contents included in the first set to obtain a sum SA_2, thereby obtaining X_n sums SA_2 corresponding respectively to the X_n weighting patterns; by sequentially applying the X_n weighting patterns, obtaining a total D_2 for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals D_2 for the plurality of contents included in the second set to obtain a sum SD_2, thereby obtaining X_n sums SD_2 corresponding respectively to the X_n weighting patterns; and identifying N_n calculation values H_2 ($=SA_2/SD_2$ or SD_2-SA_2) from among the calculation values H_2 corresponding respectively to the X_n weighting patterns in ascending order to select N_n weighting patterns corresponding respectively to the N_n calculation values H_2.

[0021] The giving weights in the technique of the present disclosure may include solving an optimization problem that derives the weight for each of the plurality of keywords with the second evaluation criterion as an objective function to thereby determine a weighting pattern specifying weighting to be applied to each of the plurality of keywords.

[0022] The second evaluation criterion in the technique of the present disclosure may include a criterion of a weighting pattern with which a sum SA_3 obtained by summing totals A_3 for the plurality of contents included in the first set is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents

included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0023] The second evaluation criterion in the technique of the present disclosure may include a criterion of a weighting pattern with which a total A_3m being a smallest value among totals A_3 is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0024] The second evaluation criterion in the technique of the present disclosure may include a criterion of a weighting pattern with which, when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set is a highest position or a position close to the highest position, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0025] The second evaluation criterion in the technique of the present disclosure may include a criterion of a weighting pattern with which a value of P/Q calculated by using a position P and a number Q is a largest value or a value larger than a predetermined value, where when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, the position P is a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight, and the number Q is such a number of the plurality of contents included in the first set and the second set that a sum SA_4 obtained by summing the totals A_4 for the plurality of contents included in the first set is larger than a predetermined threshold.

[0026] The second evaluation criterion in the technique of the present disclosure may further include a criterion of a weighting pattern with which the number Q is a smallest value or a value close to the smallest value.

[0027] The technique of the present disclosure may be a program that causes a computer to execute the above method.

[0028] With the technique of the present disclosure, it is possible to reduce operator's work by assisting the operator to more efficiently understand each of contents included in a set of contents that are obtained by performing a search of contents containing text or the like when the operator is provided with the set of contents.

BRIEF DESCRIPTION OF DRAWINGS

[0029] FIGS. **1**A and **1**B illustrate various sets of contents obtained by a search or the like.

[0030] FIG. **2**A is an example of information that can serve as a base for selecting positive keywords. FIG. **2**B illustrates a table in which positive keywords and corresponding weights (r) are designated by an operator.

[0031] FIG. **3**A is an example of a graph that can serve as a base for selecting negative keywords. FIG. **3**B illustrates a table in which negative keywords and corresponding weights (r) are designated by the operator.

[0032] FIG. **4**A is a table in which the totals of the products of the frequencies of appearance of keywords in contents included in a set V and respective weights for those keywords are listed in descending order. FIG. **4**B illustrates the result of reviewing all the contents included in the set V.

[0033] FIGS. **5**A and **5**B illustrate an example of a user interface that assists the operator to change selected keywords and change the corresponding weights.

[0034] FIG. **6**A illustrates a flow of processing in Embodiment 1. FIG. **6**B is a flowchart illustrating details of the process of step **S102** of identifying a plurality of contents.

[0035] FIG. **7** is a flowchart illustrating details of the process of step **S112** of extracting a plurality of words related to the plurality of contents.

[0036] FIG. **8**A is a flowchart illustrating details of the process of step **S104** of receiving keyword information including a plurality of keywords and corresponding weights (including positive or negative weights). FIG. **8**B is a flowchart illustrating details of the process of step **S108** of determining the degrees of priority of presentation of the plurality of contents based on totals for the contents.

[0037] FIG. **9** is a flowchart illustrating details of the process of step **S312** of changing the degrees of priority of contents given evaluation values so as to present the changes in response to accepting correction.

[0038] FIG. **10** is a flowchart of processing in Embodiment 2.

[0039] FIG. **11** is a flowchart illustrating further details of the process of step **S606** of identifying a plurality of keywords including positive keywords and negative keywords according to a first evaluation criterion.

[0040] FIG. **12**A is a flowchart illustrating further details of the process of step **S606** of identifying a plurality of keywords including positive keywords and negative keywords according to the first evaluation criterion. FIG. **12**B is a flowchart illustrating further details of the process of step **S606** of identifying a plurality of keywords including positive keywords and negative keywords according to the first evaluation criterion.

[0041] FIG. **13** is a flowchart illustrating further details of the process of step **S608** of giving a weight to each of the plurality of keywords according to a second evaluation criterion.

[0042] FIG. **14** is a flowchart illustrating further details of the process of step **S904** of creating a plurality of weighting patterns in which one of the finite number of weights is given to each of the plurality of keywords by giving one of the finite number of weights to each of the plurality of keywords.

[0043] FIG. **15**A is a flowchart illustrating details of the process of step **S1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. FIG. **15**B is a flowchart illustrating details of the process of step **S1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords.

[0044] FIG. **16**A is a flowchart illustrating details of the process of step S**1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. FIG. **16**B is a flowchart illustrating details of the process of step S**1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords.

[0045] FIG. **17** is a flowchart illustrating details of the process of step S**1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords.

[0046] FIG. **18** is a flowchart illustrating details of the process of step S**1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords.

[0047] FIG. **19** is a flowchart illustrating further details of the process of step S**608** of giving a weight to each of the plurality of keywords according to the second evaluation criterion.

[0048] FIG. **20** is a table illustrating examples of the second evaluation criterion.

[0049] FIG. **21** is a block diagram illustrating functions in the embodiments.

[0050] FIG. **22** is a diagram illustrating hardware components in the embodiments.

DETAILED DESCRIPTION

[0051] In particular, in patent document research, it is necessary to devise a search formula so as to prevent omission of relevant patent documents and inclusion of many unnecessary patent documents (noise documents). Thus, a search formula is considered, and a set of patent documents are obtained with it. However, a set of patent documents obtained with a search formula thus devised include many documents irrelevant to the research target (noise documents).

[0052] To reduce these noise documents, more strict search filtering must be applied. However, applying more strict search filtering involves a risk of omitting important documents in the search result. Conversely, performing a search in a way to prevent omission of important documents will increase the size of the set of documents in the search result, which will in turn increase the operator's work for browsing (reviewing) the documents.

[0053] For example, in the case of extracting related patents by reviewing them, it is a common practice to focus on whether words related to the target technical field are included. A document tends to be determined as a noise document if, for example, words not related to the research target are included.

[0054] Thus, an appropriate search result tends to be obtained by performing a search with a search formula created by appropriately selecting words and phrases related to the research target and words and phrases not related to the research target.

[0055] Here, it is to be noted that patent documents, which include long sentences, may include descriptions of matters other than the patent documents' target technologies in some sentences. For example, there are many cases where unsuccessful test examples and the like (counter examples) are described. Also, there are cases where words that describe the level of technical performance, such as "high" and "low", are used. In the case of using words and phrases that characterize performance as search words and phrases, a document can be a noise document if a word indicating the level of that performance is not suitable for the technology of interest or in other similar cases.

[0056] Note that a search formula can include a NOT operation. It has been a conventional practice to designate non-related words and phrases and incorporating a NOT operation in a search formula to obtain a search result excluding documents including the non-related words and phrases. This method, however, has a risk of omitting an important document in a search result against the searcher's intention if the document includes a counter example as mentioned above or the like.

