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(54) **INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND PROGRAM**

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(57) **ABSTRACT**

Provided are an information processing apparatus, an information processing method, and a program capable of extracting a future trend in units of features of target content. The information processing apparatus includes a control unit that acquires a distribution of features of a target content in a predetermined period, regarding target content, acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period, and compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

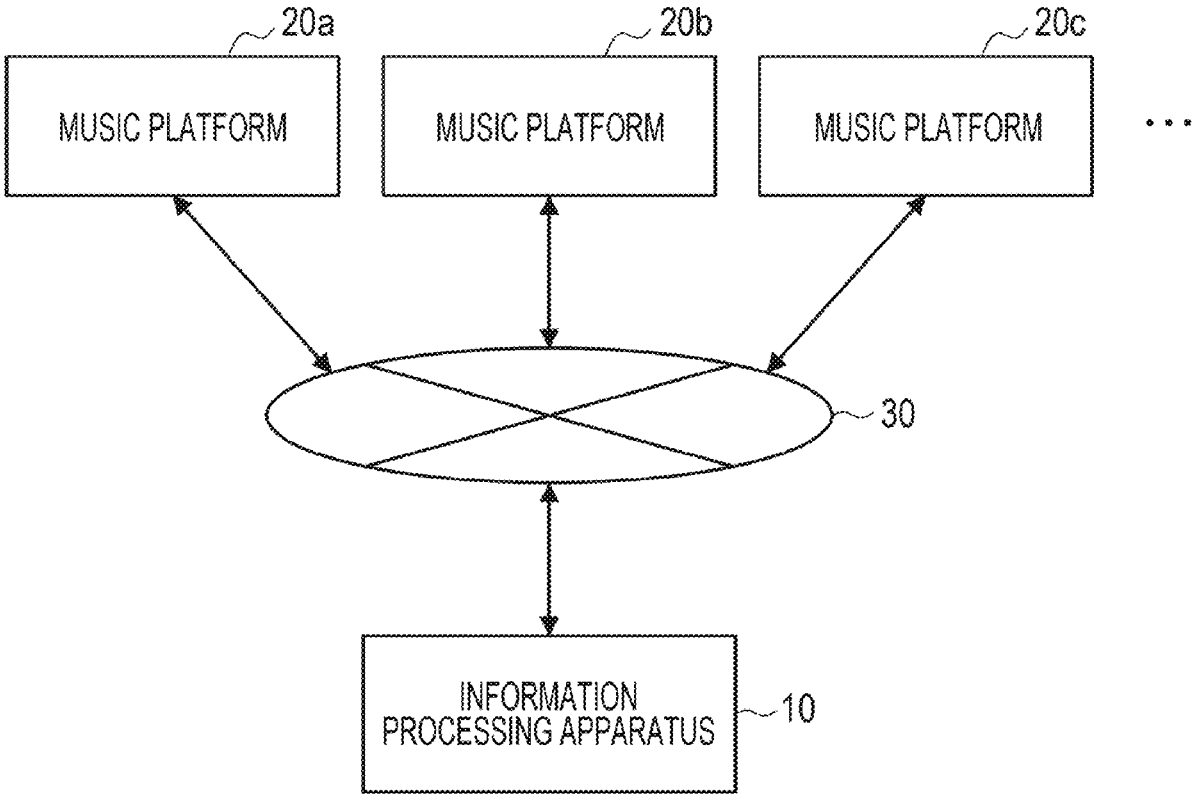


FIG. 1

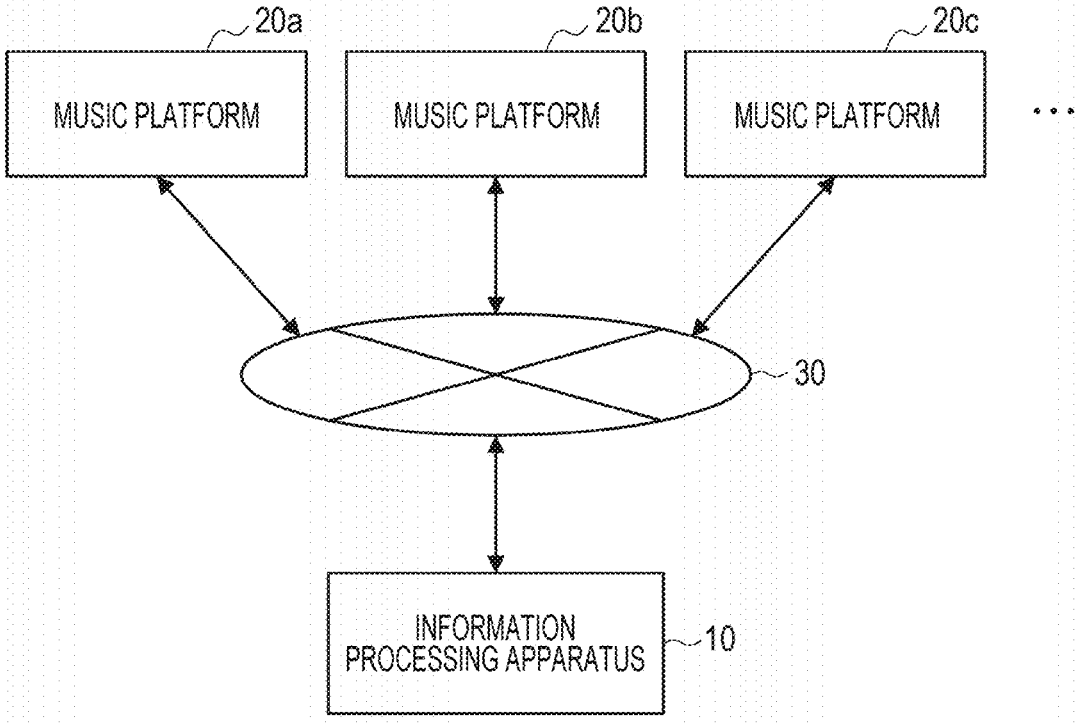

20a
20b
20c
MUSIC PLATFORM
MUSIC PLATFORM
MUSIC PLATFORM
• • •
30
INFORMATION PROCESSING APPARATUS
10

FIG. 2

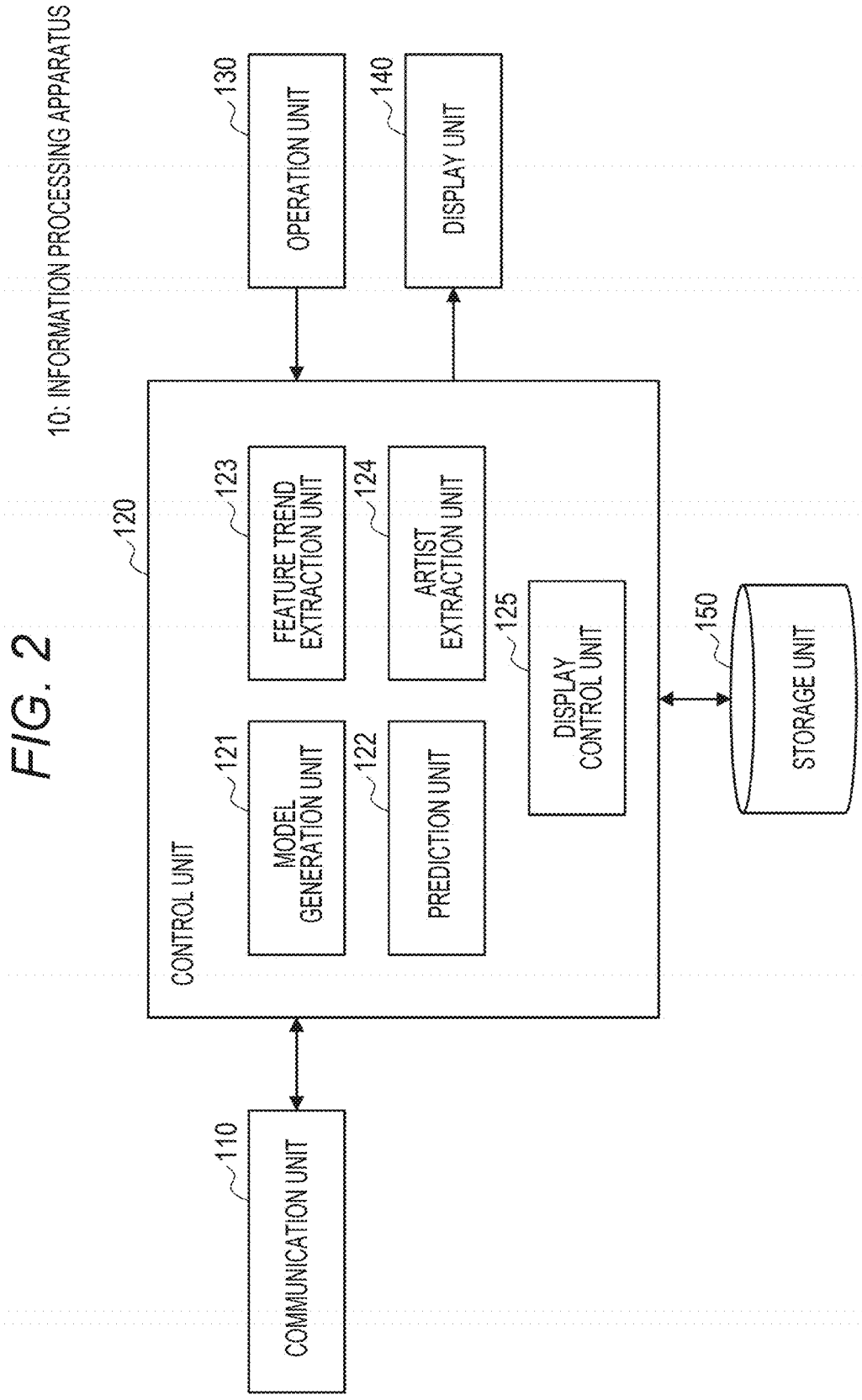
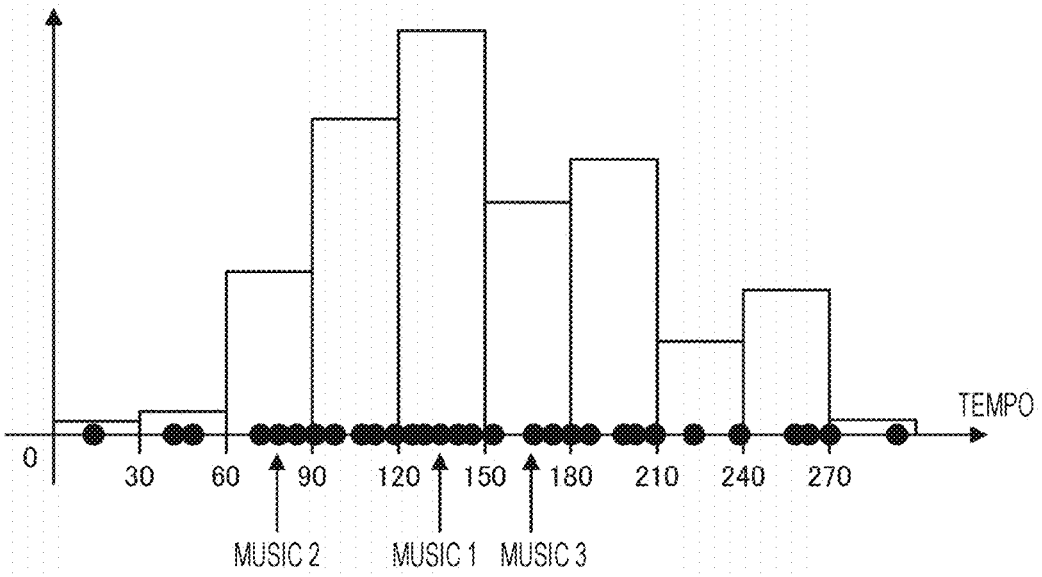

10: INFORMATION PROCESSING APPARATUS
110
COMMUNICATION UNIT
120
CONTROL UNIT
121
MODEL GENERATION UNIT
122
PREDICTION UNIT
123
FEATURE TREND EXTRACTION UNIT
124
ARTIST EXTRACTION UNIT
125
DISPLAY CONTROL UNIT
130
OPERATION UNIT
140
DISPLAY UNIT
150
STORAGE UNIT

FIG. 3

POPULAR SONG IN PREDETERMINED PERIOD

	TEMPO	DANCEABILITY	KEY
MUSIC 1	137	0.3	E
MUSIC 2	75	0.8	A
MUSIC 3	160	0.6	F



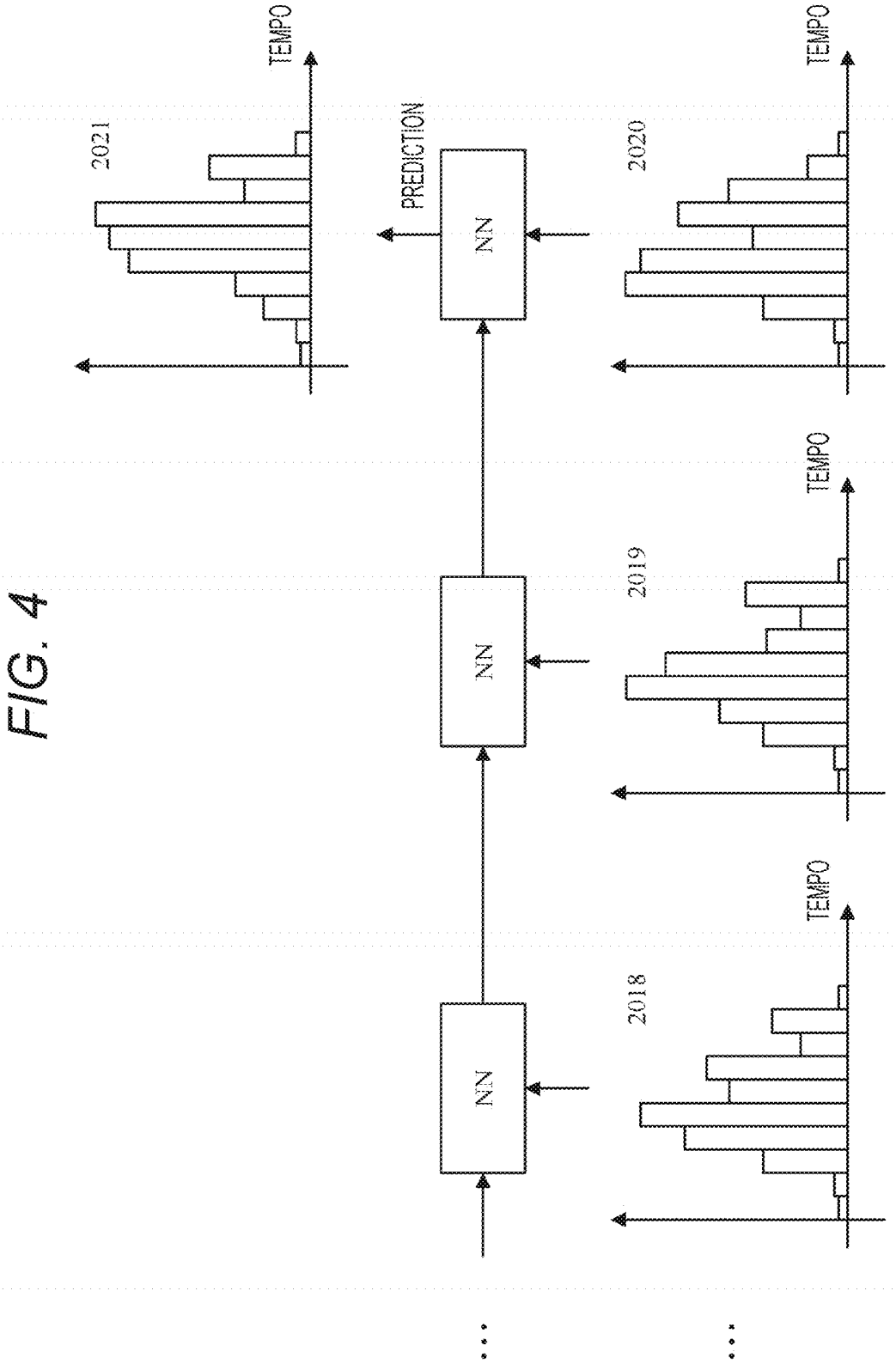

TEMPO
2021
PREDICTION
NN
2020
TEMPO
TEMPO
2019
NN
TEMPO
2018
NN

FIG. 4

FIG. 5

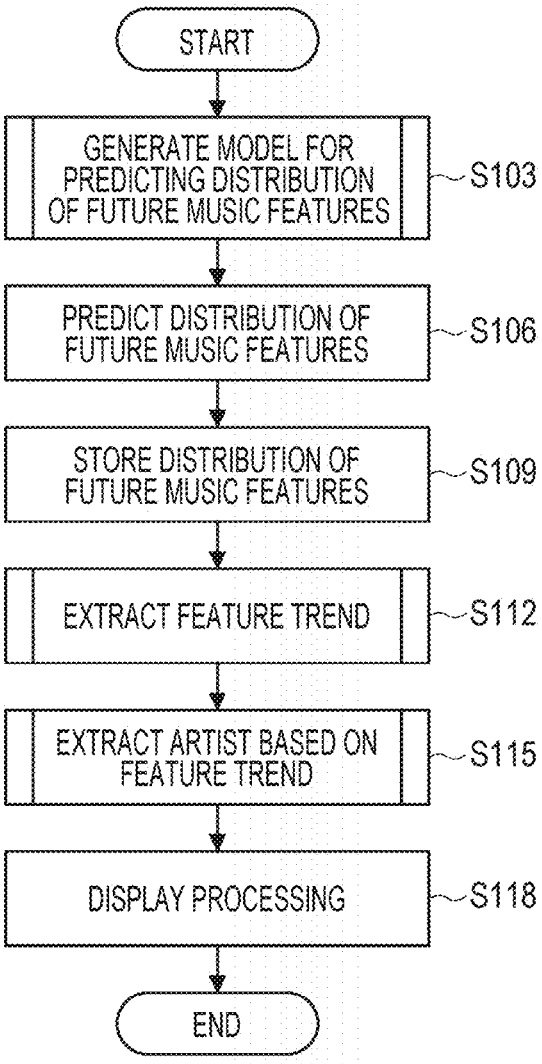

START
GENERATE MODEL FOR PREDICTING DISTRIBUTION OF FUTURE MUSIC FEATURES
S103
PREDICT DISTRIBUTION OF FUTURE MUSIC FEATURES
S106
STORE DISTRIBUTION OF FUTURE MUSIC FEATURES
S109
EXTRACT FEATURE TREND
S112
EXTRACT ARTIST BASED ON FEATURE TREND
S115
DISPLAY PROCESSING
S118
END