[0057] To address this, the technology of the disclosure proposes, for example, using weights for keywords related to a research target which the operator desires and for keywords not related to the research target to give a degree of priority to each content included in a set of contents. By adjusting the order of presentation of the contents to the operator based on the degrees of priority or displaying the contents and the degrees of priority in association with each another, the operator to more easily utilize the contents.

[0058] Note that the keywords used in the following embodiments are keywords that can be set separately from the keywords used in the search formula, and do not necessarily have to be the same keywords. The set of contents to be handled in the following embodiments may be one obtained by a search using a search formula with keywords, or a set of contents collected by using other means, e.g., AI, or the like. In short, the following embodiments are not dependent on the means for collecting the target set of contents.

[0059] In the embodiments of the disclosure, a content means an expression including verbally expressed matter such as text, an image, a video, and speech.

[0060] The operator, who designs search formulas, has a certain level of knowledge and understanding of technical terms. Thus, the operator can designate keywords that are closely associated with contents determined to be important to the operator themself. Moreover, the operator can designate keywords that are closely related to contents determined to be not important to the operator themself (noise documents). Furthermore, it is considered possible for the operator to designate synonyms and quasi-synonyms of each keyword.

[0061] Incidentally, if the operator is an individual with a technical level high enough to create search formulas, the operator is likely to be able to select (or designate) related keywords and non-related keywords without reviewing the contents. In addition, if the operator has reviewed some of the contents in a search result, the operator should be able to more appropriately select (or designate) keywords related to the target contents and keywords not related to the target contents.

[0062] Moreover, a list of words and phrases included the set of contents in a search result (a set of contents that have been reviewed) may be presented to the operator in an easy-to-understand fashion by means of text mining, statistical processing, or the like. In this way, the operator can easily select related keywords and non-related keywords. In this case, the operator cannot predict what kinds of key-

words are included in the target contents. This can also occur when many words and phrases that are synonyms, quasi-synonyms, and/or variant notations of the keywords which the operator used in the search formula or the like are included in the target contents. Thus, it is possible to improve the accuracy of this method with a method that involves selecting keywords from a list of words and phrases included in targets.

[0063] In the present specification, a keyword closely related to a content determined to be important for the operator themself (positive content) (search target document) will be referred to as "positive keyword". Moreover, a keyword closely related to a content determined to be not important for the operator themself (negative content) (noise document) will be referred to as "negative keyword".

<Description of Set as Search Result>

[0064] FIGS. **1**A and **1**B illustrate various sets of contents obtained by a search.

[0065] As illustrated in FIG. **1**A, a set V is obtained as a result of filtering a content population U by using a search formula or the like. Generally, the operator reviews the contents included in the set V one by one, which were obtained by the filtering with a search or the like, to determine whether each of the contents is important.

[0066] A positive set R**1** in FIG. **1**A represents a set including contents determined to be important among the contents in the set V reviewed by the operator. The positive set R**1** is defined as a positive set including contents given positive evaluations as the result of the review by the operator (positive contents).

[0067] A negative set G**1** represents a set including contents determined to be not important among the contents in the set V reviewed by the operator. The negative set G**1** is defined as a negative set including contents given negative evaluations as the result of the review by the operator (negative contents).

[0068] Another set T**1** represents a set of contents that are neither important nor unimportant (or contents that has not been thoroughly reviewed and has not been given a thorough evaluation result) among the contents in the set V reviewed by the operator. The other set T**1** is defined as another set including contents given neither a positive evaluation nor a negative evaluation as the result of the review by the operator.

[0069] Generally, the operator reviews the contents included in the set V one by one, which were obtained by the filtering and, by reviewing all the contents in the set V, gives a positive evaluation, a negative evaluation, another evaluation, or the like to each content. Note that the perspective of evaluation can vary depending on the purpose of the research to be conducted by the operator. There are various purposes of research such as acquiring a patent, obtaining documents for invalidating another company's patent, preventing infringements, figuring out other companies' technologies, and obtaining basic information for research and development. Needless to say, the perspective for determining the importance (priority) of one content will vary depending on which of these purposes of research is used.

[0070] FIG. **1**B illustrates an example of a state after the operator has finished reviewing all of the contents in the set V, which is the search result. Specifically, the set V includes a positive set R**0**, a negative set G**0**, and another set TO.

[0071] To obtain each set illustrated in FIG. **1**B, it is generally desirable that the operator review all of the contents in the set V.

Embodiment 1

[0072] In the embodiment to be presented below, a higher degree of priority is given to contents presumed to be more important to the operator. This makes it possible to infer at least the positive set R**0** in advance.

[0073] By employing the present embodiment, the operator can refer to the degree of priority given to each content and preferentially browse (review) contents that are likely to be important to the operator first. By sequentially going through the contents with high degrees of priority, the operator can easily and appropriately process the contents belonging to the set V in a shorter time.

[0074] FIG. **2**A is an example of information that can serve as a base for selecting positive keywords.

[0075] In FIG. **2**A, keywords are listed on the horizontal axis, and "Keyword Index 1" is plotted on the vertical axis for each keyword.

[0076] Referring to the graph of FIG. **2**A, the operator can select at least one positive keyword. The following are examples of "Keyword Index 1" in FIG. **2**A.

Examples of the Keyword Index 1

[0077] 1. The frequency of appearance of the word included in some or all of the contents in the set V being a search result.

[0078] 2. The average frequency of appearance of the word per content given a positive evaluation as a result of the review.

[0079] 3. [The average frequency of appearance of the word per content given a positive evaluation as a result of the review]−[The average frequency of appearance of the word per content given a negative evaluation as a result of the review]

[0080] Note that "frequency of appearance" in the above may be the frequency of appearance of the word in part of the content(s) instead of the frequency of appearance of the word in the entirety of the content(s). For example, when a patent document is included as a content, the frequency of appearance of the word strictly in the claims of the patent document may be counted.

[0081] FIG. **2**B illustrates a table in which positive keywords and corresponding weights (r) are designated by the operator.

[0082] The weight (r) for each keyword is desirably set such that the more likely the keyword is to be included in a content important (i.e., positive) to the operator, the larger a value greater than zero is given. Moreover, the weight (r) is desirably set such that the more likely the keyword is to be included in a content not important (i.e., negative) to the operator, the larger a value less than zero as an absolute value is given. Usage of the weight (r) will be described later.

[0083] Incidentally, there are a case where the operator has not reviewed the contents, and other similar cases. If so, the graph of FIG. **2**A itself will not be present or another similarly situation will occur. Thus, the operator may freely designate positive keywords and the corresponding weights (r) based on the operator knowledge and the like without referring to the graph of FIG. **2**A (or regardless of whether

the graph of FIG. **2**A is present or absent). Alternatively, a list of words included in some or all of the contents belonging to the set V may be presented to the operator, and the operator may select positive keywords from that list. It is desirable to designate at least one positive keyword. Note that setting the weight (r) to zero means the same as not designating the corresponding positive keyword.

[0084] Incidentally, a computer may automatically designate "synonyms and variant notations" by referring to dictionaries. Alternatively, a computer may refer to dictionaries and present candidate "synonyms and variant notations" to the operator to prompt the operator to select some. Alternatively, the operator may set "synonyms and variant notations". The words designated as "synonyms and variant notations" are desirably handled similarly to (as the same words as) the corresponding positive keywords.

[0085] FIG. **3**A is an example of a graph that can serve as a base for selecting negative keywords.

[0086] In FIG. **3**A, "Keyword Index 2" is plotted on the vertical axis for each word.

[0087] Referring to the graph of FIG. **3**A, the operator can select at least one negative keyword. The following are examples of "Keyword Index 2" in FIG. **3**A.

Examples of the Keyword Index 2

[0088] 4. The frequency of appearance of the word included in some or all of the contents in the set V being a search result.

[0089] 5. The average frequency of appearance of the word per content given a negative evaluation as a result of the review.

[0090] 6. [The average frequency of appearance of the word per content given a negative evaluation as a result of the review]–[The average frequency of appearance of the word per content given a positive evaluation as a result of the review]

[0091] FIG. **3**B illustrates a table in which negative keywords and corresponding weights (r) are designated by the operator.

[0092] Each weight (r) is desirably set such that the more likely the content is not important (i.e., negative) to the operator, the larger the absolute value of a negative value is given. Usage of the weight (r) will be described later.

[0093] Incidentally, there are a case where the operator has not reviewed the contents, and other similar cases. If so, the graph of FIG. **3**A itself will not be present or another similarly situation will occur. Thus, the operator may freely designate negative keywords and the corresponding weights (r) based on the operator knowledge and the like without referring to the graph of FIG. **3**A (or regardless of whether the graph of FIG. **3**A is present or absent). Alternatively, a list of words included in some or all of the contents belonging to the set V may be presented to the operator, and the operator may select negative keywords from that list. It is desirable to designate at least one negative keyword. Note that setting the weight (r) to zero means the same as not designating the corresponding negative keyword.

[0094] Incidentally, a computer may automatically designate "synonyms and variant notations" by referring to dictionaries. Alternatively, a computer may refer to dictionaries and present candidate "synonyms and variant notations" to the operator to prompt the operator to select some. Alternatively, the operator may set "synonyms and variant notations". The words designated as "synonyms and variant notations" are desirably handled similarly to (as the same words as) the corresponding negative keywords.

[0095] Note that the positive evaluations and the negative evaluations mentioned above are an example of evaluation values.

[0096] FIG. **4**A is a table in which totals (Total(m)) for the contents included in the set V being a search result are listed in descending order.

[0097] For example, Total(m), or a total derived by summing the products of the frequencies of appearance of all keywords in a content m belonging to the set V being a search result and the respective weights for those keywords, is defined as below.

[Math. 1]

$$\mathrm{Total}(m) = \sum_{n=1}^{u} c(m)_n r_n \tag{1}$$

where

[0098] m: a number identifying a content included in the set V being a search result (one of consecutive integers starting from 1),

[0099] u: the number of positive keywords+the number of negative keywords, i.e., the total number of keywords,

[0100] $c(m)_n$: the frequency of appearance of the n-th positive keyword or negative keyword (keyword) in the content m, and

[0101] r_n: the weight r for the n-th keyword.

[0102] The total described above, i.e., the total Total(m) of the products of the frequencies of appearance of the keywords in the content m included in the set V being a search result and the respective weights for those keywords, is an example of the degree of priority of the content m.

[0103] The weight for each positive keyword is desirably a numerical value more than or equal to zero, and the weight for each negative keyword is desirably a numerical value less than or equal to zero.

[0104] It is possible to infer that a content is likely to be more closely related to a technology which the operator desires the larger the frequency of appearance of a positive keyword in the content. In addition, the content including that positive keyword is likely to be a content more relevant to the technology which the operator desires the larger the weight for that positive keyword.

[0105] It is possible to infer that a content is likely to be less closely related to a technology which the operator desires the larger the frequency of appearance of a negative keyword in the content. In addition, the content including that negative keyword is likely to be a content less relevant to the technology which the operator desires the larger the absolute value of the weight for that negative keyword (a value less than or equal to zero).

[0106] Thus, the product of the frequency of appearance of a keyword (a positive keyword or a negative keyword) in a content and the weight for that keyword is an element of an index indicating the degree of importance of that content to the operator. Moreover, a total derived by summing the products for all keywords included in a content (positive keywords or negative keywords) can serve as an index indicating the degree of closeness of that content to the technology which the operator desires (degree of priority).

[0107] Thus, it is possible to infer that the larger the value of the total for a content (degree of priority) is, the closer the content is to the technology which the operator desires.

[0108] FIG. **4**A is a table in which the totals of the products of the frequencies of appearance of the keywords in the contents included in the set V and the respective weights for those keywords are listed in descending order.

[0109] It is possible to infer that a content in a table **400** of FIG. **4**A at a higher position is a content with a higher degree of priority. Conversely, it is possible to infer that a content in the table at a lower position is a content with a lower degree of priority.

[0110] For example, the content with content number **45** listed at the top of the table **400** of FIG. **4**A is the content whose value of the total Total(m) is the largest. It means that the sum of the products of the frequencies of appearance of the keywords (positive keywords and negative keywords) in this content and the corresponding weights is the largest. In the table **400** of FIG. **4**A, a content listed at a higher position is determined to be a content that is likely to include positive keywords with larger weights and thus have a higher degree of priority.

[0111] FIG. **4**B illustrates the result of reviewing all the contents included in the set V. It is a graph in which the horizontal axis indicates degrees of priority in order, and the vertical axis indicates the ratio of contents determined to be important that are included among m contents from the one whose order of priority (No.) is 1 (No. =1) up to the one whose order of priority is m (the proportion of contents determined to be important).

[0112] For example, a graph **410** means that the 43 contents from the content with a degree of priority of **1** up to the content at the position of the degree of priority of **43** indicated on the horizontal axis include 90% of contents determined to be important among the contents belonging to the set V. This means that, by giving degrees of priority to the 200 contents belonging to the set V being a search result and reviewing the 43 contents with high degrees of priority among these contents with use of the present embodiment, it is possible to find 90% of the contents that are important (have high degrees of priority) in the set V.

[0113] Moreover, by reviewing the 100 contents in descending order of priority, the operator can find 100% of the contents determined to be important among the contents belonging to the set V. Thus, in accordance with the present embodiment, it is possible to the operator with the degrees of priority of contents such that the operator can efficiently review contents among the 200 contents included in the set V being a search result.

[0114] FIGS. **5**A and **5**B illustrate an example of a user interface that assists the operator to change selected keywords and change the corresponding weights.

[0115] FIGS. **5**A and **5**B assume a case where 17 contents have been reviewed among the 200 contents included in the set V. Assume, for example, that six contents among these have been determined to be closely related to the operator's purpose and important (the positive set R**1** in FIGS. **1**A and **1**B), eight contents have been determined to be not related to the operator's purpose and not important (the negative set G**1** in FIGS. **1**A and **1**B), and three contents have been determined to belong to other categories (the other set T**1** in FIGS. **1**A and **1**B).

[0116] A table **520** of the reviewed contents in FIG. **5**A is a table in which the reviewed contents are listed in descending order of their Total(m). A column i displays black, white, and hatched cells corresponding to the sets to which the contents belong illustrated in FIGS. **1**A and **1**B (R**1**, G**1**, or T**1**), respectively. Checking the identifications in this column i, the operator can correct keywords listed in the table **520** or the corresponding weights such that the contents belonging to the positive set R**1** are listed as high as possible in the table **520**. Since the contents belonging to the positive set R**1** among the reviewed documents are listed at high positions in the table **520**, it is possible to increase the possibility that the Total(m) of each positive content among the contents yet to be reviewed can be set to a higher value. This means that it is possible to increase the possibility of raising the priority of presentation of the positive content yet to be reviewed.