FIG. 6

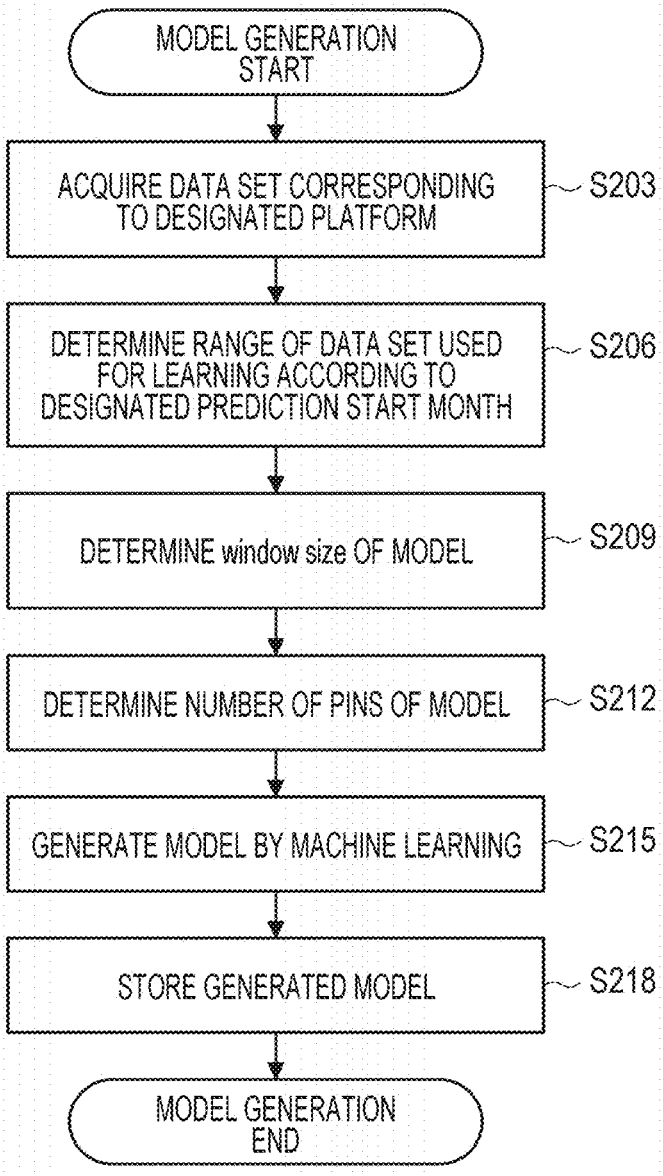

MODEL GENERATION START
ACQUIRE DATA SET CORRESPONDING TO DESIGNATED PLATFORM
S203
DETERMINE RANGE OF DATA SET USED FOR LEARNING ACCORDING TO DESIGNATED PREDICTION START MONTH
S206
DETERMINE window size OF MODEL
S209
DETERMINE NUMBER OF PINS OF MODEL
S212
GENERATE MODEL BY MACHINE LEARNING
S215
STORE GENERATED MODEL
S218
MODEL GENERATION END

FIG. 7

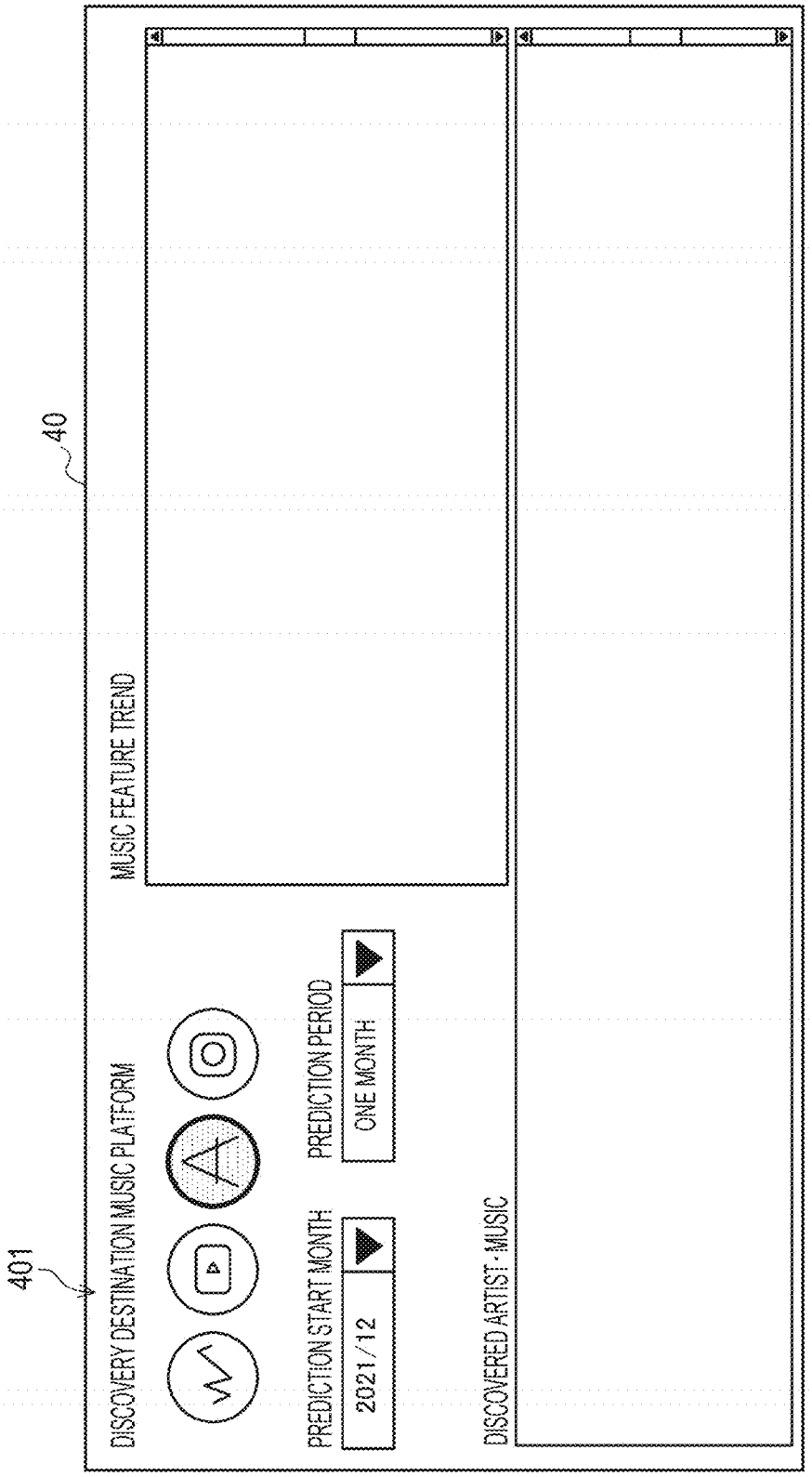

401
40
DISCOVERY DESTINATION MUSIC PLATFORM
MUSIC FEATURE TREND
PREDICTION START MONTH
2021/12
PREDICTION PERIOD
ONE MONTH
DISCOVERED ARTIST · MUSIC

FIG. 8

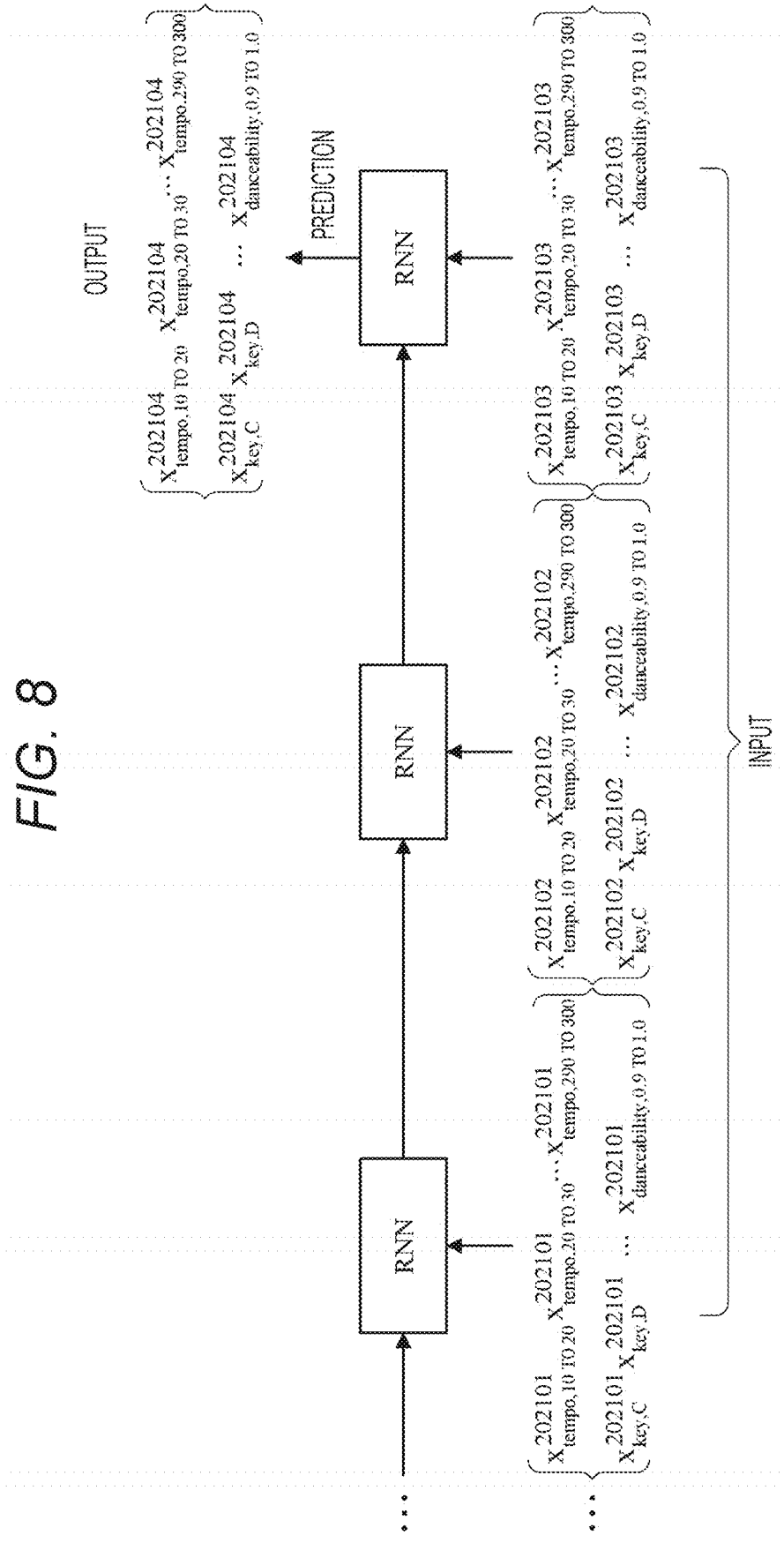


FIG. 9

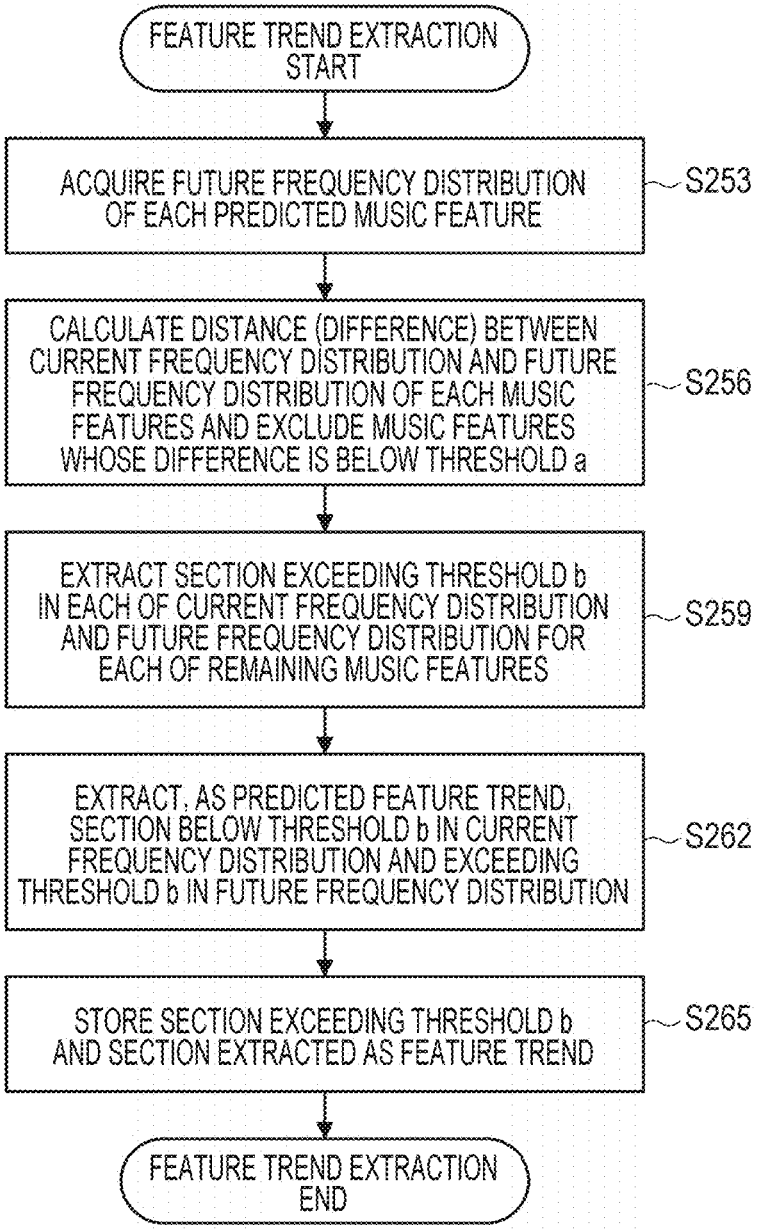

FEATURE TREND EXTRACTION START
ACQUIRE FUTURE FREQUENCY DISTRIBUTION OF EACH PREDICTED MUSIC FEATURE
S253
CALCULATE DISTANCE (DIFFERENCE) BETWEEN CURRENT FREQUENCY DISTRIBUTION AND FUTURE FREQUENCY DISTRIBUTION OF EACH MUSIC FEATURES AND EXCLUDE MUSIC FEATURES WHOSE DIFFERENCE IS BELOW THRESHOLD a
S256
EXTRACT SECTION EXCEEDING THRESHOLD b IN EACH OF CURRENT FREQUENCY DISTRIBUTION AND FUTURE FREQUENCY DISTRIBUTION FOR EACH OF REMAINING MUSIC FEATURES
S259
EXTRACT, AS PREDICTED FEATURE TREND, SECTION BELOW THRESHOLD b IN CURRENT FREQUENCY DISTRIBUTION AND EXCEEDING THRESHOLD b IN FUTURE FREQUENCY DISTRIBUTION
S262
STORE SECTION EXCEEDING THRESHOLD b AND SECTION EXTRACTED AS FEATURE TREND
S265
FEATURE TREND EXTRACTION END