[0117] A table **500** of FIG. **5**A lists positive keywords and negative keywords that have been designated, and corresponding weights **502**. The operator can add new keywords to and delete keywords from the table **520**. In addition, a user interface may be provided on which the operator can slide a mark **506** on a slide bar **504** sideways with a mouse or the like to change the weight. Alternatively, the configuration may be such that the operator can change the weight by typing keys or doing the like.

[0118] Incidentally, setting the weight to zero has the same effect as deleting the keyword (i.e., excluding the keyword from consideration).

[0119] FIG. **5**B is a diagram illustrating a state where the order of contents has been changed according to the changes in Total(m) and the display of the column i resulting from changing the weight of a keyword.

[0120] A table **501** of the reviewed contents in FIG. **5**B illustrates an example in which the position of the mark **506** for the keyword "heater" in the table **500** of the reviewed contents in FIG. **5**A has been moved to "1" from "5" to change the weight to "1" from "5". How the order of the contents listed in a table **521** of FIG. **5**B has been changed according to the values of their Total(m) in response to this change in the weight is illustrated.

[0121] It can be seen that, in the table **521** of the reviewed contents in FIG. **5**B, more positive contents in the positive set R**1** among the reviewed contents are listed at higher positions than those in the table **520** of the reviewed contents in FIG. **5**A. It can also be seen that the content at the lowest position in the positive set in the table **520** of FIG. **5**A (m=112) has risen from the 11th position in the table **520** of FIG. **5**A to the 7th position in the table **521** of FIG. **5**B.

[0122] Thus, the operator can easily recognize that the pattern of correspondence between the plurality of keywords and the corresponding weights in the table **501** of FIG. **5**B is more preferable than the pattern in the table **500** of FIG. **5**A.

[0123] Although description of deletion and addition of keywords with a drawing is omitted, those skilled in the art can understand that the arrangement of the contents will change according to correction of a keyword(s).

[0124] The operator can attempt to correct keywords or correct the corresponding weights as appropriate such that many of the contents belonging to the positive set R**1** among the reviewed contents are arranged at high positions in the list of contents in the table **521** of FIG. **5**B.

[0125] The user interface of FIGS. **5**A and **5**B is an example, and the user interface is not limited to this example. In FIGS. **5**A and **5**B, the table **520** of FIG. **5**A and

the table **521** of FIG. **5**B include only the reviewed contents, but may include all of the contents belonging to the set V. In this case too, the operator may correct keywords or correct weights such that the reviewed contents belonging to the positive set R**1** are listed as high as possible in the table. Alternatively, the operator may correct keywords or correct weights such that the position of the content at the lowest position among the reviewed contents belonging to the positive set R**1** goes up as much as possible.

[0126] Then, the pattern of the keywords and the corresponding weights recognized as preferable by the operator is determined. The determined pattern is used to provide the total (i.e., a degree of priority) of each content belonging to the set V to the operator. By reviewing the contents in descending order of priority, the operator can preferentially review the contents inferred to be important to the operator.

[0127] FIG. **6**A illustrates a flow of processing in Embodiment 1. The flow of processing illustrated in FIG. **6**A will be described below.

[Step S**102**]

[0128] A plurality of contents (i.e., the contents belonging to the set V) are identified. For example, the operator obtains the set V being a search result from the content population U by using a search formula to thereby identify a plurality of target contents.

[Step S**104**]

[0129] Keyword information including a plurality of keywords and corresponding weights (including positive or negative weights) is received.

[Step S**106**]

[0130] For each of the plurality of contents, the product of the frequency of appearance of each keyword and the corresponding weight is calculated, and the total of the products for the plurality of keywords is derived.

[Step S**108**]

[0131] The degrees of priority of presentation of the plurality of contents are determined based on the total for each of the contents. Note that these totals (degrees of priority) are not limited to the degrees of priority in terms of the order in which the plurality of contents are presented to the operator. For example, the contents may be displayed to the operator along with their totals (degrees of priority) so that the operator can recognize the estimated degrees of importance of the displayed contents.

[0132] Based on the total (degree of priority) for each content obtained by the above process, the operator can efficiently process the contents belonging to the set V.

[0133] FIG. **6**B is a flowchart illustrating details of the process of step S**102** of identifying a plurality of contents. That process will be described below.

[Step S**112**]

[0134] A plurality of words related to a plurality of contents are extracted. The plurality of contents may be all of the contents belonging to the set V or some of the contents. Alternatively, words may be extracted from part of the contents (e.g., claims in the case of patent documents).

[Step S**114**]

[0135] The plurality of extracted words are presented to the operator. Positive keywords or negative keywords may be identified based on the presented words. Alternatively, positive keywords or negative keywords determined by the operator themself may be identified.

[0136] Presenting the words to the operator makes it easier for the operator to identify positive keywords or negative keywords.

[0137] FIG. **7** is a flowchart illustrating details of the process of step S**112** of extracting a plurality of words related to the plurality of contents. That process will be described below.

[Step S**202**]

[0138] A positive or negative evaluation value given by the operator to each of a plurality of contents reviewed by the operator is received. By this process, the positive set R**1** and the negative set G**1** illustrated in FIGS. **1**A and **1**B are identified. The other set T**1** may be identified. Incidentally, it is not necessarily essential to identify the other set T**1**.

[Step S**204**]

[0139] A plurality of words are identified from among words related to the plurality of contents given the evaluation values so as to be able of distinguish and present positive words more strongly related to the contents given the positive evaluation values and the negative words more strongly related to the contents given the negative evaluation values.

[0140] As already described with reference to FIGS. **2**A, **2**B, **3**A, and **3**B, this process makes it easier for the operator to determine positive keywords or negative keywords, or the weights for these.

[0141] FIG. **8**A is a flowchart illustrating details of the process of step S**104** of receiving the keyword information including a plurality of keywords and corresponding weights (including positive or negative weights). That process will be described below.

[Step S**302**]

[0142] At least one of correction of a plurality of designated keywords or correction of the corresponding weights is accepted. By this process, more preferable keywords (positive keywords or negative keywords) or corresponding weights are obtained.

[0143] FIG. **8**B is a flowchart illustrating details of the process of step S**108** of determining the degrees of priority of presentation of the plurality of contents based on the total for each of the contents. That process will be described below.

[Step S**312**]

[0144] In response to accepting the correction, the degrees of priority of the contents given evaluation values are changed so as to present the changes.

[0145] By this process, a degree of priority that is desirable for the operator is given to each content belonging to the set V.

[0146] The operator can efficiently perform reviewing of the contents and the like by using these degrees of priority.

[0147] FIG. **9** is a flowchart illustrating details of the process of step S**312** of changing the degrees of priority of the contents given evaluation values so as to present the changes in response to accepting correction. That process will be described below.

[Step S**402**]

[0148] The degrees of priority are associated with the evaluation values so as to allow the operator to recognize the evaluation values. As described with reference to FIGS. **5**A and **5**B, by performing this process, the operator can correct keywords (positive keywords or negative keywords) or determine the corresponding weights such that the totals (degrees of priority) for the contents belonging to the positive set R**1** will have as high degrees of priority as possible.

Embodiment 2

[0149] Embodiment 2 is an embodiment capable of lessening the burden on the operator for the selection of a plurality of keywords, the identification of the weight pattern, and/or the like. Specifically, Embodiment 2 is capable of automatically selecting a plurality of keywords and/or identifying the weight pattern. Note that, if an instruction is given from the operator, that instruction may be applied to select a plurality of keywords and/or identify the weight pattern.

[0150] FIG. **10** illustrates a flowchart of processing in Embodiment 2. The flow of the processing in FIG. **10** will be described below.

[Step S**601**]

[0151] A plurality of contents (i.e., the contents belonging to the set V) are identified. For example, the operator obtains the set V being a search result from the content population U by using a search formula to thereby identify a plurality of target contents.

[Step S**602**]

[0152] A first set and a second set are received. This step is based on the assumption that at least some of the plurality of contents belonging to the set V being a search result have been reviewed. Moreover, the first set means the positive set R**1**, which has been reviewed, as illustrated in FIGS. **1**A and **1**B. The second set means the negative set G**1**, which has been reviewed, as illustrated in FIGS. **1**A and **1**B. Incidentally, the other set T**1** illustrated in FIGS. **1**A and **1**B may be received in this step.

[Step S**604**]

[0153] A first word set and a second word set are extracted. The first word set means the set of words included in the contents belonging to the first set. The second word set means the set of words included in the contents belonging to the second set. The words included in the first word set may also be included (there is a possibility of being included) in the second set. The words included in the second word set may also be included (there is a possibility of being included) in the first set.

[0154] It is possible to predict that the first word set is likely to include many positive words that appear frequently in positively evaluated documents. It is possible to predict that the second word set is likely to include many negative words that appear frequently in negatively evaluated documents.

[Step S**606**]

[0155] A plurality of keywords including positive keywords and negative keywords are identified according to a first evaluation criterion. Here, one or two or more of various evaluation criteria may be employed as the first evaluation criterion. The first evaluation criterion will be specifically described later.

[0156] Incidentally, in this step, positive keywords or negative keywords designated by the operator may be received.

[Step S**608**]

[0157] A weight is given to each of the plurality of keywords according to a second evaluation criterion. Of the plurality of keywords identified in step S**606**, each of the positive keywords is desirably given a weight of zero or more. Moreover, each of the negative keywords is desirably given a weight of zero or less. Furthermore, the pattern of the weights to be given to the plurality of keywords is desirably determined according to the second evaluation criterion.

[0158] Incidentally, specific examples of the second evaluation criterion will be described later. In this step, weights corrected by the operator may be received.

[Step S**609**]

[0159] Positive keywords or negative keywords and corresponding weights may be received from the operator as necessary. The receiving of keywords and weights has been described in Embodiment 1. This process makes it possible to select keywords and set corresponding weights based on the operator's knowledge, and thus perform a more appropriate process that matches the operator's need.

[Step S**610**]

[0160] For each of the plurality of contents, a total is derived by summing, over the plurality of keywords, a product of a frequency of appearance of each of the keywords and the given weight for the keyword.

[Step S**612**]

[0161] The degree of priority of presentation of each of the plurality of contents is determined based on the total for each of the plurality of contents. A content whose total has a larger value is considered to be such a content that a positive keyword included in that content gives a stronger influence than a negative keyword. Thus, it can be inferred to be a content with a higher degree of importance.

[0162] By the process in FIG. **10**, each of the plurality of contents belonging to the set V being a search result can be given a degree of priority based on information on a plurality of reviewed contents. For example, by determining the order of reviewing the contents according to this degree of priority, contents that are inferred to have high degrees of importance can be preferentially presented to the operator. In this way, the operator can, for example, review contents

inferred to have high degrees of importance at first. This enhances the efficiency of the operator's work such as reviewing the contents.

[0163] FIG. **11** is a flowchart illustrating further details of the process of step S**606** of identifying a plurality of keywords including positive keywords and negative keywords according to the first evaluation criterion. This process will be described below.

[Step S**702**]

[0164] Designation of keywords from the operator is employed. This specific example has already been described in Embodiment 1. Employing designation of keywords from the operator is an example of identifying keywords according to the first evaluation criterion.

[0165] FIG. **12**A is a flowchart illustrating further details of the process of step S**606** of identifying a plurality of keywords including positive keywords and negative keywords according to the first evaluation criterion. This process will be described below.

[Step S**802**]

[0166] The plurality of keywords are determined based on the frequency of appearance of each of the words included in the first word set and the second word set per content in the first set and the second set.

[0167] It is possible to infer that a word with a high frequency of appearance per content belonging to the first set is likely to be a candidate positive keyword. It is also possible to infer that a word with a high frequency of appearance per content belonging to the second set is likely to be a candidate negative keyword.

[0168] For example, a predetermined number of words may be identified in descending order of the frequency of appearance per content belonging to the first set as positive keywords. A predetermined number of words may be identified in descending order of the frequency of appearance per content belonging to the second set as negative keywords.

[0169] The determination in this step is an example of the determination based on the first evaluation criterion.

[0170] FIG. **12**B is a flowchart illustrating further details of the process of step S**606** of identifying a plurality of keywords including positive keywords and negative keywords according to the first evaluation criterion. This process will be described below.

[Step S**812**]

[0171] Keywords whose frequencies of appearance per content in the first set are higher than their frequencies of appearance per content in the second set can be designated as a plurality of positive keywords, and keywords whose frequencies of appearance per content in the second set are higher than their frequencies of appearance per content in the first set can be designated as a plurality of negative keywords.

[0172] When the frequency of appearance of a word per content belonging to the first set is higher than its frequency of appearance per content belonging to the second set, that word can be inferred to be a word that is associated more closely with the contents belonging to the first set than with the contents belonging to the second set. Thus, this word can be inferred to be a possible candidate that may be identified as a positive keyword.

[0173] Also, when the frequency of appearance of a word per content belonging to the second set is higher than its frequency of appearance per content belonging to the first set, that word can be inferred to be a word that is associated more closely with the contents belonging to the second set than with the contents belonging to the first set. Thus, this word can be inferred to be a possible candidate that may be identified as a negative keyword.

[0174] For example, a predetermined number of words may be selected in descending order of the difference between the frequencies of appearance to identify positive keywords and negative keywords.

[0175] The determination in this step is an example of the determination based on the first evaluation criterion.

[0176] FIG. **13** is a flowchart illustrating further details of the process of step S**608** of giving a weight to each of the plurality of keywords according to the second evaluation criterion. This process will be described below.

[Step S**902**]

[0177] A finite number of candidate weights are prepared to give one of the finite number of candidate weights to each of the plurality of keywords. For example, three weights (5, 3, 1) may be prepared in advance as the weights for the positive keywords. Moreover, for example, three weights (−5, −3, −1) may be prepared in advance as the weights for the negative keywords. Note that zero may be included as a weight.

[Step S**904**]

[0178] A plurality of weighting patterns in which one of the finite number of weights is given to each of the plurality of keywords are created by giving one of the finite number of weights to each of the plurality of keywords.

[0179] These weighting patterns may be created such that the plurality of keywords and the plurality of weights are comprehensively paired.

[Step S**906**]

[0180] One weighting pattern is selected from among the plurality of weighting patterns according to the second evaluation criterion. Incidentally, the second evaluation criterion will be described later.

[0181] FIG. **14** is a flowchart illustrating further details of the process of step S**904** of creating a plurality of weighting patterns in which one of the finite number of weights is given to each of the plurality of keywords by giving one of the finite number of weights to each of the plurality of keywords. This process will be described below.

[Step S**1052**]

[0182] N_p weighting patterns are selected from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. If the number of the X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords is relatively large, the amount of calculation to select appropriate weighting patterns will be large. Thus, N_p weighting patterns may be selected from among X_p weighting patterns. This selection method will be described later.