FIG. 10

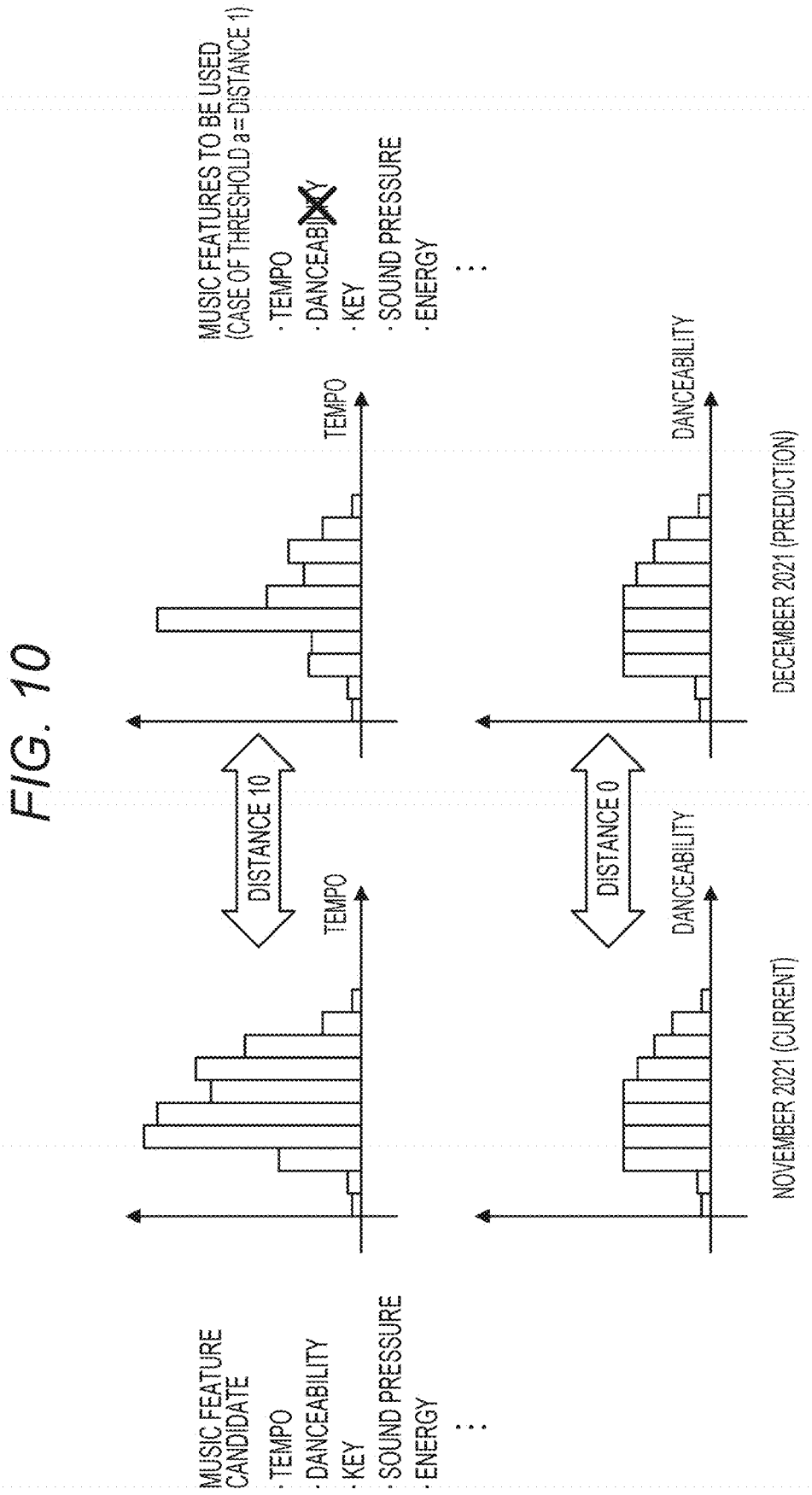

MUSIC FEATURE CANDIDATE
· TEMPO
· DANCEABILITY
· KEY
· SOUND PRESSURE
· ENERGY
· · ·
TEMPO
DISTANCE 10
TEMPO
MUSIC FEATURES TO BE USED (CASE OF THRESHOLD a = DISTANCE 1)
· TEMPO
· DANCEABILITY
· KEY
· SOUND PRESSURE
· ENERGY
· · ·
NOVEMBER 2021 (CURRENT)
DANCEABILITY
DISTANCE 0
DANCEABILITY
DECEMBER 2021 (PREDICTION)

FIG. 11

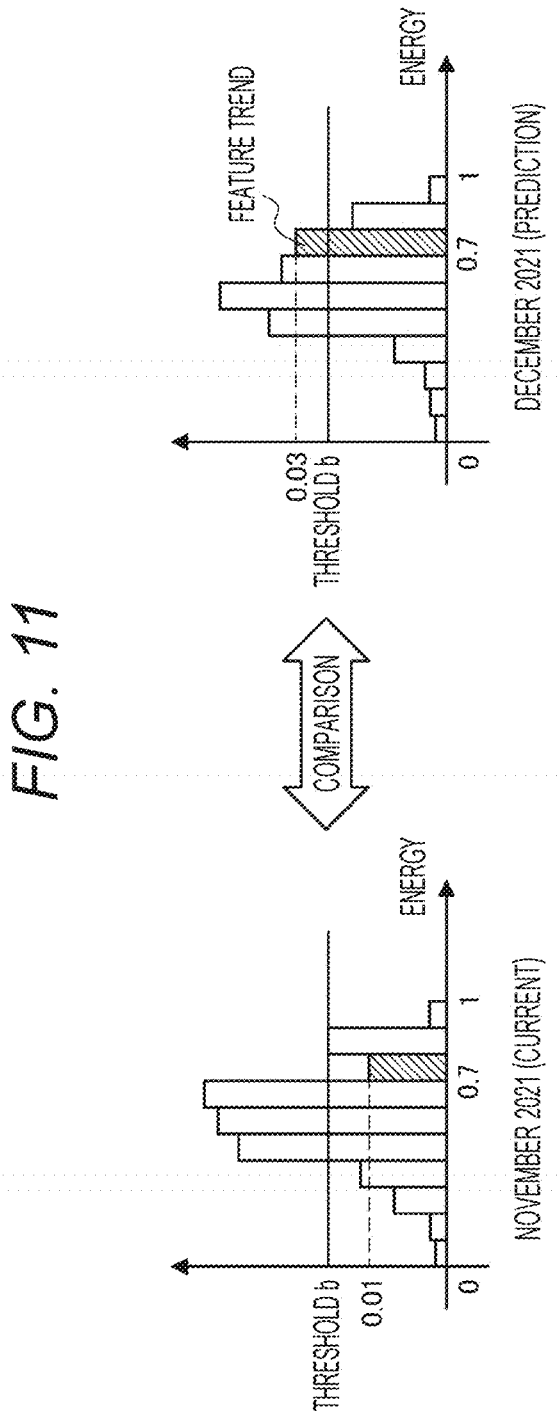

NOVEMBER 2021 (CURRENT)
ENERGY
1
0.7
0
THRESHOLD b
0.01
COMPARISON
DECEMBER 2021 (PREDICTION)
ENERGY
1
0.7
0
FEATURE TREND
0.03
THRESHOLD b

FIG. 12

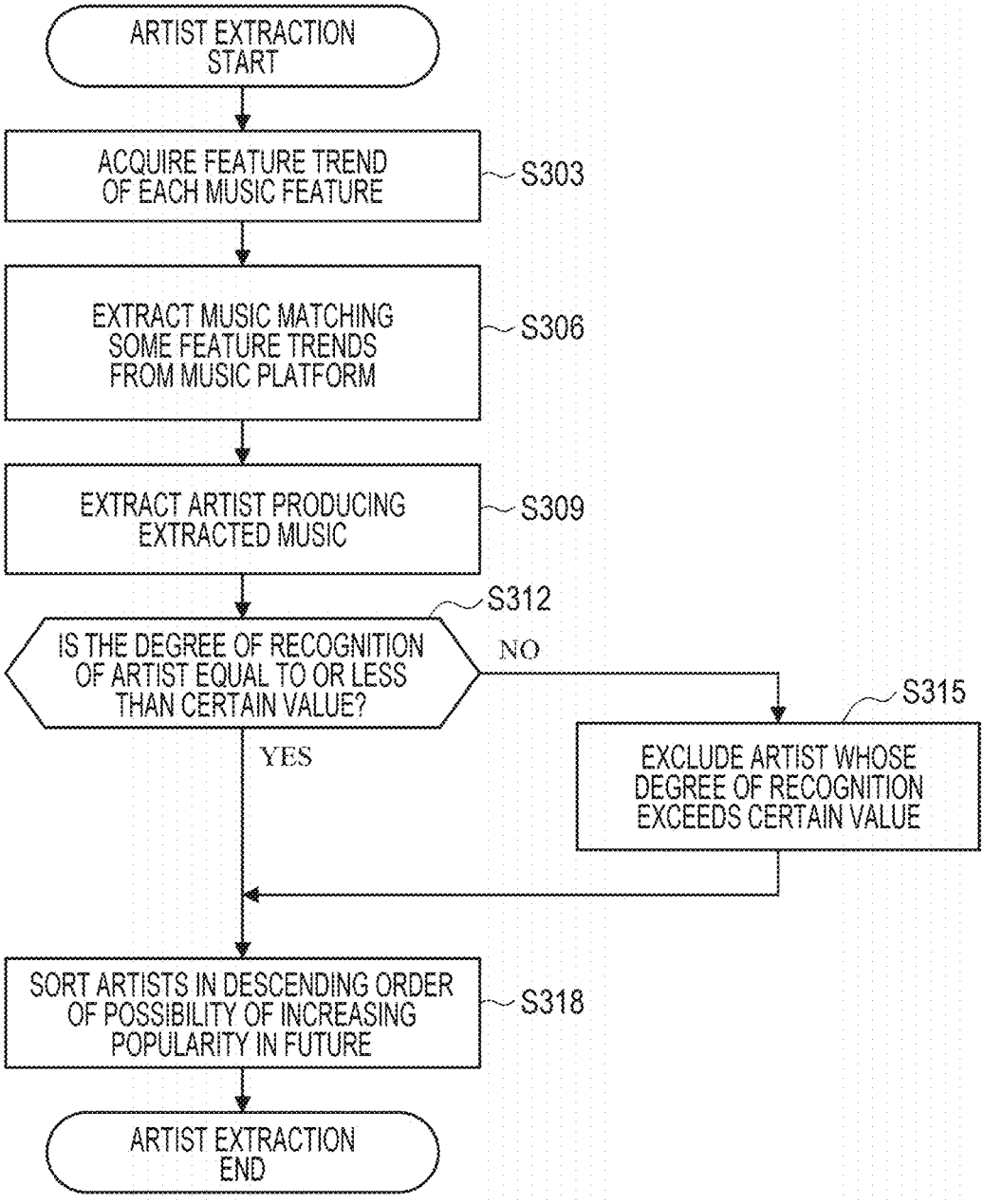

ARTIST EXTRACTION START
ACQUIRE FEATURE TREND OF EACH MUSIC FEATURE
S303
EXTRACT MUSIC MATCHING SOME FEATURE TRENDS FROM MUSIC PLATFORM
S306
EXTRACT ARTIST PRODUCING EXTRACTED MUSIC
S309
S312
IS THE DEGREE OF RECOGNITION OF ARTIST EQUAL TO OR LESS THAN CERTAIN VALUE?
NO
YES
S315
EXCLUDE ARTIST WHOSE DEGREE OF RECOGNITION EXCEEDS CERTAIN VALUE
SORT ARTISTS IN DESCENDING ORDER OF POSSIBILITY OF INCREASING POPULARITY IN FUTURE
S318
ARTIST EXTRACTION END

FIG. 13

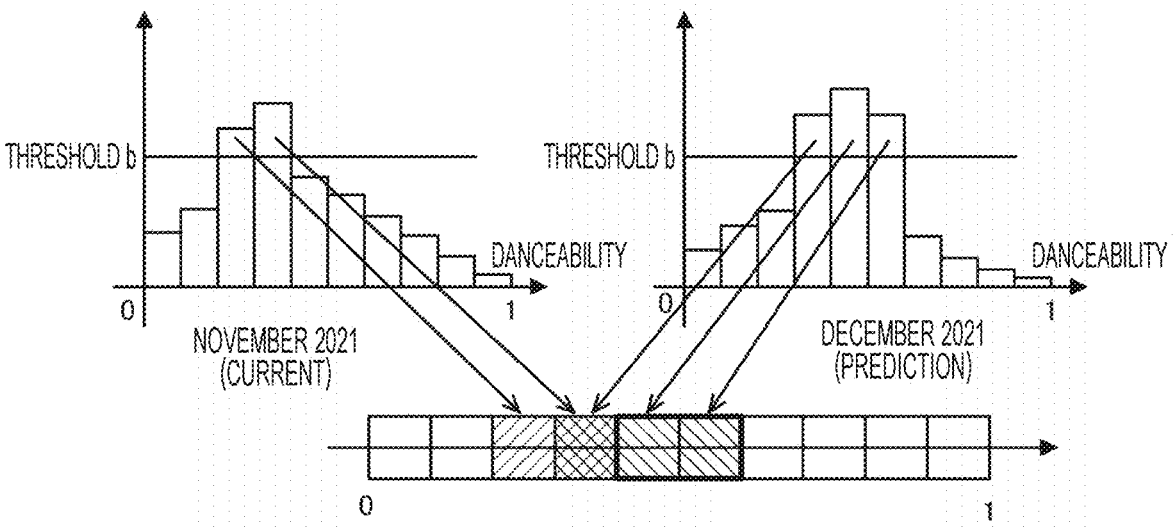

THRESHOLD b
DANCEABILITY
0
1
NOVEMBER 2021
(CURRENT)
THRESHOLD b
DANCEABILITY
0
1
DECEMBER 2021
(PREDICTION)
0
1

FIG. 14

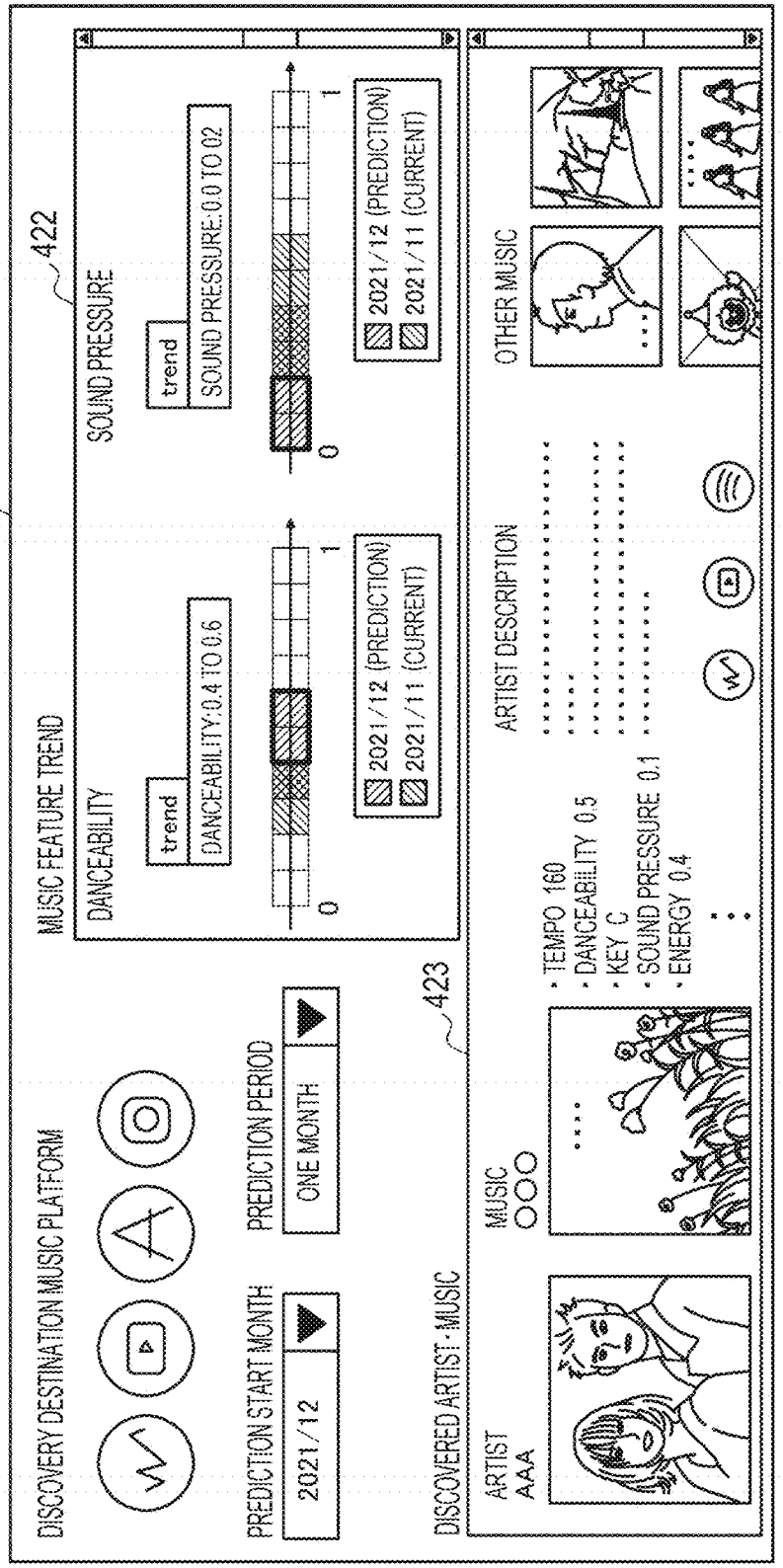

42
DISCOVERY DESTINATION MUSIC PLATFORM
MUSIC FEATURE TREND
422
DANCEABILITY
trend
DANCEABILITY:0.4 TO 0.6
SOUND PRESSURE
trend
SOUND PRESSURE:0.0 TO 02
PREDICTION START MONTH
2021/12
PREDICTION PERIOD
ONE MONTH
0
1
2021/12 (PREDICTION)
2021/11 (CURRENT)
0
1
2021/12 (PREDICTION)
2021/11 (CURRENT)
423
DISCOVERED ARTIST · MUSIC
ARTIST
AAA
MUSIC
ARTIST DESCRIPTION
OTHER MUSIC
• TEMPO 160
• DANCEABILITY 0.5
• KEY C
• SOUND PRESSURE 0.1
• ENERGY 0.4