[Step S1054]

[0183] N_n weighting patterns are selected from among X_n weighting patterns in which one or ones of the finite number of weights are given to the plurality of negative keywords. If the number of the X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords is relatively large, the amount of calculation to select appropriate weighting patterns will be large. Thus, N_n weighting patterns may be selected from among X_n weighting patterns. This selection method will be described later.

[Step S1056]

[0184] $N_p \times N_n$ weighting patterns are created. In this process, $X_p \times X_n$ weighting patterns may be an extremely large number of weighting patterns and require an extremely large amount of calculation to determine weighting patterns. Thus, $N_p \times N_n$ weighting patterns are created. Selecting appropriate weighting patterns reduces the amount of calculation.

[0185] By the above process, an appropriate number of weighting pattern candidates are prepared.

[0186] FIG. **15**A is a flowchart illustrating details of the process of step **S1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. This process will be described below.

[Step S1102]

[0187] By sequentially applying the X_p weighting patterns, a total A is obtained for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and the totals A for the plurality of contents included in the first set are summed to obtain a sum SA, thereby obtaining X_p sums SA corresponding respectively to the X_p weighting patterns.

[Step S1104]

[0188] N_p sums SA are identified from among the X_p sums SA in descending order to select the N_p weighting patterns corresponding respectively to the identified N_p sums SA.

[0189] It is possible to determine that a content with a larger value of SA has a larger number of positive keywords, has a larger weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to unknown contents further increases the likelihood of extracting positive contents.

[0190] Accordingly, by selecting N_p weighting patterns with large values of SA among the X_p weighting patterns, a smaller number of weighting patterns will be handled.

[0191] FIG. **15**B is a flowchart illustrating details of the process of step **S1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords. This process will be described below.

[Step S1122]

[0192] By sequentially applying the X_n weighting patterns, a total D is obtained for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and the totals D for the plurality of contents included in the second set are summed to obtain a sum SD, thereby obtaining X_n sums SD corresponding respectively to the X_n weighting patterns.

[Step S1124]

[0193] N_n sums SD are identified from among the X_n sums SD in ascending order to select the N_n weighting patterns corresponding respectively to the identified N_n sums SD.

[0194] It is possible to determine that a content with a smaller value of SD (negative value) has a larger number of negative keywords, has a smaller weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to unknown contents further increases the likelihood of further lowering the degrees of priority of negative contents.

[0195] Accordingly, by selecting N_n weighting patterns with small values of SD among the X_n weighting patterns, a smaller number of weighting patterns will be selected.

[0196] FIG. **16**A is a flowchart illustrating details of the process of step **S1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. This process will be described below.

[Step S1202]

[0197] By sequentially applying the X_p weighting patterns, a total A is obtained for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and a total A_{pm} which is the smallest value among the totals A for the plurality of contents included in the first set is obtained, thereby obtaining X_p totals A_{pm} corresponding respectively to the X_p weighting patterns.

[Step S1204]

[0198] N_p totals A_{pm} are identified from among the X_p totals A_{pm} in descending order to select N_p weighting patterns corresponding respectively to the identified N_p totals A_{pm}.

[0199] It is possible to determine that a content with a larger value of A_{pm} has a larger number of positive keywords, has a larger weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to unknown contents further increases the likelihood of extracting positive contents.

[0200] Accordingly, by selecting N_p weighting patterns with large values of A_{pm} among the X_p weighting patterns, a smaller number of weighting patterns will be selected.

[0201] FIG. **16**B is a flowchart illustrating details of the process of step **S1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords. This process will be described below.

[Step S1212]

[0202] By sequentially applying the X_n weighting patterns, a total A_n is obtained for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and a total A_{nm} which is the smallest value among the totals A_n for the plurality of contents included in the first set is obtained.

[Step S1214]

[0203] N_n totals A_{nm} are identified from among the X_n totals A_{nm} in descending order to select N_n weighting patterns corresponding respectively to the identified N_n totals A_{nm}

[0204] It is possible to determine that a content included in the first set with a larger value of A_{nm} has a smaller number of negative keywords, has a larger weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to negative keywords in unknown contents further increases the likelihood of extracting positive contents.

[0205] Accordingly, by selecting N_n weighting patterns with large values of A_{nm} among the X_n weighting patterns, a smaller number of weighting patterns will be selected.

[0206] FIG. **17** is a flowchart illustrating details of the process of step **S1052** of selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords. This process will be described below.

[Step S1302]

[0207] By sequentially applying the X_p weighting patterns, a total A_1 is obtained for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and the totals A_1 for the plurality of contents included in the first set are summed to obtain a sum SA_1, thereby obtaining X_p sums SA_1 corresponding respectively to the X_p weighting patterns.

[Step S1304]

[0208] By sequentially applying the X_p weighting patterns, a total D_1 is obtained for each of the plurality of contents included in the second set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and the totals D_1 for the plurality of contents included in the second set are summed to obtain a sum SD_1, thereby obtaining X_p sums SD_1 corresponding respectively to the X_p weighting patterns.

[Step S1306]

[0209] N_p calculation values H_1 ($=SA_1/SD_1$ or SA_1-SD_1) are identified from among calculation values H_1 corresponding respectively to the X_p weighting patterns in descending order to select N_p weighting patterns corresponding respectively to the N_p calculation values H_1.

[0210] It is possible to determine that a content in the first set with a larger calculation value H_1 ($=SA_1/SD_1$ or SA_1-SD_1) has a larger number of positive keywords or a larger weight(s), and a content in the second set has a smaller number of positive keywords, has a smaller weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to unknown contents further increases the likelihood of extracting positive contents.

[0211] Accordingly, by selecting N_p weighting patterns with large calculation values H_1 ($=SA_1/SD_1$ or SA_1-SD_1) among the X_p weighting patterns, a smaller number of weighting patterns will be selected.

[0212] FIG. **18** is a flowchart illustrating details of the process of step **S1054** of selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights is given to the plurality of negative keywords. This process will be described below.

[Step S1402]

[0213] By sequentially applying the X_n weighting patterns, a total A_2 is obtained for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and the totals A_2 for the plurality of contents included in the first set are summed to obtain a sum SA_2, thereby obtaining X_n sums SA_2 corresponding respectively to the X_n weighting patterns.

[Step S1404]

[0214] By sequentially applying the X_n weighting patterns, a total D_2 is obtained for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and the totals D_2 for the plurality of contents included in the second set are summed to obtain a sum SD_2, thereby obtaining X_n sums SD_2 corresponding respectively to the X_n weighting patterns.

[Step S1406]

[0215] N_n calculation values H_2 ($=SA_2/SD_2$ or SD_2-SA_2) are identified from among calculation values H_2 corresponding respectively to the X_n weighting patterns in ascending order to select N_n weighting patterns corresponding respectively to the N_n calculation values H_2.

[0216] It is possible to determine that a content in the first set with a smaller calculation value H_2 ($=SA_2/SD_2$ or SD_2-SA_2) has a smaller number of negative keywords or a larger weight(s), and a content in the second set has a larger number of negative keywords, has a smaller weight(s), or has both. Thus, it is possible to presume that applying this weighting pattern to unknown contents further increases the likelihood of further lowering the degrees of priority of negative contents.

[0217] Accordingly, by selecting N_n weighting patterns with small calculation values H_2 ($=SA_2/SD_2$ or SD_2-SA_2) among the X_n weighting patterns, a smaller number of weighting patterns will be selected.

[0218] FIG. **19** is a flowchart illustrating details of the process of step **S608** of giving a weight to each of the

plurality of keywords according to the second evaluation criterion. This process will be described below.