FIG. 15

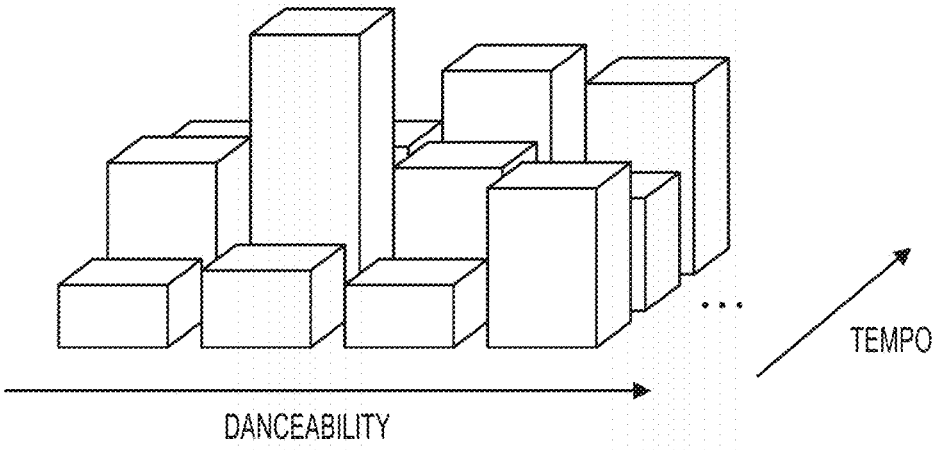


FIG. 16

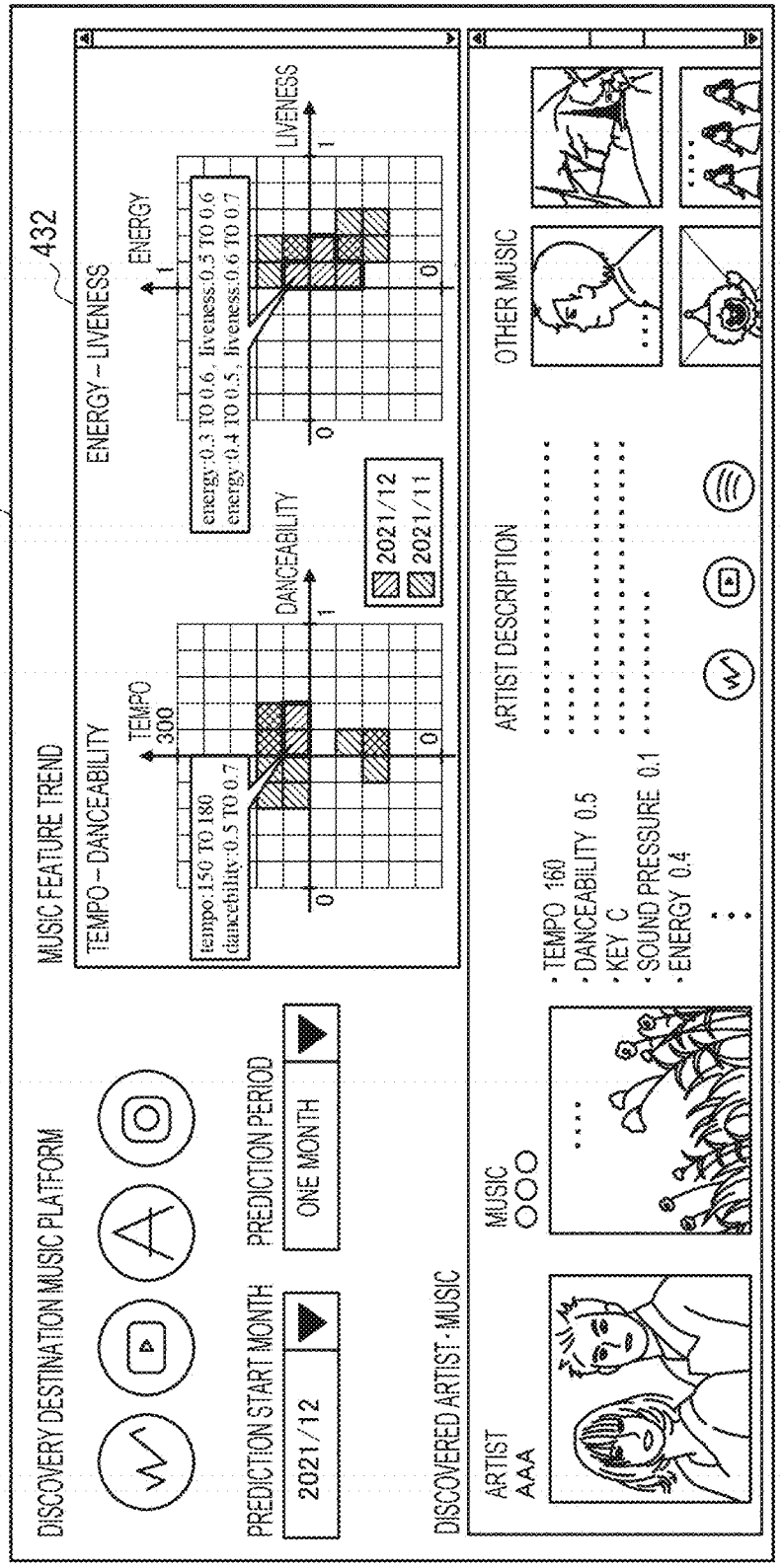

43
DISCOVERY DESTINATION MUSIC PLATFORM
PREDICTION START MONTH
2021/12
PREDICTION PERIOD
ONE MONTH
MUSIC FEATURE TREND
432
TEMPO – DANCEABILITY
TEMPO
300
tempo:150 TO 180
danceability:0.5 TO 0.7
DANCEABILITY
1
0
ENERGY – LIVENESS
ENERGY
1
energy:0.3 TO 0.6, liveness:0.5 TO 0.6
energy:0.4 TO 0.5, liveness:0.6 TO 0.7
LIVENESS
1
0
2021/12
2021/11
DISCOVERED ARTIST · MUSIC
ARTIST
AAA
MUSIC
ARTIST DESCRIPTION
· TEMPO 160
· DANCEABILITY 0.5
· KEY C
· SOUND PRESSURE 0.1
· ENERGY 0.4
OTHER MUSIC
AAA

FIG. 17

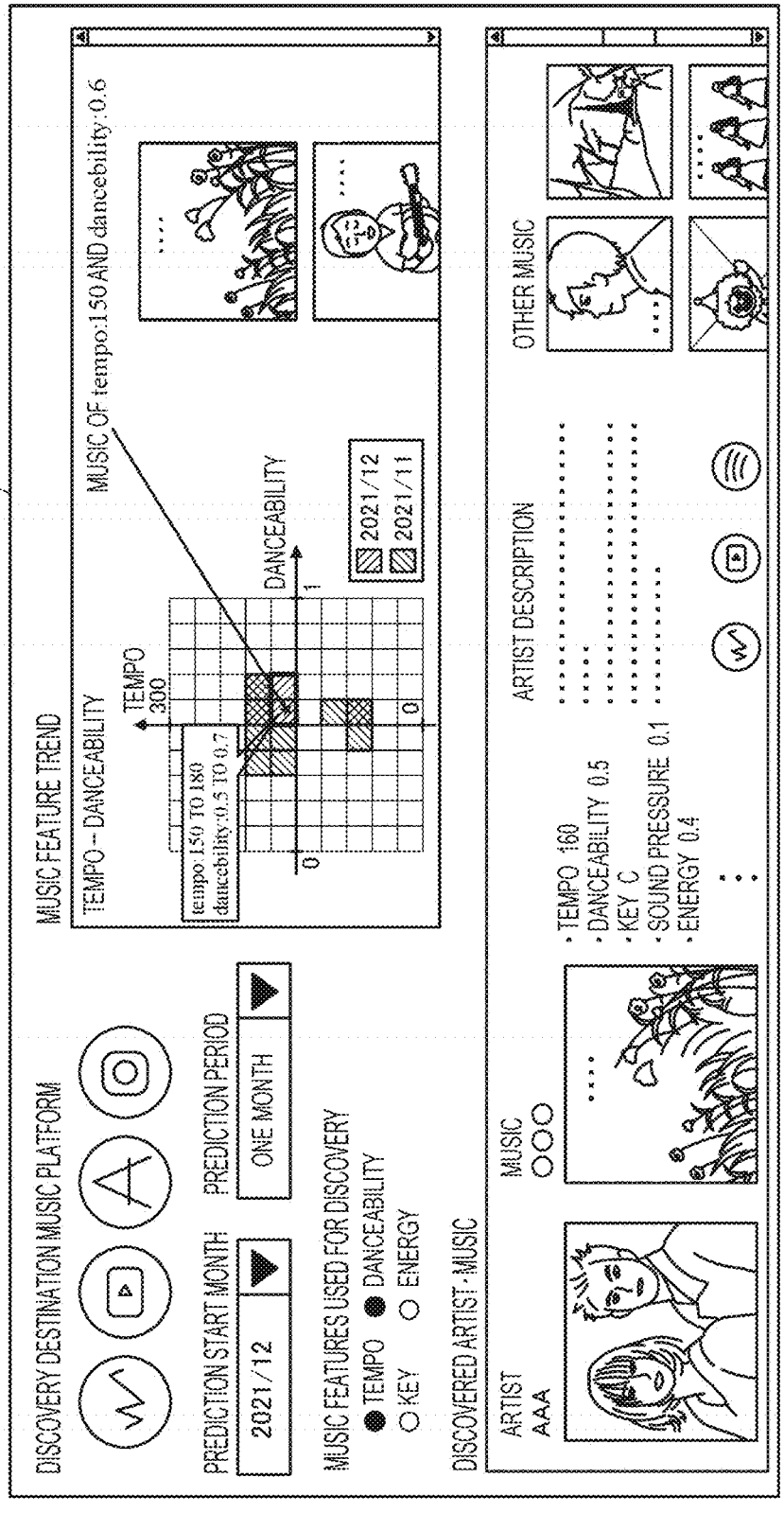

44
DISCOVERY DESTINATION MUSIC PLATFORM
PREDICTION START MONTH
2021/12
PREDICTION PERIOD
ONE MONTH
MUSIC FEATURES USED FOR DISCOVERY
TEMPO
DANCEABILITY
KEY
ENERGY
MUSIC FEATURE TREND
TEMPO – DANCEABILITY
MUSIC OF tempo:150 AND dancebility:0.6
TEMPO
300
tempo:150 TO 180
dancebility:0.5 TO 0.7
DANCEABILITY
1
0
0
2021/12
2021/11
DISCOVERED ARTIST · MUSIC
ARTIST
AAA
MUSIC
ARTIST DESCRIPTION
TEMPO 160
DANCEABILITY 0.5
KEY C
SOUND PRESSURE 0.1
ENERGY 0.4
OTHER MUSIC
AAA

FIG. 18

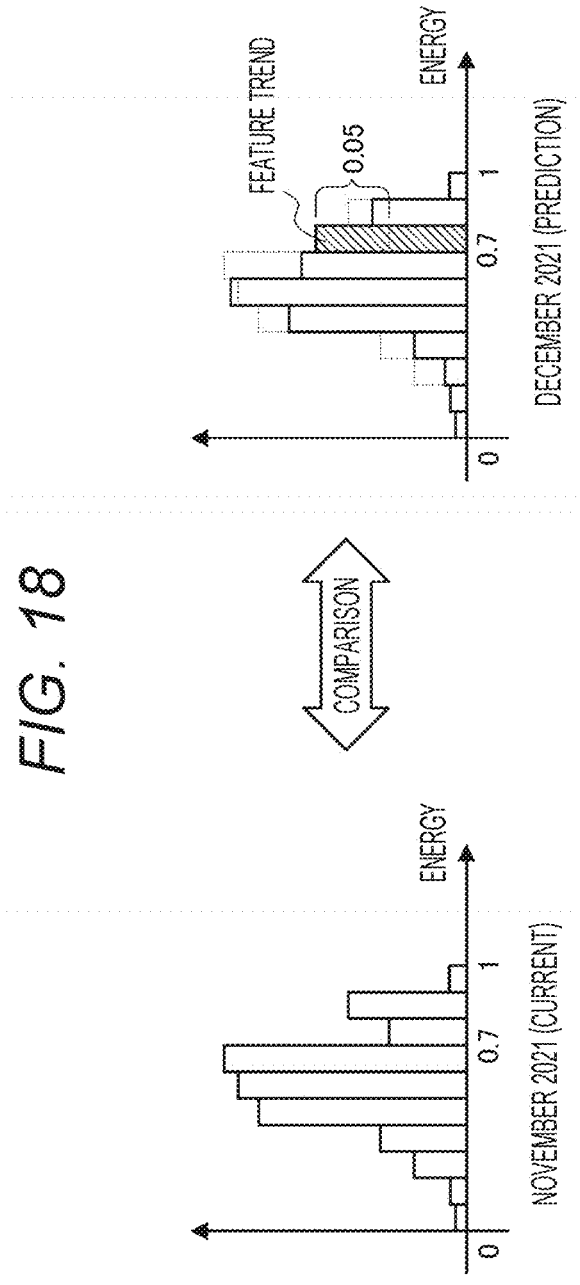

NOVEMBER 2021 (CURRENT)
ENERGY
0
0.7
1
COMPARISON
DECEMBER 2021 (PREDICTION)
ENERGY
FEATURE TREND
0.05
0
0.7
1

FIG. 19

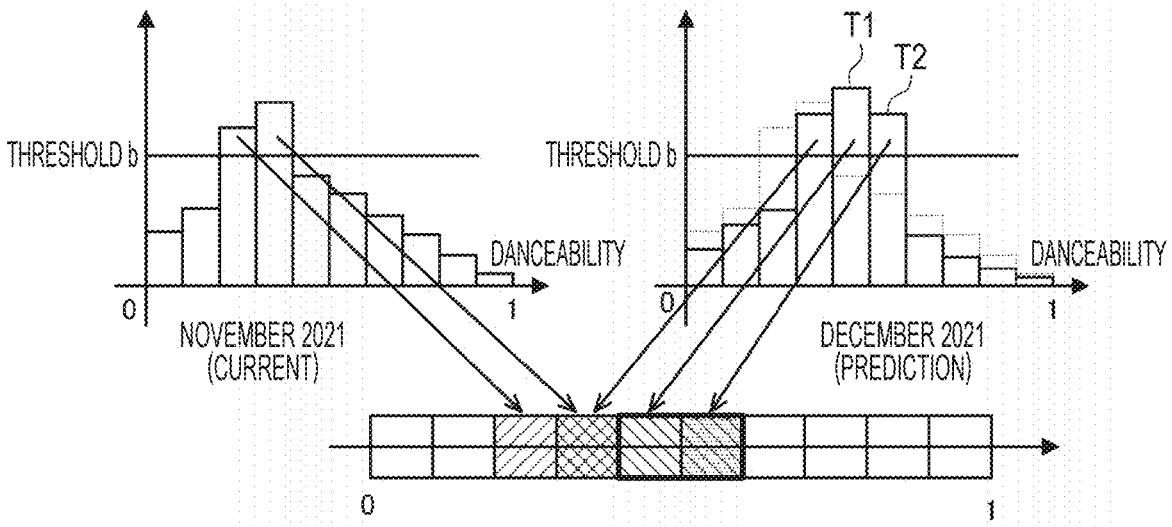

THRESHOLD b
DANCEABILITY
0
1
NOVEMBER 2021
(CURRENT)
THRESHOLD b
T1
T2
DANCEABILITY
0
1
DECEMBER 2021
(PREDICTION)
0
1

FIG. 20

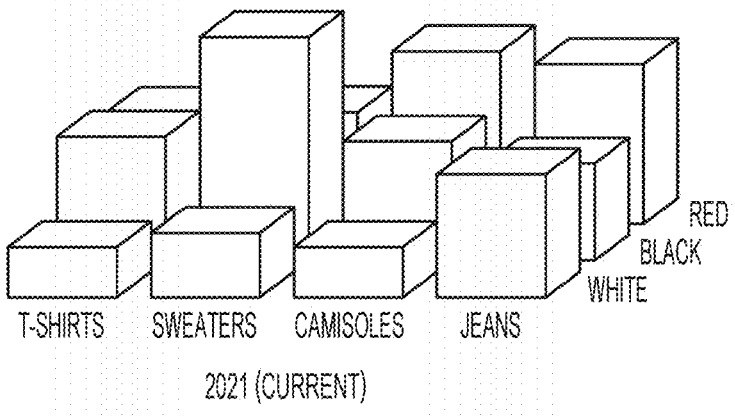

RED
BLACK
WHITE
T-SHIRTS
SWEATERS
CAMISOLES
JEANS
2021 (CURRENT)

FIG. 21

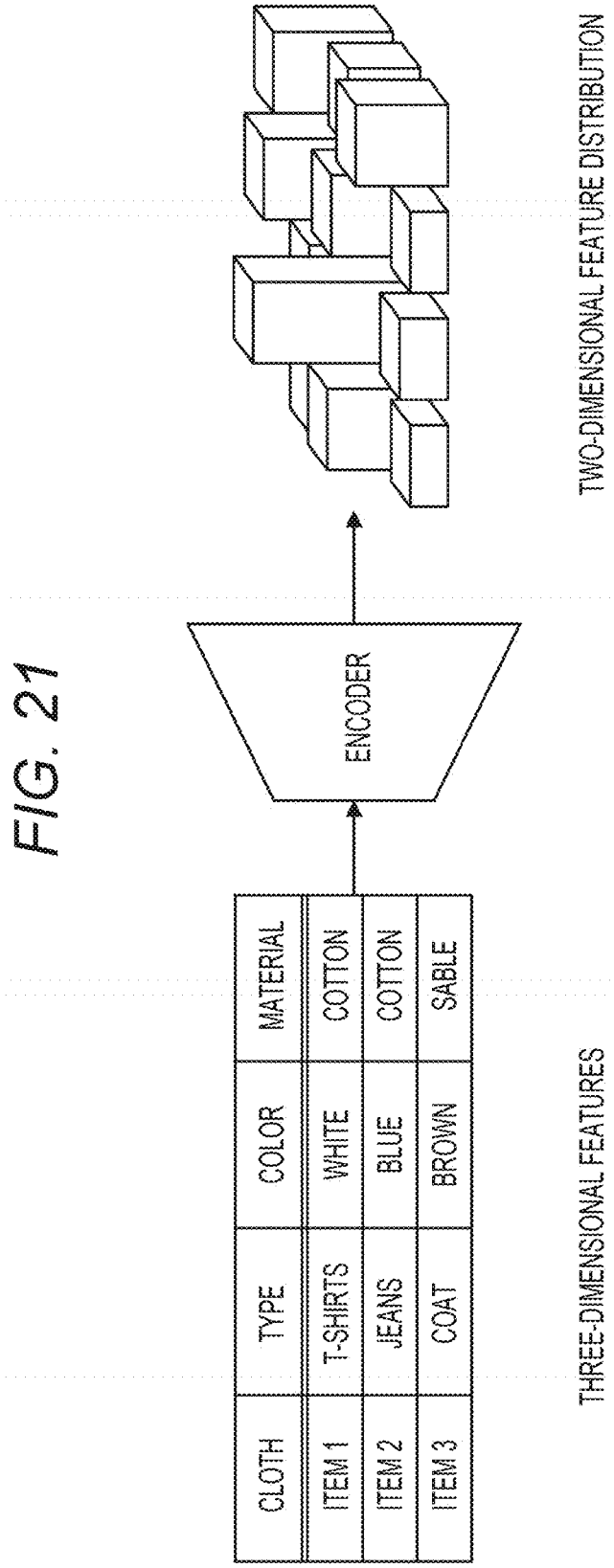

CLOTH
TYPE
COLOR
MATERIAL
ITEM 1
T-SHIRTS
WHITE
COTTON
ITEM 2
JEANS
BLUE
COTTON
ITEM 3
COAT
BROWN
SABLE
THREE-DIMENSIONAL FEATURES
ENCODER
TWO-DIMENSIONAL FEATURE DISTRIBUTION

FIG. 22

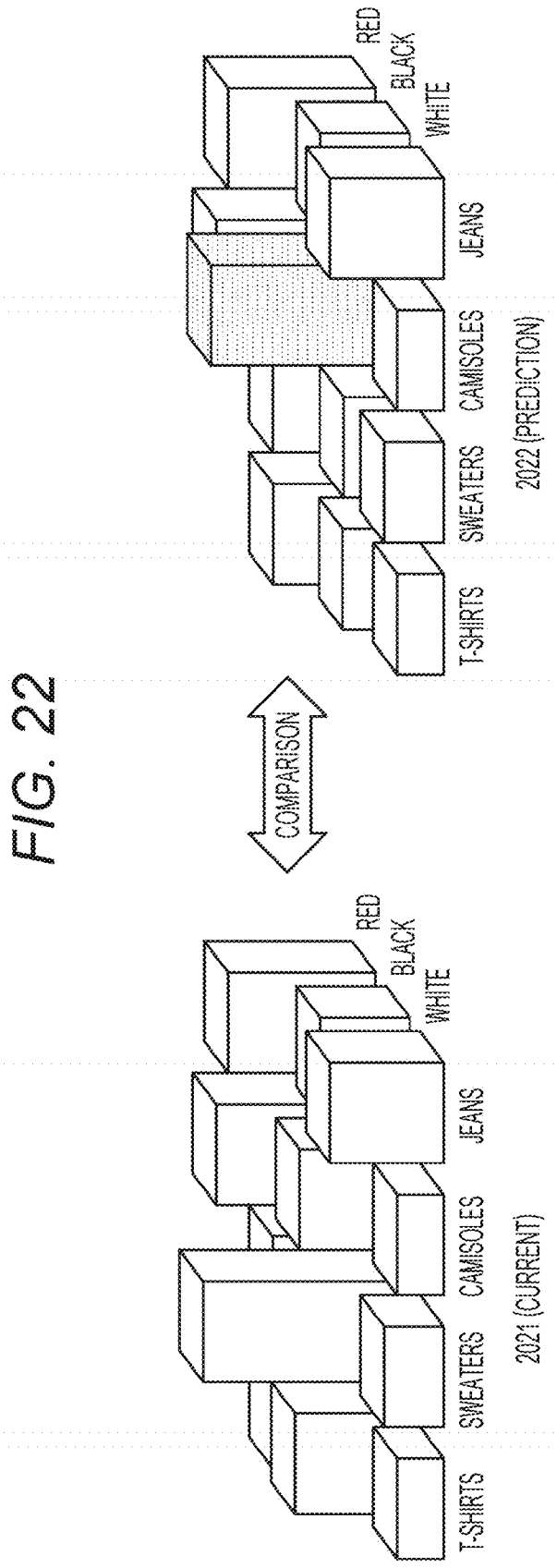
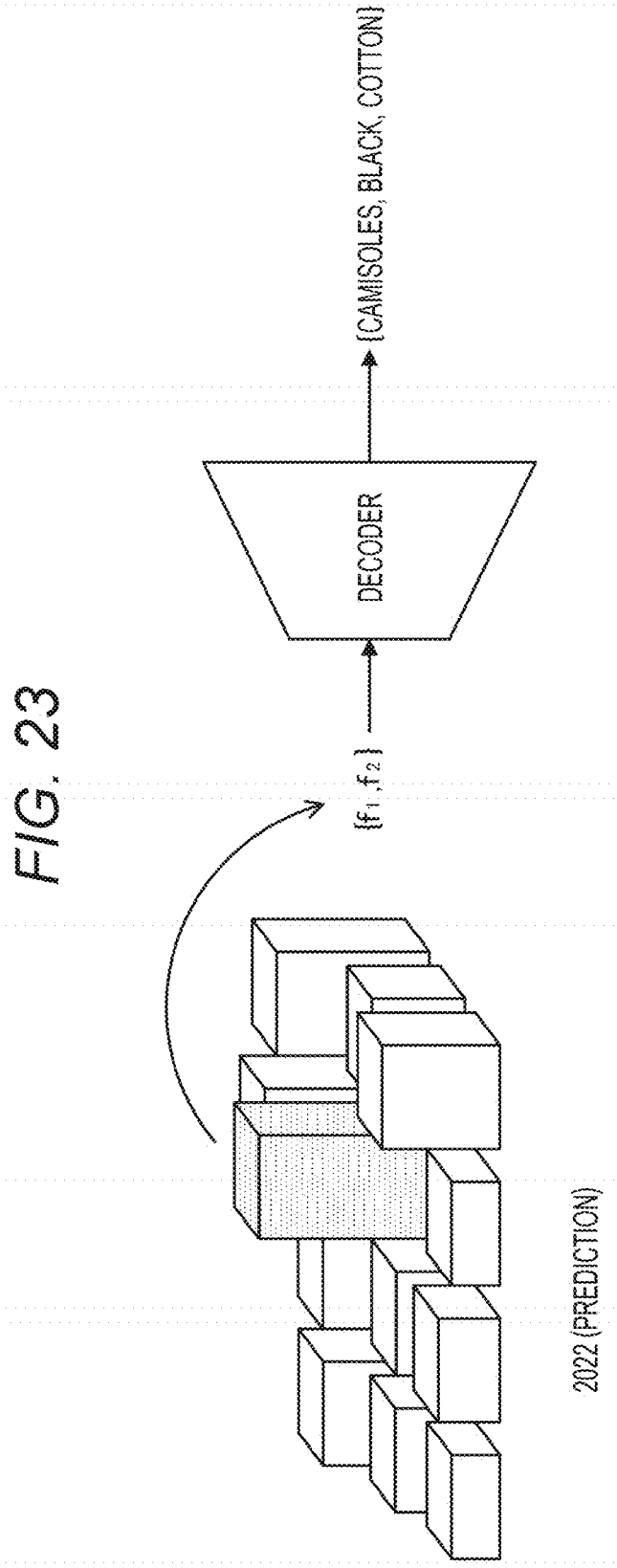

RED
BLACK
WHITE
JEANS
CAMISOLES
SWEATERS
T-SHIRTS
2022 (PREDICTION)
COMPARISON
RED
BLACK
WHITE
JEANS
CAMISOLES
SWEATERS
T-SHIRTS
2021 (CURRENT)

FIG. 23



INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND PROGRAM

TECHNICAL FIELD

[0001] The present disclosure relates to an information processing apparatus, an information processing method, and a program.

BACKGROUND ART

[0002] In recent years, attempts have been made to analyze and predict trends using various information disclosed on the Internet.

[0003] For example, Patent Document 1 described below proposes a technique for determining which period of trend transition times (dawn period, epidemic period, reaction period, recovery period, stability period) is appropriate, on the basis of frequency of appearance of a keyword for identifying a period, from a sentence related to a specific theme, and furthermore predicting when a next period after the determined period will arrive.

CITATION LIST

Patent Document

[0004] Patent Document 1: Japanese Patent Application Laid-Open No. 2012-38135

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

[0005] However, the trend transition times do not necessarily change in a determined order, and it has been difficult for the technology disclosed in Patent Document 1 to sufficiently analyze and predict a complicated trend change. In addition, in the technology disclosed in Patent Document 1, a target of trend prediction is narrowed down to a somewhat large theme, and trend prediction targeting detailed features is not assumed.

[0006] Therefore, the present disclosure proposes an information processing apparatus, an information processing method, and a program capable of extracting a future trend in units of features of a target content.

Solutions to Problems

[0007] According to the present disclosure, there is proposed an information processing apparatus including a control unit that acquires a distribution of features of a target content in a predetermined period, regarding target content, acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period, and compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

[0008] According to the present disclosure, there is proposed an information processing method causing a processor to perform the steps of: acquiring a distribution of features of a target content in a predetermined period, regarding target content; acquiring a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and comparing a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

[0009] According to the present disclosure, there is proposed a program causing a computer to function as a control unit that acquires a distribution of features of a target content in a predetermined period, regarding target content; acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

BRIEF DESCRIPTION OF DRAWINGS

[0010] FIG. **1** is a diagram illustrating an outline of a trend extraction system according to an embodiment of the present disclosure.

[0011] FIG. **2** is a block diagram illustrating an example of a configuration of an information processing apparatus according to the present embodiment.

[0012] FIG. **3** is a diagram illustrating an example in which music features (for example, "tempo") of a popular song in a predetermined period are expressed by frequency distribution according to the present embodiment.

[0013] FIG. **4** is a diagram illustrating generation (learning) of a prediction model of a music feature distribution in a case of a window size 3 according to the present embodiment.

[0014] FIG. **5** is a flowchart illustrating an example of an overall flow of trend extraction processing according to the present embodiment.

[0015] FIG. **6** is a flowchart illustrating an example of a flow of model generation processing according to the present embodiment.

[0016] FIG. **7** is a diagram illustrating a display screen example of music platform selection and the like according to the present embodiment.

[0017] FIG. **8** is a diagram illustrating an example of generation of a time-series prediction model in which all music features are input and output in a connected form according to the present embodiment.

[0018] FIG. **9** is a flowchart illustrating an example of a flow of feature trend extraction processing according to the present embodiment.

[0019] FIG. **10** is a diagram illustrating exclusion of music features having no difference according to the present embodiment.

[0020] FIG. **11** is a diagram illustrating extraction of a feature trend according to the present embodiment according to the present embodiment.

[0021] FIG. **12** is a flowchart illustrating an example of a flow of artist extraction processing according to the present embodiment.

[0022] FIG. **13** is a diagram illustrating a case where a feature trend is displayed in a one-dimensional grid according to the present embodiment.

[0023] FIG. **14** is a diagram illustrating a display screen example including display of the feature trend on a one-dimensional grid and display of discovered artists and music according to the present embodiment.

[0024] FIG. **15** is a diagram illustrating an example of a distribution (two-dimensional distribution) of two types of music features according to a modification of the present embodiment.

[0025] FIG. **16** is a diagram illustrating a screen example in which each of two types of feature trends is displayed in a two-dimensional grid according to a modification of the present embodiment.

[0026] FIG. **17** is a diagram illustrating an example of a screen having an additional function according to a modification of the present embodiment.

[0027] FIG. **18** is a diagram illustrating extraction of a feature trend according to a modification of the present embodiment.

[0028] FIG. **19** is a diagram illustrating a modification of display of a feature trend of the present embodiment.

[0029] FIG. **20** is a diagram illustrating an example of a feature distribution in an application example to fashion according to the present embodiment.

[0030] FIG. **21** is a diagram illustrating dimension reduction in the application example to the fashion according to the present embodiment.

[0031] FIG. **22** is a diagram illustrating extraction of a feature trend in the application example to the fashion according to the present embodiment.

[0032] FIG. **23** is a diagram illustrating extraction of the feature trend in a case where a dimension reduction algorithm is used in the application example to the fashion according to the present embodiment.

MODE FOR CARRYING OUT THE INVENTION

[0033] Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Note that, in the present specification and drawings, components having substantially the same functional configuration are denoted by the same reference signs, and redundant description is omitted.

[0034] Further, a description will be given in the following order.

[0035] 1. Overview of trend extraction system
[0036] 2. Example configurations
[0037] 3. Operation processing
[0038] 3-1. Overall flow
[0039] 3-2. Model generation processing
[0040] 3-3. Prediction processing of distribution of future music features
[0041] 3-4. Feature trend extraction processing
[0042] 3-5. Artist extraction processing
[0043] 4. Display screen example
[0044] 4-1. Display of feature trend in one-dimensional grid
[0045] 4-2. Display of feature trend in one-dimensional grid and display of discovered artist and music
[0046] 5. Modification
[0047] 5-1. Multi-dimensional display of feature trends
[0048] 5-2. Additional function
[0049] 6. Application example to other than music
[0050] 6-1. Fashion
[0051] 6-2. Design
[0052] 6-3. Image and symbols
[0053] 7. Supplement

1. Overview of Trend Extraction System

[0054] FIG. **1** is a diagram illustrating an outline of a trend extraction system according to an embodiment of the present disclosure. As illustrated in FIG. **1**, the trend extraction system according to the present embodiment causes an information processing apparatus **10** to analyze data regarding target content and extract a future trend. Content targeted for trend extraction is assumed to be content in various fields such as music, fashion, books, moving images, photographs, and so on. In the present embodiment, trend extraction of music will be described as an example.

[0055] The data regarding the target content may be acquired from an external server that stores the data regarding the target content. For example, the information processing apparatus **10** communicably connects to a plurality of music platforms **20** (**20***a* to **20***c* . . .) through a network **30**, and can receive data regarding music being handled in each music platform **20** as data regarding the target content. The music platform **20** is an example of a data sharing platform where various content (data) is shared by a large number of users. As the music platform **20** according to the present embodiment, for example, various social networking services (SNSs), video and audio distribution services, company music platforms used by each company, and the like are assumed. More specifically, in recent years, YouTube (registered trademark) of a moving image SNS, Twitter (registered trademark) of a short sentence SNS, Spotify (registered trademark) of a music streaming service, Instagram (registered trademark) of a photo SNS, TikTok (registered trademark) of a short movie SNS, and the like are exemplified as the music platform **20**, but the present embodiment is not limited thereto.

[0056] The information processing apparatus **10** may analyze popular songs (for example, the number of plays is equal to or greater than a threshold) on the designated music platform **20** to extract a future trend in the music platform **20**.

[0057] Here, even if analysis is simply performed on a large theme such as a genre of music, it is difficult to sufficiently analyze a transition of a complicated trend.

[0058] Therefore, in the trend extraction system according to the present disclosure, analysis is performed in units of features of target content, and a trend is extracted.

[0059] The analysis in the feature unit of the target content means that analysis is performed for each feature that is an element that defines the content. The content may have a number of features. Which feature is used for analysis may be set in the information processing apparatus **10** in advance.

[0060] For example, in a case where the content is music (music), examples of the feature (music feature) include tempo (speed of music, Beats Per Minute (BPM)), rhythm, melody, key (musical scale), beat, length of a song, sound pressure (for example, average loudness and gaudiness of an entire song), and the like. In addition, new features such as danceability (index indicating whether the music is a song for dance calculated on the basis of tempo, rhythm, beat, and the like), energy (index indicating strength calculated on the basis of the loudness and speed of sound), an acoustic degree (index indicating whether or not a song is acoustic), and a liveness (index indicating a high possibility of live recording in which presence or absence of a voice of an audience is detected) can be calculated on the basis of the plurality of features. These characteristics may be calculated on the basis of data regarding music acquired by the information

processing apparatus **10** from the music platform **20**, or may be calculated in the music platform **20** in advance.

[0061] The information processing apparatus **10** according to the present embodiment extracts content (popular content) satisfying a predetermined condition indicating popularity or attention as target content, uses data of the target content as learning data, and generates a model for predicting future feature distribution using a prescribed machine learning model. The predetermined condition indicating popularity or attention may be, for example, that the number of times of reproduction in a predetermined period is equal to or larger than a threshold, or may be that music is arranged in descending order of the number of times of reproduction in a predetermined period and enters top several % (for example, 10%, 7%, 5%, and the like). The information processing apparatus **10** analyzes a feature distribution of target content (popular content) satisfying a predetermined condition (that is, acquires frequency distribution of each feature), and uses the feature distribution as learning data. Next, the information processing apparatus **10** generates a model for predicting a future feature distribution (frequency distribution of features) using the learning data (feature distribution in each predetermined period) and predicts the future feature distribution. Then, the information processing apparatus **10** compares the current frequency distribution with the future frequency distribution for each feature, and extracts, as a trend (feature trend), a section (for example, a section of tempo 80 to 90, a section of danceability 0.5 to 0.65, a section of energy 0.2 to 0.25, and the like) in which each feature is not currently popular but will become popular in the future.

[0062] As described above, in the present embodiment, trend extraction is performed on a feature-by-feature basis, and thus, it is possible to more precisely and sufficiently analyze a transition of a complicated trend and to more accurately extract the trend.

[0063] The outline of the trend extraction system according to the embodiment of the present disclosure has been described above.