[Step S1502]

[0219] An optimization problem that derives the weight for each of the plurality of keywords is solved with the second evaluation criterion as an objective function. As a result, the plurality of keywords are identified, and a weighting pattern specifying the weighting to be applied to each of the plurality of identified keywords is determined.

[0220] Here, the method to solve the optimization problem is a matter well known to those skilled in the art, and detailed description thereof is therefore omitted.

[0221] To keep the calculation of the optimization problem from becoming long, it is possible to determine the maximum number of keywords, the maximum range of weights, and the like in advance. Alternatively, Embodiment 1 may be used to identify the keywords in advance.

[0222] FIG. **20** is a table illustrating examples of the second evaluation criterion. These will be described below.

(Variation 1)

[0223] The second evaluation criterion includes a criterion of a weighting pattern with which a sum SA_3 obtained by summing totals A_3 for the plurality of contents included in the first set is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0224] This evaluation criterion can be expressed with the following equation.

[Math. 2]

$$SA_3 = \sum_{content(m) \in R1} \text{Total}(m) \quad (2)$$

where

[0225] R1: a set of contents given positive evaluations among the reviewed contents, i.e., the first set (see FIGS. **1**A and **1**B),

[0226] content (m): m-th content, and

[0227] Total(m): A_3 described above, which is the total obtained by summing the products of the frequencies of appearance of all keywords in content (m) and the weights for those keywords (see Equation (1)).

(Variation 2)

[0228] The second evaluation criterion includes a criterion of a weighting pattern with which a total A_3m being a smallest value among totals A_3 is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0229] It is presumed that, when the total A_3m being the smallest value among the totals A_3 is the largest value, the total A_3 for each content is more likely to be a large value. Thus, a desirable weight pattern is obtained.

(Variation 3)

[0230] The second evaluation criterion includes a criterion of a weighting pattern with which, when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set is a highest position or a position close to the highest position, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

[0231] The weighting pattern with which the position of the lowest total A_4 among the totals A_4 is the highest position is a desirable weight pattern since it is presumed that each content is likely to be at a high position.

(Variation 4-1)

[0232] The second evaluation criterion includes a criterion of a weighting pattern with which a value of P/Q calculated by using a position P and a number Q is a largest value or a value larger than a predetermined value,

[0233] where when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, the position P is a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight, and

[0234] the number Q is such a number of the plurality of contents included in the first set and the second set that a sum SA_4 obtained by summing the totals A_4 for the plurality of contents included in the first set is larger than a predetermined threshold.

[0235] In the case of using this evaluation criterion, the positive contents are presumed to be at high positions, and thus a desirable weight pattern is obtained.

(In Addition to Variation 4-1)

[0236] The second evaluation criterion includes a criterion of a weighting pattern with which the number Q is a smallest value or a value close to the smallest value.

[0237] This evaluation criterion is used for judgment in addition to the evaluation criterion 4-1, and is a more desirable weight pattern since Q is small, which makes the above value of P/Q large.

Modification

[0238] In addition to the embodiment described as Embodiment 2, which can lessen the burden of selection of a plurality of keywords, identification of a weight pattern, and/or the like on the operator, designation of keywords and corresponding weights may be received from the operator as described in step S**609** in FIG. **10**.

[0239] FIG. **21** is a block diagram illustrating functions in the embodiments. This block diagram will be described below.

[0240] A content identification unit **1002** identifies various information on contents from search results, for example.

[0241] A word extraction unit **1004** is capable of receiving the positive set R**1**, the negative set G**1**, or the other set T**1**, extracting the words present in these sets, and presenting them to the operator, for example. The word extraction unit **1004** may extract words from all contents belonging to the set V or from some of the contents. Incidentally, there may be a case where the word extraction unit **1004** does not function. In this case, the operator may cause a keyword identification unit **1006** and a weight determination unit **1008** described next to function to identify keywords and their weights.

[0242] The keyword identification unit **1006** identifies keywords (positive keywords or negative keywords). The keywords may be selected by the operator from a presented word list. Alternatively, keywords designated by the operator themself may be used. The keyword identification unit **1006** may use a first evaluation criterion **1007** described above.

[0243] The weight determination unit **1008** is capable of determining weights for keywords based on an instruction (or a correction instruction) from the operator. The weight determination unit **1008** may use a second evaluation criterion **1009**.

[0244] A dictionary storage unit **1010** is utilized to extract synonyms, quasi-synonyms, and/or variant notations of keywords as keywords.

[0245] A content priority determination unit **1012** calculates totals (degrees of priority) for contents as described above.

[0246] The calculated degrees of priority are utilized by the operator to efficiently process the contents.

[0247] FIG. **22** is a diagram illustrating hardware components in the embodiments. The hardware components include a CPU **3001**, a program in the present embodiments, a database and/or a ROM **3002** in which data can be stored, a RAM **3003**, a network interface **3005**, an input interface **3006**, a display interface **3007**, and an external memory interface **3008**. These pieces of hardware are connected to one another by a bus **3004**.

[0248] The network interface **3005** is connected to a network **3015**. The network **3015** includes a wired LAN, a wireless LAN, the Internet, a telephone network, and the like. An input unit **3016** is connected to the input interface **3006**. A display unit **3017** is connected to the display interface **3007**. A storage medium **3018** is connected to the external memory interface **3008**. The storage medium **3018** may be a RAM, a ROM, a CD-ROM, a DVD-ROM, a hard disk drive, a memory card, a USB memory, or the like.

[0249] The programs and methods to implement the above embodiments can be executed by a computer including the hardware components illustrated in FIG. **22**.

[0250] The embodiments described above are not exclusive. It is possible to, for example, incorporate part of one embodiment in the other embodiment and replace part of one embodiment with part of the other embodiment.

[0251] In addition, the order of the flows in the exemplarily described flowcharts can be changed as long as there is no contradiction. Also, a single exemplarily described flow can be executed a plurality of times at different times as long as there is no contradiction. A plurality of steps may be executed simultaneously. Each step may be implemented by executing a program stored in a memory (non-transitory memory).

[0252] Also, some programs in the disclosed embodiments can be implemented by a versatile program, such as an operating system, or hardware. In addition, the disclosed programs may each be distributed among and executed by a plurality of pieces of hardware.

[0253] The programs that implement the above embodiments can be executed by a computer having the hardware components illustrated in FIG. **22**. Also, the programs in the embodiments may be implemented as methods to be executed by a computer.

[0254] It is needless to say that the above embodiments do not limit the invention described in the claims but are to be construed as examples. Those skilled in the art may make modifications and alterations to the embodiments without departing from the scope and spirit of the invention. Accordingly, the foregoing detailed description is intended to be illustrative rather than restrictive. Also, text, speech, and the like that can be included in contents to be handled in the technique of the present disclosure and the invention described in the claims are not limited to a particular language, and may be expressed in any language or a mixture of a plurality of languages.

1. A content processing method for determining a degree of priority of presentation of each of a plurality of contents, comprising:

identifying the plurality of contents;

receiving a first set including contents given positive evaluations and a second set including contents given negative evaluations from among the plurality of contents;

extracting a first word set included in the first set and a second word set included in the second set;

identifying a plurality of keywords including a plurality of positive keywords related to the first set and a plurality of negative keywords related to the second set according to a first evaluation criterion, the plurality of positive keywords being identified based on the first word set, the plurality of negative keywords being identified based on the second word set;

giving weights to the plurality of keywords according to a second evaluation criterion so as to give a weight of zero or more to each of the plurality of positive keywords and give a weight of zero or less to each of the plurality of negative keywords;

deriving a total for each of the plurality of contents by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and the given weight for the each of the plurality of keywords to obtain the total for each of the plurality of contents; and

determining the degree of priority of presentation of each of the plurality of contents based on the total for the each of the plurality of contents.