2. Configuration Example

[0064] FIG. **2** is a block diagram illustrating an example of a configuration of the information processing apparatus **10** according to the present embodiment. As illustrated in FIG. **2**, the information processing apparatus **10** includes a communication unit **110**, a control unit **120**, an operation unit **130**, a display unit **140**, and a storage unit **150**.

(Communication Unit **110**)

[0065] The communication unit **110** transmits and receives data to and from an external device in a wired or wireless manner. The communication unit **110** is communicably connected to the music platform **20** using, for example, a wired/wireless local area network (LAN), Wi-Fi (registered trademark), Bluetooth (registered trademark), a mobile communication network (Long Term Evolution (LTE), fourth generation mobile communication system (4G), and fifth generation mobile communication system (5G)), or the like.

(Control Unit **120**)

[0066] The control unit **120** functions as an arithmetic processing device and a control device, and controls the overall operation in the information processing apparatus according to various programs. The control unit **120** is realized by, for example, an electronic circuit such as a central processing unit (CPU) or a microprocessor. In addition, the control unit **120** may include a read only memory (ROM) that memorizes programs, computation parameters, and the like to be used, and a random access memory (RAM) that temporarily memorizes parameters and the like that change appropriately.

[0067] Furthermore, the control unit **120** according to the present embodiment performs machine learning using the data acquired from the music platform **20** as learning data, predicts a distribution of future music features using the generated learned model, and extracts a trend (feature trend) of the music features. Furthermore, the control unit **120** extracts music and an artist that match the extracted feature trend, and presents the music and the artist to the display unit **140** together with the feature trend. Hereinafter, a specific description will be given.

[0068] The control unit **120** functions as a model generation unit **121**, a prediction unit **122**, a feature trend extraction unit **123**, an artist extraction unit **124**, and a display control unit **125**.

(1) Model Generation

[0069] The model generation unit **121** acquires predetermined data from the music platform **20**, performs machine learning, and generates a model for predicting the distribution of future music features.

[0070] Specifically, first, the model generation unit **121** acquires data regarding music such as a song name, an album name, an artist name, a release date, the number of times of reproduction (reproduction history), and a feature (music feature amount) of each piece of music from the music platform **20** designated by the user, and prepares a data set of popular music (music with high attention degree) for each predetermined period. The user can select, from the operation unit **130**, the music platform **20** on which the user desires to predict a trend and extract an artist. One music platform **20** may be designated, or a plurality of music platforms may be designated. The model generation unit **121** may acquire data regarding each piece of music from a plurality of music platforms **20** designated by the user, and prepare a data set of popular music (music with high attention degree) for each predetermined period.

[0071] A popular song (a song with a high degree of attention) is a song that satisfies a condition indicating popularity (or attention). The condition indicating popularity (or attention) may be, for example, that the number of times of reproduction in a predetermined period exceeds a threshold, or may be, in consideration of a change in the number of users, for example, that music is arranged in descending order of the number of times of reproduction in a predetermined period and enters a high predetermined number % (for example, 10%, 7%, 5%, and the like). Note that the condition indicating popularity is not limited to the condition regarding the number of times of reproduction. For example, an increase rate of the number of downloads, the number of favorite registrations, the number of times of reproduction, and the like, viewer evaluation, and the like may be used. In addition, the predetermined period may be one month, three months, half a year, or one year. Note that a data set for each predetermined period of data regarding music acquired from each music platform **20** may be stored

in the storage unit **150** in advance. In this case, the model generation unit **121** can extract, from the storage unit **150**, a data set of popular songs (music satisfying a condition indicating popularity) for each predetermined period in the designated music platform **20**.

[0072] Next, the model generation unit **121** acquires a frequency distribution indicating the distribution of the music features of the popular song on the basis of the data set of the popular song in the predetermined period. That is, the model generation unit **121** models each music feature in frequency distribution every predetermined period. As described above, examples of the music features include tempo, rhythm, melody, key, beat, length of a song, sound pressure, danceability, energy, an acoustic degree, and the like. In order to suppress the influence of the difference in the number of pieces of music included in each predetermined period, the model generation unit **121** normalizes the sum of the number of distributions of each music feature in each predetermined period to be **1**. FIG. **3** is a diagram illustrating an example in which music features (for example, "tempo") of a popular song in a predetermined period according to the present embodiment are expressed by frequency distribution. The model generation unit **121** acquires a frequency distribution of each music feature for each predetermined period.

[0073] Subsequently, the model generation unit **121** uses the frequency distribution of each music feature in each predetermined period as learning data, and generates (learns) a model for predicting the frequency distribution of the future music feature using prescribed machine learning. In the present embodiment, as the prescribed machine learning, for example, an arbitrary machine learning method such as Feedforward Neural Network (FNN), Long Short Term Memory (LSTM), and Transformer which are neural network (NN)-based models, or ARIMA (Auto-Regressive Integrated Moving Average) and VAR (Vector Autoregressive) which are autoregressive models, and the like is used. These models are time-series prediction models that can predict a future distribution from a plurality of consecutive past distributions. How many past distributions (distributions of how many periods) are used is set as a hyperparameter (window size) and is appropriately determined for each model.

[0074] For example, when the music feature distribution in each year of **2010** to **2021** is used as learning data to learn a model for predicting the music feature distribution in **2022**, in a case where the window size is determined to be **3**, the model is learned to predict the music feature distribution in **2013** from the music feature distribution in **2010** to **2012**, predict the music feature distribution in **2014** from the music feature distribution in **2011** to **2013**, sequentially repeat the prediction, and predict the music feature distribution in **2021** from the music feature distribution in **2018** to **2020**, as shown in FIG. **4**.

(2) Prediction of Future Music Features

[0075] The prediction unit **122** predicts the distribution (frequency distribution) of the future music feature using the generated model (learned model). The period for prediction (prediction period) can be designated by the user through the operation unit **130**.

(3) Extraction of Feature Trend

[0076] The feature trend extraction unit **123** compares the frequency distribution of the current music feature with the frequency distribution of the predicted (future) music feature, and extracts a section satisfying a predetermined condition as a trend (feature trend). More specifically, the predetermined condition means that a value is lower than a threshold in the frequency distribution in the current period, and the value is higher than the threshold in the (predicted future) frequency distribution in the prediction period. That is, the section (feature trend) satisfying the predetermined condition is a section in which the value is lower than the threshold in the frequency distribution in the current period and the value is higher than the threshold in the frequency distribution (predicted future) in the prediction period. A section in which the value is higher than the threshold in the frequency distribution in the current period is excluded because the section is an already popular section. As a result, a feature section that is not currently popular but will become popular in the future can be extracted as a feature trend.

[0077] The feature trend extraction unit **123** can extract a feature trend in the prediction period for each music feature (for example, tempo: 90 to 100, key: C, danceability: 0.5 to 0.65, and 0.75 to 0.80, energy: 0.2 to 0.25, sense of live: 0.45 to 0.50, acoustic degree: 0.30 to 0.35, and the like). Note that, when extracting a feature trend, the feature trend extraction unit **123** can reduce burden of the extraction processing by excluding in advance features having almost no difference (distance) between the frequency distribution of the current music feature and the frequency distribution of the future music feature (distance is equal to or less than a predetermined value).

(4) Extraction of Artist

[0078] The artist extraction unit **124** extracts (discovers) an artist of music matching some feature trends from the designated music platform **20**. For example, in the case of targeting a tempo, a key, and energy, the artist extraction unit **124** extracts music in which the tempo is 90 to 100, the key is C, and the energy is 0.2 to 0.25, which are extracted feature trends, and finds an artist who has created the music. Note that the music platform **20** that extracts the artist and the music platform **20** used for trend extraction may be the same or different. Furthermore, the artist information corresponding to the music platform **20** may be stored in the storage unit **150** in advance. Furthermore, a plurality of music platforms **20** may be used for trend extraction and artist extraction.

(5) Display Control

[0079] The display control unit **125** performs control to display the feature trend extracted by the feature trend extraction unit **123** and the artist (and music) extracted by the artist extraction unit **124** on the display unit **140**. Furthermore, the display control unit **125** may display a feature trend used for artist extraction among the feature trends extracted by the feature trend extraction unit **123**. Furthermore, the display control unit **125** may display only the extracted feature trend. Furthermore, the display control unit **125** may display the extracted feature trends in descending order of the difference (distance) between the frequency distribution of the current music feature and the frequency distribution of the future music feature.

[0080] Furthermore, the display control unit **125** may also display the music features of the extracted music. In addi-

tion, the display control unit **125** may highlight a portion matching the feature trend among the music features of the extracted music.

[0081] Furthermore, the display control unit **125** may display the feature trend as a numerical value, or may display the feature trend as a one-dimensional grid or a two-dimensional grid. Furthermore, when displaying in a one-dimensional or two-dimensional grid, the display control unit **125** may emphasize and display a difference from a section (currently popular section) higher than a threshold in frequency distribution of the current music feature. A display screen example of the feature trend and the extracted artist will be described later with reference to FIG. **12** (display of the feature trend on the one-dimensional grid), FIG. **14** (display of the feature trend on the one-dimensional grid and display of the artist and music), FIG. **16** (display of the feature trend on the two-dimensional grid), and the like.

(Operation Unit **130**)

[0082] The operation unit **130** receives an operation input by the user and outputs input information to the control unit **120**. The operation unit **130** may be a keyboard, a mouse, a touch panel, a controller, a voice input unit, or the like.

(Display Unit **140**)

[0083] The display unit **140** has a function of displaying an operation input screen, a feature trend extraction result screen, and the like under the control of the display control unit **125**. For example, the display unit **140** may be a display panel such as a liquid crystal display (LCD) or an organic electro luminescence (EL) display.

(Storage Unit **150**)

[0084] The storage unit **150** is implemented by a read only memory (ROM) that stores programs, operation parameters, and the like to be used for processing of the control unit **120**, and a random access memory (RAM) that temporarily stores parameters and the like that change as appropriate. For example, the storage unit **150** according to the present embodiment may appropriately store data (music name, number of times of reproduction, music feature amount, and the like) regarding music corresponding to each music platform **20**, a learned model, an extracted feature trend, artist information corresponding to each music platform **20**, and the like.

[0085] Although the configuration of the information processing apparatus **10** has been specifically described above, the configuration of the information processing apparatus **10** according to the present disclosure is not limited to the example illustrated in FIG. **2**. For example, the information processing apparatus **10** may be implemented by a plurality of devices. Furthermore, the operation unit **130** and the display unit **140** may be integrated. Furthermore, the control unit **120** and the storage unit **150** of the information processing apparatus **10** may be realized by a server (cloud server, edge server, etc.), and the operation unit **130** and the display unit **140** may be realized by a user terminal connected to the server through a network. Furthermore, each function of the control unit **120** may be implemented by being distributed to a server and a user terminal.

3. Operation Processing

[0086] Next, a flow of trend extraction processing according to the present embodiment will be specifically described with reference to the drawings.

3-1. Overall Flow

[0087] FIG. **5** is a flowchart illustrating an example of an overall flow of trend extraction processing according to the present embodiment.

[0088] First, as illustrated in FIG. **5**, the model generation unit **121** of the information processing apparatus **10** uses data sets of a large number of popular songs corresponding to the designated music platform **20** to generate (learn) a model for predicting a distribution (frequency distribution) of future music features (Step S**103**). Note that the model generation unit **121** generates a model for each music feature.

[0089] Next, the prediction unit **122** predicts the distribution of the future music feature using the generated model (learned model) (Step S**105**). Note that the prediction unit **122** predicts distribution of future music features for each music feature.

[0090] Next, the prediction unit **122** stores the distribution of the predicted future music features in the storage unit **150** (Step S**109**).

[0091] Subsequently, the feature trend extraction unit **123** compares the distribution of the current music features with the predicted distribution of the future music features, and extracts a trend (feature trend) of the music features (Step S**112**). The extracted feature trend is stored in the storage unit **150**. Note that the feature trend extraction unit **123** extracts the feature trend for each music feature.

[0092] Next, the artist extraction unit **124** extracts an artist matching the extracted feature trend (Step S**115**). Specifically, the artist extraction unit **124** extracts an artist who has produced (alternatively, some association such as playing or singing is performed) music that matches one or more predetermined feature trends from the artist information corresponding to the designated music platform **20**. The feature trend to be used may be specified by the user, or a feature trend of a music feature having a large distance (difference) between the future distribution and the current distribution may be used. In addition, the feature trend to be used may be one or a plurality of feature trends to be used.

[0093] Then, the display control unit **125** performs processing of displaying the extracted feature trend, music, and artist on the display unit **140** (Step S**118**).

[0094] An example of the overall flow of the feature trend extraction processing according to the present embodiment has been described above. Note that the operation process illustrated in FIG. **5** is an example, and part of the process may be performed in different orders or in parallel, or may not be performed. For example, model generation (learning) may be performed in advance. Furthermore, the information processing apparatus **10** may only extract a feature trend and present the feature trend to the user.

[0095] Next, the model generation processing, the prediction processing of distribution of the future music features, the feature trend extraction processing, and the artist extraction processing will be described more specifically.

3-2. Model Generation Processing

[0096] FIG. **6** is a flowchart illustrating an example of a flow of model generation processing according to the present embodiment.

[0097] As illustrated in FIG. **6**, first, the model generation unit **121** acquires a data set corresponding to the designated music platform **20** (Step S**203**). The designation of the music platform **20** is performed, for example, by the user. A system (or application) that realizes feature trend extraction and artist extraction according to the present embodiment is assumed to be used by a user in a position for discovering new faces in a record company, such as Artists and Repertoire (A & R) and the like. FIG. **7** is a diagram illustrating a display screen example of music platform selection and the like according to the present embodiment. A screen **40** illustrated in FIG. **7** can be displayed on the display unit **140** under the control of the display control unit **125**.

[0098] As illustrated in FIG. **7**, in a selection area **401** at an upper left of the screen **40**, an icon corresponding to each music platform is displayed as an option of the music platform where the artist is discovered (extracted). In the present embodiment, learning (generation) of a model that predicts a distribution (frequency distribution) of future music features is performed using a data set corresponding to the music platform **20** designated here, and an artist that matches a feature trend extracted from the distribution of future music features predicted using the generated model is extracted. Furthermore, a field (entry field of month in which prediction starts and entry field of period for prediction) for designating a future period (prediction period) for predicting the distribution (frequency distribution) of the music features is displayed in the selection area **401**. The user may specify any period of time. For example, in a case where the month in which the prediction is started is designated as "December 2021" and a period for prediction is designated as "one month", the distribution of the music features of December 2021 is predicted, the feature trend is extracted from the distribution, and the artist (of the music matching the trend of the music features) who is likely to become popular in December 2021 is discovered (extracted). Note that the period for prediction is not limited, and may be one month, three months, half a year, or one year. For example, in a case where the month in which the prediction is started is designated as "December 2021" and the period for prediction is designated as "3 months", the distribution of the music features from December 2021 to February 2022 is predicted, the feature trend is extracted from the distribution, and the artist (of the music matching the trend of the music features) who is likely to become popular within this period is discovered (extracted). Furthermore, in the example illustrated in FIG. **7**, "month" is used to start the prediction, but may be changed to any unit such as second, minute, hour, day, or year depending on the intended use.

[0099] In addition, the user can select the period for prediction by pull-down. Furthermore, the control unit **120** according to the present embodiment may calculate an appropriate initial value of the period for prediction in advance from the data set and present the initial value to the user. More specifically, a period in which a "music feature in which a difference (distance) between a distribution of a current music feature and a distribution of a future music feature is a threshold or less" to be described later is further reduced may be calculated in advance using a data set. In addition, a period in which an average value or a maximum value of the "difference (distance) between the distribution of the current music feature and the distribution of the future music feature" of each music feature becomes larger may be calculated in advance.

[0100] Next, the model generation unit **121** determines a range of the data set used for learning according to the designated prediction start month (Step S**206**). More specifically, the model generation unit **121** determines which period of the data set is used for learning and how to divide the data into Train data (learning data) and Val (validation) data (verification data). The model generation unit **121** divides train and val so that cross validation (cross verification) can be performed on the time-series data. How long a period is cut out from the data set for learning may be set in advance (for example, in a case where the period for prediction is "one month", the amount of the past twelve periods (12 months) is used, and in a case where the period for prediction is "three months", the amount of the past 36 periods (36 months) is used.).

[0101] Next, the model generation unit **121** determines a window size of the model (Step S**209**). The window size of the model is the number of past periods used when predicting the distribution of the music feature in a certain period. As described above, the model used in the present embodiment is a time series prediction model that can predict a future distribution from a plurality of consecutive past distributions, and the "window size of the model" is the number of consecutive past distributions (the number of periods). The number of parameters (the number of periods) of the "window size" may be fixed in advance, or may be determined according to a predicted period (one month, three months, six months, etc.) (for example, "window size 3" in a case where the period for prediction is "one month", "window size 6" in a case where the period for prediction is "three months", and the like).

[0102] For example, in predicting (inferring) December 2021 with January 2021 to November 2021 as learning data, when the windows size is 3, at the learning stage, the model generation unit **121** learns the model so as to predict the distribution in April from the distribution of music features in January 2021 to March 2021, predict the distribution in May from the distribution of music features in February 2021 to April 2021, and . . . predict the distribution in November 2021 from the distribution in August to October 2021. Then, at the stage of prediction (inference) to be described later, the prediction unit **122** predicts the distribution in December 2021, which is the future (in the designated prediction period), using the learned model and the distribution in September to November 2021.

[0103] Next, the model generation unit **121** determines the number of bins of the model (Step S**212**). The distribution of the music features according to the present embodiment is expressed by frequency distribution. The model generation unit **121** determines a width of the bin of the frequency distribution for each music feature. For example, for the music feature "tempo", in a case where the bin width is 10, then each section of the frequency distribution of the music feature "tempo" is delimited as 0 to 10, 10 to 20, 20 to 30, ... The number of bins can be determined by the model generation unit **121** on the basis of the following logic, for example.