2. The content processing method according to claim **1**, wherein the first evaluation criterion includes a criterion of employing designation of a keyword from an operator.

3. The content processing method according to claim **1**, wherein the first evaluation criterion includes a criterion of determining the plurality of keywords based on a frequency

of appearance of each of words included in the first word set and the second word set per content in the first set and the second set.

4. The content processing method according to claim **3**, wherein the first evaluation criterion includes a criterion of designating keywords whose frequencies of appearance in the first set are higher than frequencies of appearance thereof in the second set as the plurality of positive keywords, and designating keywords whose frequencies of appearance in the second set are higher than frequencies of appearance thereof in the first set as the plurality of negative keywords.

5. The content processing method according to claim **1**, wherein

the giving weights includes:

preparing a finite number of candidate weights to give one of the finite number of candidate weights to each of the plurality of keywords;

creating a plurality of weighting patterns in which one of the finite number of weights is given to each of the plurality of keywords by giving one of the finite number of weights to each of the plurality of keywords; and

selecting one weighting pattern from among the plurality of weighting patterns according to the second evaluation criterion.

6. The content processing method according to claim **5**, wherein the creating a plurality of weighting pattern includes:

selecting N_p weighting patterns from among X_p weighting patterns in which one or ones of the finite number of weights are given to the plurality of positive keywords;

selecting N_n weighting patterns from among X_n weighting patterns in which one or ones of the finite number of weights are given to the plurality of negative keywords; and

creating $N_p \times N_n$ weighting patterns as the plurality of weighting patterns by comprehensively pairing the N_p weighting patterns and the N_n weighting patterns with one another.

7. The content processing method according to claim **6**, wherein

the selecting N_p weighting patterns includes:

by sequentially applying the X_p weighting patterns, obtaining a total A for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals A for the plurality of contents included in the first set to obtain a sum SA, thereby obtaining X_p sums SA corresponding respectively to the X_p weighting patterns; and

identifying N_p sums SA from among the X_p sums SA in descending order to select N_p weighting patterns corresponding respectively to the identified N_p sums SA, and/or

the selecting N_n weighting patterns includes:

by sequentially applying the X_n weighting patterns, obtaining a total D for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals D for the plurality of contents included in the second set to obtain a sum SD, thereby obtaining X_n sums SD corresponding respectively to the X_n weighting patterns; and

identifying N_n sums SD from among the X_n sums SD in ascending order to select N_n weighting patterns corresponding respectively to the identified N_n sums SD.

8. The content processing method according to claim **6**, wherein

the selecting N_p weighting patterns includes:

by sequentially applying the X_p weighting patterns, obtaining a total A for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and obtaining a total A_{pm} which is a smallest value among the totals A for the plurality of contents included in the first set, thereby obtaining X_p totals A_{pm} corresponding respectively to the X_p weighting patterns; and

identifying N_p totals A_{pm} from among the X_p totals A_{pm} in descending order to select N_p weighting patterns corresponding respectively to the identified N_p totals A_{pm}, and/or

the selecting N_n weighting patterns includes:

by sequentially applying the X_n weighting patterns, obtaining a total A_n for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and obtaining a total A_{nm} which is a smallest value among the totals A_n for the plurality of contents included in the first set; and

identifying N_n totals A_{nm} from among the X_n totals A_{nm} in descending order to select N_n weighting patterns corresponding respectively to the identified N_n totals A_{nm}.

9. The content processing method according to claim **6**, wherein

the selecting N_p weighting patterns includes:

by sequentially applying the X_p weighting patterns, obtaining a total A_1 for each of the plurality of contents included in the first set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals A_1 for the plurality of contents included in the first set to obtain a sum SA_1, thereby obtaining X_p sums SA_1 corresponding respectively to the X_p weighting patterns;

by sequentially applying the X_p weighting patterns, obtaining a total D_1 for each of the plurality of contents included in the second set by summing, over the plurality of positive keywords, a product of a frequency of appearance of each of the plurality of positive keywords and the given weight for the each of the plurality of positive keywords, and summing the totals D_1 for the plurality of contents included in

the second set to obtain a sum SD_1, thereby obtaining X_p sums SD_1 corresponding respectively to the X_p weighting patterns; and

identifying N_p calculation values H_1 ($=SA_1/SD_1$ or SA_1-SD_1) from among the calculation values H_1 corresponding respectively to the X_p weighting patterns in descending order to select N_p weighting patterns corresponding respectively to the N_p calculation values H_1, and/or

the selecting N_n weighting patterns includes:

by sequentially applying the X_n weighting patterns, obtaining a total A_2 for each of the plurality of contents included in the first set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals A_2 for the plurality of contents included in the first set to obtain a sum SA_2, thereby obtaining X_n sums SA_2 corresponding respectively to the X_n weighting patterns;

by sequentially applying the X_n weighting patterns, obtaining a total D_2 for each of the plurality of contents included in the second set by summing, over the plurality of negative keywords, a product of a frequency of appearance of each of the plurality of negative keywords and the given weight for the each of the plurality of negative keywords, and summing the totals D_2 for the plurality of contents included in the second set to obtain a sum SD_2, thereby obtaining X_n sums SD_2 corresponding respectively to the X_n weighting patterns; and

identifying N_n calculation values H_2 ($=SA_2/SD_2$ or SD_2-SA_2) from among the calculation values H_2 corresponding respectively to the X_n weighting patterns in ascending order to select N_n weighting patterns corresponding respectively to the N_n calculation values H_2.

10. The content processing method according to claim **1**, wherein the giving weights includes solving an optimization problem that derives the weight for each of the plurality of keywords with the second evaluation criterion as an objective function to thereby determine a weighting pattern specifying weighting to be applied to each of the plurality of keywords.

11. The content processing method according to claim **1**, wherein the second evaluation criterion includes a criterion of a weighting pattern with which a sum SA_3 obtained by summing totals A_3 for the plurality of contents included in the first set is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

12. The content processing method according to claim **1**, wherein the second evaluation criterion includes a criterion of a weighting pattern with which a total A_3m being a smallest value among totals A_3 is a largest value or a value close to the largest value, the totals A_3 each being obtained for one of the plurality of contents included in the first set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

13. The content processing method according to claim **1**, wherein the second evaluation criterion includes a criterion of a weighting pattern with which, when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set is a highest position or a position close to the highest position, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight.

14. The content processing method according to claim **1**, wherein the second evaluation criterion includes a criterion of a weighting pattern with which a value of P/Q calculated by using a position P and a number Q is a largest value or a value larger than a predetermined value,

where when totals A_4 for the plurality of contents included in the first set and the second set are arranged in descending order, the position P is a position of the lowest total A_4 among the totals A_4 for the plurality of contents included in the first set, the totals A_4 each being obtained for one of the plurality of contents included in the first set and the second set by summing, over the plurality of keywords, a product of a frequency of appearance of each of the plurality of keywords and a possible value of the corresponding weight, and

the number Q is such a number of the plurality of contents included in the first set and the second set that a sum SA_4 obtained by summing the totals A_4 for the plurality of contents included in the first set is larger than a predetermined threshold.

15. The content processing method according to claim **14**, wherein the second evaluation criterion further includes a criterion of a weighting pattern with which the number Q is a smallest value or a value close to the smallest value.

16. A non-transitory computer-readable medium storing a program that causes a computer to execute the method according to claim **1**.

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