[0104] First, the model generation unit **121** selects a music feature for determining the number of bins, and acquires a distribution of the music feature in the entire period or the

latest period included in the data set. For example, when January 2021 to November 2021 are set as learning data (when determined as the range of the data set), the distribution of each music feature is obtained for all popular songs from January 2021 to November 2021 in the case of considering in the entire period. Furthermore, in the case of considering in the latest period, the distribution of each music feature is obtained for the popular song of November 2021. Next, for the acquired distribution of each music feature, the number of bins is determined using an estimator utilizing the Freedman Diaconis' law and a function (for example, the number of bins=√ data set size) that determines the number of bins according to the size of the data set. Then, a bin width calculated by the determined number of bins is checked, and in a case where the bin width is extremely small, the number of bins is changed to a predetermined minimum number of bins.

[0105] Next, the model generation unit **121** generates a model by machine learning (Step S**215**). Specifically, the model generation unit **121** generates the time series prediction model of the distribution of the music features using the prescribed machine learning. Note that the time series prediction model of the distribution of the music features may be generated for each music feature, or a time series prediction model that can learn all the music features in a connected manner and input and output all the music features in the connected manner may be generated. The determination of the number of bins is made for each music feature. FIG. **8** is a diagram illustrating an example of generation of a time-series prediction model that performs input and output all the music features in a connected manner.

[0106] In FIG. **8**, as each music feature mf in a certain period t, a section of the music feature amount is fr, and the number of distributions of bins of the frequency distribution (corresponding to a height of each bin) is represented by the following value 1.

[Expression 1]

$$x^{t}_{mf,fr} \quad \text{Value 1}$$

[0107] For example, the number of distributions in a section of 10 to 20 of the tempo in January 2021 can be expressed by the following value 2.

[Expression 2]

$$x^{202101}_{tempo,10\sim20} \quad \text{Value 2}$$

[0108] Then, for example, when a distribution of music features in April 2021 is predicted by a window size 3 (learning phase) by a recurrent neural network (RNN), as illustrated in FIG. **8**, a model is learned (generated) such that data to which the number of distributions in each section of all music features in January 2021 is connected, data to which the number of distributions in each section of all music features in February 2021 is connected, and data to which the number of distributions in each section of all music features in March 2021 is connected are input to the RNN, and data to which the number of distributions in each section of all music features in April 2021 is connected is output (predicted).

[0109] Although the model generation using machine learning has been specifically described above, the above content is an example, and the present disclosure is not limited thereto.

[0110] Then, the model generation unit **121** stores the learned model in the storage unit **150** (Step S**218**).

[0111] The model generation processing for predicting the distribution of the future music features has been specifically described above.

3-3. Prediction Processing of Distribution of Future Music Feature

[0112] The prediction unit **122** predicts the distribution of the future music feature using the model (learned model) generated by the model generation unit **121**. For example, in a case where January 2021 to November 2021 are set as the learning data, the month in which the prediction is started is December 2021, the prediction period is one month, and the window size is 3, the prediction unit **122** inputs the distribution of each music feature in each period of September to November 2021 to the learned model, and predicts (outputs) the distribution of each music feature in December 2021.

[0113] Furthermore, in a case where the month in which the prediction is started is December 2021 and the prediction period is three months, the prediction unit **122** first inputs the distribution of each music feature in each period of September to November 2021 to the learned model, and predicts the distribution of each music feature in December 2021. Next, the prediction unit **122** inputs the distribution of each music feature in October and November 2021 and the predicted distribution of each music feature in December 2021, and predicts January 2022. Subsequently, similarly, the prediction unit **122** predicts the distribution in February 2022 using the distributions in November, December 2021 and January 2022 as inputs. In this way, the prediction unit **122** can obtain the distribution of each music feature of December 2021, January and February 2022.

[0114] The obtained distribution of each music feature (of the prediction period) in the future can be stored in the storage unit **150**.

3-4. Feature Trend Extraction Processing

[0115] FIG. **9** is a flowchart illustrating an example of a flow of feature trend extraction processing.

[0116] As illustrated in FIG. **9**, first, the feature trend extraction unit **123** acquires a future distribution (frequency distribution) of each predicted music feature (from the storage unit **150**) (Step S**253**).

[0117] Next, the feature trend extraction unit **123** calculates a distance (difference) between the current frequency distribution and the future frequency distribution of each music feature, and excludes music features whose difference is below a threshold a (Step S**256**). With removal of the music features having no difference, a burden of the feature trend extraction processing can be reduced. In other words, since there is a high possibility that a music feature having no difference between the current distribution and the future distribution (the difference is equal to or less than the threshold) cannot be extracted as a feature trend (is not used for artist extraction), the music feature is excluded at this stage so that the burden of extraction processing to be described later can be reduced. In the calculation of the difference (distance) in the distribution, the difference in the

number of distributions in the frequency distribution may be simply calculated, or a distance scale (Kullback Liebler distance, Pearson distance, relative PE distance, L2 distance (Euclidean distance), and the like) of the probability distribution may be used. FIG. **10** is a diagram illustrating exclusion of music features having no difference. As illustrated in FIG. **10**, for example, in a case where the present is November 2021 and the predicted future is December 2021, a difference (distance) between the present and future frequency distributions is calculated for each music feature by various calculation methods, and a music feature ("danceability" in the example illustrated in FIG. **10**) whose distance is below the threshold a (for example, in a case where the threshold a is distance 1) is excluded from the music feature to be used.

[0118] Next, for each remaining music feature (each music feature to be used), the feature trend extraction unit **123** extracts a section exceeding a threshold b in each of the current frequency distribution and the future frequency distribution (Step S**259**). When the frequency distribution of each analyzed music feature is presented to the user, it is difficult to understand if numerical values of all sections of each distribution are presented as they are. Therefore, a portion exceeding the certain threshold b (trend threshold) is presented as a popular section. The threshold b may be appropriately set for each music feature. The threshold b may be set as follows, for example.

[0119] First, the feature trend extraction unit **123** sets an initial value to the threshold b. Next, the feature trend extraction unit **123** extracts all pairs of distribution sets of two temporally adjacent periods in the learning data. For example, when January 2021 to November 2021 are set as learning data, pairs of "January, February 2021", "February, March 2021", . . . "October 2021, November" are extracted. Then, the feature trend extraction unit **123** repeats adopting an initial value when a section (section below the threshold b in the current distribution and above the threshold b in the future distribution) extracted as a feature trend in all pairs is, for example, 1 or 2, and changing the initial value in a case where the section is 0 or 3 or more.

[0120] Next, the feature trend extraction unit **123** extracts, as a feature trend, a section in which (the number of distributions) falls below the threshold b in the current frequency distribution and (the number of distributions) exceeds the threshold b in the future frequency distribution (Step S**262**). The feature trend extraction unit **123** extracts a section of the feature trend for each music feature. FIG. **11** is a diagram illustrating extraction of the feature trend according to the present embodiment. As illustrated in FIG. **11**, for example, in the current distribution and the future predicted distribution of the music feature being energy, a section "70 to 80" in which the number of distributions is lower than the threshold b in the current distribution and higher than the threshold b in the future predicted distribution is extracted as a trend (feature trend) of the music feature being energy.

[0121] Then, the feature trend extraction unit **123** stores a section exceeding the threshold b and a section extracted as a feature trend in the storage unit **150** (Step S**265**).

[0122] The feature trend extraction processing has been specifically described above.

3-5. Artist Extraction Processing

[0123] FIG. **12** is a flowchart illustrating an example of a flow of artist extraction processing according to the present embodiment.

[0124] As illustrated in FIG. **12**, first, the artist extraction unit **124** acquires a trend (feature trend) of each music feature from the storage unit **150** (Step S**303**). Next, the artist extraction unit **124** extracts music matching some feature trends from the designated music platform **20** (Step S**306**). Among the music features, how many music features are used can be appropriately set. In addition, which music feature is used can be appropriately set. For example, when three music features are used, top three music features ranked in the order of the distance (difference) between the current and future distributions may be used. Furthermore, the artist extraction unit **124** may extract music that matches at least one feature trend without being limited to music that matches all the feature trends to be used. A large number of matched pieces of music can be extracted.

[0125] Next, the artist extraction unit **124** extracts an artist who has produced the extracted music (from the designated music platform **20**) (Step S**309**). Note that although "produced" is described here, the artist may be associated with the music without being limited to the production. A large number of artists can be extracted.

[0126] Subsequently, it is determined whether or not the degree of recognition of each extracted artist is equal to or less than a certain value (Step S**312**). This is because an artist whose degree of recognition exceeds a certain value is highly likely to be an artist who has already sold well (a popular one that has attracted attention), and is excluded from the artist presented to the user. The information of the degree of recognition of each artist may be obtained from the music platform **20** or may be obtained from another server. The degree of recognition is calculated on the basis of various indexes, and a calculation method thereof is not particularly limited. For example, the degree of recognition of each artist can be calculated by using information such as the total number of times of reproduction of the artist's music, the number of followers of the artist, and the number of channel registrants. Furthermore, a threshold of the degree of recognition can be set at a boundary between the artist who is selling and the artist who is not selling. Specifically, the threshold of the degree of recognition may be set to a value that separates the top 10% of the degree of recognition of the artist and the remaining 90%, for example.

[0127] Next, in a case where the degree of recognition of the artist is not equal to or less than a certain value (Step S**312**/No), the artist extraction unit **124** excludes the artist whose degree of recognition exceeds the certain value from the extracted artist (Step S**315**). This leaves an artist (for example, a new artist, a nameless artist) who is now unpopular but may in turn become popular.

[0128] Then, in order to determine the priority order at the time of presentation to the user, the artist extraction unit **124** sorts the extracted artists in descending order of possibility of increasing the popularity (degree of recognition) in the future (Step S**318**). The descending order of the possibility of increasing the popularity (degree of recognition) in the future is calculated on the basis of various indexes, and the calculation method is not particularly limited. For example, the artist extraction unit **124** may sort the extracted artists on the basis of the number of pieces of music or the number of

music features matching the feature trend. Sorting based on the number of matched pieces of music and the number of music features may be performed using rule base or machine learning. As an example of the rule base, for example, it is conceivable to sort music in descending order of the number of pieces of music matching the feature trend or sort music in descending order of the number of music features matching the feature trend. Furthermore, as an example using machine learning, for example, a method of calculating f by performing regression such as y=f (the number of pieces of music matching the feature trend, the number of music features matching the feature trend, and the type of music features matching the feature trend) when a rate of increase in future degree of recognition from the current degree of recognition is y is considered.

[0129] The artist extraction processing has been specifically described above.

4. Display Screen Example

[0130] Next, a display screen example for presenting a feature trend and an extracted (discovered) artist according to the present embodiment will be described.

4-1. Display of Feature Trend on One-Dimensional Grid

[0131] The display control unit **125** may display the extracted feature trend by the numerical value (width of the trend section) or by a one-dimensional grid.

[0132] FIG. **13** is a diagram illustrating a case where a feature trend according to the present embodiment is displayed in a one-dimensional grid. As illustrated in FIG. **13**, the display control unit **125** can display, on a one-dimensional grid, a section exceeding the threshold b in the current distribution (November 2021), a section exceeding the threshold b in the predicted future distribution (December 2021), and a section falling below the threshold b in the current distribution and exceeding the threshold b in the future distribution (that is, a section of the extracted feature trend). The display control unit **125** can highlight and display a section of the extracted feature trend and clearly indicate a future trend that does not overlap with the current trend. The emphasis may be a color tone, a pattern, a gradation, or a frame.

4-2. Display of Feature Trend on One-Dimensional Grid and Display of Discovered Artist and Music

[0133] FIG. **14** is a diagram illustrating a display screen example including the display of the feature trend on the one-dimensional grid and the display of the discovered artist and music according to the present embodiment. As illustrated in FIG. **14**, the trend of each music feature is displayed in a one-dimensional grid in the display area **422** of the music feature trend displayed at an upper right of the screen **42**. In addition, a numerical value of a trend section of the music feature is also displayed.

[0134] Note that the display control unit **125** may sort each music feature in descending order of the difference (distance) between the current distribution and the future distribution, and display the music features from the top in the sorted order (that is, in descending order of the distance). A large difference (distance) in the distribution is a music feature that is expected to greatly change in the future trend, and thus can be preferentially displayed. In addition, each music feature may be displayed not only in one column but also in n rows and m columns so as to be easily viewed by the user.

[0135] Furthermore, as illustrated in FIG. **14**, an artist and music extracted on the basis of a trend (feature trend) of the extracted music feature are displayed in a display area **423** of the discovered artist/music displayed below the screen **42**. Specifically, an artist name, a music name, a music feature amount of music, an artist description, an icon for flying to an SNS or the like of the artist, other music of the artist, and the like are displayed. In the display of the music feature amount of the music, the music feature amount matching the feature trend may be highlighted. Furthermore, in the display area **423**, each extracted artist can be displayed in descending order of possibility of becoming popular (degree of recognition) in the future.

[0136] The screen display example according to the present embodiment has been described above. Note that the arrangement and display content of each display area illustrated in FIG. **14** are merely examples, and the present disclosure is not limited thereto.

5. Modifications

5-1. Multidimensional Display of Feature Trends

[0137] In the above-described embodiment, each feature trend is displayed one-dimensionally, but the present disclosure is not limited thereto, and may be displayed in a multidimensional manner such as two-dimensionally or three-dimensionally.

[0138] For example, in a case where the distribution of music features is represented by two types of music features (for example, "danceability" and "tempo"), a two-dimensional distribution as illustrated in FIG. **15** is assumed. FIG. **15** is a diagram illustrating an example of a distribution (two-dimensional distribution) of two types of music features according to a modification of the present embodiment. As illustrated in FIG. **15**, "danceability" can be expressed in an x-axis direction, "tempo" can be expressed in a z-axis direction, and the number of distributions can be expressed in a y-axis direction.

[0139] Hereinafter, points different from the above-described one-dimensional case will be described. First, in the model generation in the model generation unit **121**, in the one-dimensional case, data in which the number of distributions of each section of all music features is connected (coupled) is input (see FIG. **8**), but in the case of a two-dimensional, three-dimensional, or the like multidimensional case, since a shape of the distribution is as illustrated in FIG. **15**, it is difficult to input data as it is. Therefore, the model generation unit **121** may use, for example, a convolutional neural network (CNN) that matches the number of dimensions, or may develop a two-dimensional distribution one-dimensionally. Furthermore, in a case where the number of types of music features is extremely larger than the number of data, there is a possibility that the data used for learning increases exponentially. Therefore, in this case, the model generation unit **121** may reduce the dimension of the distribution of the music features using a dimension reduction algorithm that can be restored, input the distribution to the model in that state, and learn the model, and restore the prediction result to the original distribution using a restoration algorithm.

[0140] Then, the display control unit **125** displays the current distribution and the predicted future distribution on the multidimensional grid. FIG. **16** is a diagram illustrating a screen example in which each of two types of feature trends is displayed in a two-dimensional grid according to a modification of the present embodiment. As illustrated in FIG. **16**, in a display area **432** of the music feature trend displayed at the upper right of the screen **43**, arbitrary two types of feature trends are displayed in a two-dimensional grid. As illustrated in FIG. **16**, also in the case of the two-dimensional grid, the display control unit **125** can display, on the two-dimensional grid, a section (for example, tempo 150 to 210 and danceability 0.3 to 0.5, tempo 180 to 210 and danceability 0.5 to 0.7, and the like) in which a value exceeds the threshold b in the current distribution (November 2021), a section (for example, the tempo 150 to 210 and the danceability 0.5 to 0.7) in which the value exceeds the threshold b in the predicted future distribution (December 2021), and a section (that is, a section of the extracted feature trend) in which the value falls below the threshold b in the current distribution and the value exceeds the threshold b in the future distribution (for example, the tempo 150 to 180 and the danceability 0.5 to 0.7). The display control unit **125** can highlight and display the section (for example, the tempo 150 to 180 and the danceability 0.5 to 0.7) of the extracted feature trend to clearly indicate a future trend that does not overlap with the current trend. The emphasis may be a color tone, a pattern, a gradation, or a frame. In addition, the display control unit **125** may also display the numerical values of the feature trend sections.

[0141] Furthermore, the display control unit **125** may sort arbitrary pairs of respective music features in descending order of the difference between the current and future distributions, and display the pairs from the top in the sorted order (that is, in descending order of the difference).

[0142] In addition, since the distribution or grid of three-dimensional or multi-dimensional music features can be aggregated two-dimensionally or three-dimensionally, the display control unit **125** can perform aggregation according to the number of dimensions (types of music features) desired to be displayed as appropriate. For example, in a case of handling a four-dimensional (tempo, danceability, energy, and liveness) music feature distribution, in a case where it is desired to display two dimensions of tempo and danceability, the display control unit **125** aggregates the distribution and the grid such that axes of energy and a liveness disappear. In addition, the order of display of the distribution (order of sorting) is similarly conceivable. Specifically, in a case where it is desired to display two dimensions from four dimensions, the display control unit **125** calculates and sorts a difference (distance) between a current distribution and a future distribution in the two-dimensional distribution for each 4C2 feature pair. Here, with respect to the processing of removing the music features having no difference, all the music features may be aggregated one-dimensionally, and then the processing of determining whether or not to remove each music feature one by one (whether or not the difference falls below the threshold a) may be determined by the display control unit **125**.

5-2. Additional Function

[0143] Subsequently, an additional function will be proposed. In the trend extraction system (application) according to the present embodiment, for example, the user may be allowed to arbitrarily select a music feature to be used for extracting (discovering) an artist. Furthermore, the trend extraction system (application) according to the present embodiment may present music corresponding to a location arbitrarily designated by the user on a grid on which a feature trend is displayed, for example.

[0144] An example of a screen having such an additional function is illustrated in FIG. **17**. As illustrated in FIG. **17**, an area for selecting a music feature to be used for discovery is displayed on the screen **44**, and the user can select an arbitrary music feature. Furthermore, the user designates an arbitrary location in the area indicating the trend of the music feature of the screen **44**, and then music corresponding to the music feature of the designated location is presented. This makes it possible to assist the user's understanding of the music features. In the example illustrated in FIG. **17**, since the user instructs the vicinity of the tempo of 150 and the danceability of 0.6, some pieces of music corresponding to the music feature amount are presented.

5-3. Modification of Feature Trend

[0145] In the above-described embodiment, it has been described that an example of the predetermined condition is a section in which a value is lower than the threshold in the frequency distribution in the current period and the value is higher than the threshold in the (predicted future) frequency distribution in the prediction period (see FIG. **11**), but the present disclosure is not limited thereto. For example, the section that satisfies the predetermined condition according to the present disclosure may be a section in which a difference between a current value and a prediction period (predicted future) value exceeds a prescribed threshold.

[0146] FIG. **18** is a diagram illustrating extraction of a feature trend according to the modification of the present embodiment. As illustrated in FIG. **18**, for example, in the current frequency distribution and the future frequency distribution of the music feature: energy, the difference between the current value and the future value in each section is calculated. For example, in a case where the prescribed threshold is 0.03 and the difference between the current value and the future value in the section "70 to 80" among the sections of the frequency distribution is 0.05, the feature trend extraction unit **123** extracts the section as a feature trend since the difference exceeds the threshold. As described above, the feature trend extraction unit **123** extracts, as the feature trend, a section in which the difference exceeds the prescribed threshold, and does not extract, as the feature trend, a section in which the difference does not exceed the prescribed threshold (including a case where the difference is negative).

[0147] Furthermore, the feature trend extraction unit **123** may extract, as the feature trend, a case where both the condition described with reference to FIG. **11** and the condition according to the present modification are satisfied. That is, the feature trend extraction unit **123** may extract, as the feature trend, a section in which a difference between a current value and a future value exceeds a second threshold (the prescribed threshold) among sections in which a value is lower than the first threshold in the current distribution and the value is higher than the first threshold in the future distribution.

5-4. Modification of Feature Trend Display

[0148] Next, a modification of the display of the feature trend will be described with reference to FIG. **19**. FIG. **19** is a diagram illustrating a modification of display of the feature trend according to the present embodiment.

[0149] In the example illustrated in FIG. **19**, a section (for example, sections T**1** and T**2** illustrated in FIG. **19**) having a value lower than the first threshold (threshold b) in the current distribution and having the value higher than the first threshold in the future distribution is extracted as the feature trend and displayed in a highlighted manner. Here, the display control unit **125** may further perform display control to further emphasize a section (for example, a section T**2** illustrated in FIG. **19**) in which the difference between the current value and the future value exceeds a second threshold (prescribed threshold) in the extracted feature trend. In the example illustrated in FIG. **19**, a location corresponding to the section T**2** is illustrated more densely on the one-dimensional grid. Such a one-dimensional grid may be displayed in the trend display area **422** of the trend of the music features shown in FIG. **14**. As a result, when a plurality of sections is extracted as feature trends, it is possible to clearly indicate a section having a difference from the present. The emphasis may be performed by using a color tone or a pattern.

6. Application Example to Other than Music

[0150] The extraction of the feature trend according to the present embodiment is not limited to music, and can be applied to various fields other than music. Here, application to some fields other than music will be described.

6-1. Fashion

[0151] As a first application example, fashion can be mentioned. In the case of fashion, examples of fashion features to be analyzed include the following.

[0152] Types of clothes and accessories (T-shirts, blouses, sweaters, vests, and the like)

[0153] Color

[0154] Shape, silhouette (square neck, T-neck, crew-neck, etc.)

[0155] Material (Satin, fur, etc.)

[0156] Gender (men's, women's, kids, etc.)

[0157] In the present embodiment, a trend at a more detailed feature level rather than a large theme such as a trend for each clothing is analyzed so that the feature trend can be extracted more accurately.

[0158] In the case of fashion, extraction and presentation of trends can be performed by a method similar to that in the case of performing in multiple dimensions described above. Furthermore, fashion has strong restrictions on combinations of features. For example, when considering a combination of "clothes, shapes, materials", a combination such as "chino pan, T-neck, fur" cannot be assumed. Therefore, in the case of acquiring the multidimensional distribution of the fashion features, the distribution is not acquired for each feature, but is acquired as the multivariate distribution of the number of dimensions of the features as illustrated in FIG. **20**. FIG. **20** is a diagram illustrating an example of a feature distribution in an application example to fashion according to the present embodiment. As illustrated in FIG. **20**, for example, a two-dimensional distribution indicating the type of clothes in the x-axis direction, the color in the z-axis direction, and the number of distributions in the y-axis direction is acquired.

[0159] Note that, when the multivariate distribution is used, there is a possibility that data used for learning increases exponentially in a case where the number of types of features is too large compared to the number of data. At that time, as illustrated in FIG. **21**, with use of a dimension reduction algorithm such as principal component analysis (PCA) or variational autoencoder (VAE) as an encoder, the distribution can be expressed with a low-dimensional distribution.

[0160] Furthermore, in the case of fashion, posted images on a designated SNS (data sharing platform) may be collected, and fashion with a large number of images in a predetermined period (that is, fashion with the number of posts equal to or greater than a threshold) may be extracted as fashion (popular content) popular in the period. An extraction destination of popular fashion is not limited to the SNS, and if the company has the sales data, the sales data can be also used.

[0161] Next, when the feature distribution of the popular fashion in the designated fashion platform can be acquired in multiple dimensions, the information processing apparatus **10** generates a model using machine learning by a method similar to the time series prediction of the future feature distribution in the music field, and predicts the distribution of the future fashion feature. Thereafter, as illustrated in FIG. **22**, the information processing apparatus **10** compares the current distribution with the predicted future distribution, and extracts a section (section of "camisole, black" illustrated in FIG. **22**) in which the number of distributions is lower than a predetermined threshold in the current distribution but the number of distributions is higher than the predetermined threshold in the future distribution as a feature trend.

[0162] Note that, also in a case where the dimension reduction algorithm is used, the information processing apparatus **10** is only required to extract a section that is a feature trend in a similar manner. However, since the extracted feature trend cannot be presented as it is, as illustrated in FIG. **23**, the extracted feature trend is restored to an original feature amount using a decoder corresponding to an encoder used at the time of dimension reduction.

[0163] Furthermore, the information processing apparatus **10** can discover a fashion that matches a combination (for example, T-shirts, white, cotton) of trends of the extracted fashion features by extracting the fashion from a posted image on a designated SNS, a company stock list, or the like.

6-2. Design

[0164] As a second application example, a design can be mentioned. For example, in the case of designs such as web pages, posters, book covers, and advertisements, examples of design features to be analyzed include the following.

[0165] Ratio of background color, hue, and color

[0166] Types and arrangement of objects, parts, and blanks

[0167] Character font, color, and size

[0168] In the case of design, extraction and presentation of trends can be performed by the same method as in the case of performing in multiple dimensions described above. For example, a background color is white, a font of characters is

Gothic, the color is black, the size is 16 pt, the size of the main image is 100×100, and the arrangement is "10, 120".

[0169] Furthermore, the information processing apparatus **10** may extract, as a popular design (popular content) for a predetermined period, a design with "the number of likes" equal to or greater than a threshold in a designated SNS or the like, a design of a web page with the number of accesses equal to or greater than a threshold, a design of an advertisement with a click rate equal to or greater than a threshold, or the like.

[0170] Furthermore, as discovery (extraction) of a design matching the trend of the extracted design features, the information processing apparatus **10** may pick up a page matching a combination of feature trends from a designated SNS, web page, or the like, or may newly generate a design of a combination of the feature trends.

6-3. Image and Sentence

[0171] Examples of a third application include images and sentences. The examples may include unstructured information such as an image such as a photograph, a picture, or an icon, or such as a text such as a book, a script, or a catch phrase. In the case of such an image or sentence, the information processing apparatus **10** may obtain a distribution (latent variable) using a generation model such as a variational autoencoder (VAE) and a derivative model thereof (CNN-VAE, VQ (Vector Quantised)-VAE, LSTM-VAE) in order to express data (input features) used for learning as a distribution. These include two types of components of an embedding unit (encoder) in a distribution and a restoration unit (decoder) of an original input feature from the distribution, predict the distribution of the features embedded by the encoder in time series, extract a feature trend using a threshold on the predicted distribution, and restore the extracted feature trend by the decoder. This makes it possible to obtain (generate) an image and a sentence that are likely to become a trend in the future.

[0172] Furthermore, with application of the above method, the information processing apparatus **10** can not only obtain features that are likely to become a trend in the future, but also determine whether or not a new image or sentence is likely to become popular in the future by encoding the image or sentence into a future distribution.

7. Supplement

[0173] The preferred embodiment of the present disclosure has been described above in detail with reference to the accompanying drawings, but the present technology is not limited to such an example. It is obvious that those with ordinary skill in the technical field of the present disclosure can conceive various alterations or corrections within the scope of the technical idea recited in the claims, and it is naturally understood that these alterations or corrections also fall within the technical scope of the present disclosure.

[0174] For example, it is also possible to create one or more computer programs for causing hardware such as the CPU, the ROM, and the RAM built in the information processing apparatus **10** described above to exhibit the functions of the information processing apparatus **10**. Furthermore, a computer-readable storage medium that stores the one or more computer programs is also provided.

[0175] Further, the effects disclosed in the present specification are merely illustrative or exemplary, but are not restrictive. That is, the technology according to the present disclosure may achieve other effects obvious to those skilled in the art from the description in the present specification, in addition to or instead of the effects described above.

[0176] Note that the present technology may also have the following configurations.

(1)

[0177] An information processing apparatus including a control unit that

[0178] acquires a distribution of features of a target content in a predetermined period, regarding target content,

[0179] acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period, and

[0180] compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

(2)

[0181] The information processing apparatus according to (1) described above, in which the section satisfying the predetermined condition is a section in which a value is lower than a threshold in the distribution in the current period and the value is higher than the threshold in the distribution in the prediction period.

(3)

[0182] The information processing apparatus according to (1) or (2) described above, in which the target content is content that satisfies a condition indicating popularity.

(4)

[0183] The information processing apparatus according to (3) described above, in which the target content acquires the content that satisfies the condition indicating the popularity as the target content on a basis of data acquired from a designated data sharing platform.

(5)

[0184] The information processing apparatus according to (4) described above, in which the content is music, and the condition indicating the popularity is a number of times of reproduction in the data sharing platform.

(6)

[0185] The information processing apparatus according to (5) described above, in which the feature is at least one of a tempo, a rhythm, a melody, a key, a beat, a length of a song, a sound pressure, danceability, energy, an acoustic degree, and a liveness of music.

(7)

[0186] The information processing apparatus according to any one of (1) to (6) described above, in which the control unit uses the distribution of the features in one or more predetermined periods as input data, and acquires the distribution of the features in the prediction period by prediction using a learned model.

(8)

[0187] The information processing apparatus according to (7) described above, in which the control unit generates the learned model used for the prediction by using prescribed machine learning with data regarding the target content satisfying the condition indicating the popularity, acquired from the designated data sharing platform, as learning data.

(9)

[0188] The information processing apparatus according to any one of (1) to (8) described above, in which the control unit performs control to display a screen indicating the feature trend in the prediction period on a display unit.

(10)

[0189] The information processing apparatus according to (9) described above, in which the screen is a screen in which the section extracted as the feature trend is highlighted on a one-dimensional grid.

(11)

[0190] The information processing apparatus according to (9) described above, in which the screen is a screen in which a section having a value higher than a threshold in the current period and a section having a value higher than the threshold in the prediction period are indicated on a one-dimensional grid, and further a section extracted as the feature trend among sections having a value higher than the threshold in the prediction period is emphasized.

(12)

[0191] The information processing apparatus according to (11) described above, in which the screen further highlights a section in which a difference between a current value and a future value exceeds a prescribed threshold among the extracted sections of the feature trend.

(13)

[0192] The information processing apparatus according to any one of (9) to (12) described above, in which the screen includes a display indicating a numerical value of a section extracted as the feature trend.

(14)

[0193] The information processing apparatus according to any one of (9) to (13) described above, in which the control unit

[0194] acquires a distribution of features in the prediction period for each feature of the target content, and

[0195] calculates, for each feature, a distance between a distribution of features in the current period and a distribution of features in the prediction period, and extracts the feature trend for each feature after excluding features whose distance is less than a threshold.

(15)

[0196] The information processing apparatus according to (14) described above, in which the screen displays each feature trend in descending order of the distance.

(16)

[0197] The information processing apparatus according to any one of (1) to (15) described above, in which the control unit extracts an artist associated with music in which at least one of the extracted feature trends matches.

(17)

[0198] The information processing apparatus according to (16) described above, in which the control unit performs control to display the extracted feature trend and the extracted artist and music.

(18)

[0199] The information processing apparatus according to any one of (1) to (17) described above, in which the control unit performs control to extract the feature trend on a basis of a distribution obtained by combining a plurality of features and display the extracted feature trend on a multi-dimensional grid.

(19)

[0200] An information processing method causing a processor to perform the steps of:

[0201] acquiring a distribution of features of a target content in a predetermined period, regarding target content;

[0202] acquiring a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and

[0203] comparing a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

(20)

[0204] A program causing a computer to function as a control unit that

[0205] acquires a distribution of features of a target content in a predetermined period, regarding target content;

[0206] acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and

[0207] compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

REFERENCE SIGNS LIST

[0208] **10** Information processing apparatus
[0209] **110** Communication unit
[0210] **120** Control unit
[0211] **121** Model generation unit
[0212] **122** Prediction unit
[0213] **123** Feature trend extraction unit
[0214] **124** Artist extraction unit
[0215] **125** Display control unit
[0216] **130** Operation unit
[0217] **140** Display unit
[0218] **150** Storage unit
[0219] **20** Music platform
[0220] **30** Network

1. An information processing apparatus comprising a control unit that acquires a distribution of features of a target content in a predetermined period, regarding target content,

acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period, and

compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

2. The information processing apparatus according to claim **1**, wherein the section satisfying the predetermined condition is a section in which a value is lower than a threshold in the distribution in the current period and the value is higher than the threshold in the distribution in the prediction period.

3. The information processing apparatus according to claim **1**, wherein the target content is content that satisfies a condition indicating popularity.

4. The information processing apparatus according to claim **3**, wherein the target content acquires the content that

satisfies the condition indicating the popularity as the target content on a basis of data acquired from a designated data sharing platform.

5. The information processing apparatus according to claim **4**, wherein the content is music, and

the condition indicating the popularity is a number of times of reproduction in the data sharing platform.

6. The information processing apparatus according to claim **5**, wherein the feature is at least one of a tempo, a rhythm, a melody, a key, a beat, a length of a song, a sound pressure, danceability, energy, an acoustic degree, and a liveness of music.

7. The information processing apparatus according to claim **1**, wherein the control unit uses the distribution of the features in one or more predetermined periods as input data, and acquires the distribution of the features in the prediction period by prediction using a learned model.

8. The information processing apparatus according to claim **7**, wherein the control unit generates the learned model used for the prediction by using prescribed machine learning with data regarding the target content satisfying the condition indicating the popularity, acquired from the designated data sharing platform, as learning data.

9. The information processing apparatus according to claim **1**, wherein the control unit performs control to display a screen indicating the feature trend in the prediction period on a display unit.

10. The information processing apparatus according to claim **9**, wherein the screen is a screen in which the section extracted as the feature trend is highlighted on a one-dimensional grid.

11. The information processing apparatus according to claim **9**, wherein the screen is a screen in which a section having a value higher than a threshold in the current period and a section having a value higher than the threshold in the prediction period are indicated on a one-dimensional grid, and further a section extracted as the feature trend among sections having a value higher than the threshold in the prediction period is emphasized.

12. The information processing apparatus according to claim **11**, wherein the screen further highlights a section in which a difference between a current value and a future value exceeds a prescribed threshold among the extracted sections of the feature trend.

13. The information processing apparatus according to claim **9**, wherein the screen includes a display indicating a numerical value of a section extracted as the feature trend.

14. The information processing apparatus according to claim **9**, wherein the control unit

acquires a distribution of features in the prediction period for each feature of the target content, and

calculates, for each feature, a distance between a distribution of features in the current period and a distribution of features in the prediction period, and extracts the feature trend for each feature after excluding features whose distance is less than a threshold.

15. The information processing apparatus according to claim **14**, wherein the screen displays each feature trend in descending order of the distance.

16. The information processing apparatus according to claim **1**, wherein the control unit extracts an artist associated with music in which at least one of the extracted feature trends matches.

17. The information processing apparatus according to claim **16**, wherein the control unit performs control to display the extracted feature trend and the extracted artist and music.

18. The information processing apparatus according to claim **1**, wherein the control unit performs control to extract the feature trend on a basis of a distribution obtained by combining a plurality of features and display the extracted feature trend on a multi-dimensional grid.

19. An information processing method causing a processor to perform the steps of:

acquiring a distribution of features of a target content in a predetermined period, regarding target content;

acquiring a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and

comparing a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

20. A program causing a computer to function as a control unit that

acquires a distribution of features of a target content in a predetermined period, regarding target content;

acquires a distribution of features in a prediction period on a basis of the distribution of the features in each the predetermined period; and

compares a distribution of features in a current period with the distribution of the features in the prediction period to extract a section satisfying a predetermined condition as a feature trend in the prediction period.

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