

DESCRIPTION

**PEAK-RIPENESS-PERIOD CALCULATING METHOD,
PEAK-RIPENESS-PERIOD CALCULATING SYSTEM,
PEAK-RIPENESS-PERIOD CALCULATING PROGRAM, AND STORAGE
MEDIUM**

TECHNICAL FIELD

[0001] The present invention relates to a peak-ripeness-period calculating method for calculating a peak ripeness period of a fruit, a peak-ripeness-period calculating system, a peak-ripeness-period calculating program, and a storage medium in which the program is stored.

BACKGROUND ART

[0002] In recent years, with an advanced technology in the field of physical distribution, it has become possible to distribute fresh produce to consumers from a production site while keeping its freshness. It is preferable that the fresh produce be delivered to the consumers from the production site as soon as possible and be consumed while it is fresh. However, with fruits and vegetables, especially fruits among the fresh produce, it is important to ensure the suitable ripeness of the fresh produce, besides the freshness. Hereinafter, a suitable time period in which the fresh produce is suitably ripened and is suitable for consumption may be referred to as a peak ripeness period. It is desired by the consumers to consume the purchased fruits in the peak ripeness period.

[0003] Thus, a technique in which a peak ripeness period of a fruit is informed to the consumers has been proposed (JP2005-280909A).

[0004] In the technique disclosed in JP2005-280909A, a non-contact tag provided with a temperature sensor, an antenna, and a memory is attached to the individual produce. In this technique, it is disclosed that environment temperature values experienced by the produce in distribution channels before it is consumed by the consumer are periodically obtained and stored in the memory, degrees of ripeness corresponding to the thus obtained environment temperature values are respectively obtained on the basis of a degree of ripeness correspondence table in which the degree of ripeness is associated with the temperature in advance, and a cumulative sum of the thus obtained degrees of ripeness is calculated over the elapsed time to obtain a timing at which the produce reaches the degree of ripeness that corresponds to the peak ripeness period.

SUMMARY OF INVENTION

[0005] Because the peak ripeness period of the fruit tends to be affected by not only pre-harvest conditions, but also by post-harvest conditions, it is conceivable that, even if the technique disclosed in JP2005-280909A is used, there may be a case in which a predicted peak ripeness period does not overlap with the actual peak ripeness period. As described above, although it is difficult to accurately predict the peak ripeness period of a fruit, it is desired by the consumers to be informed of the peak ripeness period more accurately. Therefore, there has been a request for further improvement of the technique for calculating the peak ripeness period.

[0006] An object of the present invention is to improve a calculation accuracy of a peak ripeness period.

[0007] According to the present invention, provided is a

peak-ripeness-period calculating method for calculating a suitable time period of a fruit as a peak ripeness period, including: a step of calculating the suitable time period with a peak-ripeness-period calculating algorithm prepared by being associated with an attribute of the fruit; a step of obtaining evaluation information for evaluating the suitable time period; a step of correcting the peak-ripeness-period calculating algorithm when the evaluation information satisfies a specific condition; and a step of calculating a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.

[0008] According to the above-described aspect, it is possible to improve a calculation accuracy of a peak ripeness period.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

FIG. 1 FIG. 1 is a schematic view showing a case in which a peak-ripeness-period calculating system 1 according to an embodiment of the present invention is applied to a market channel MC of a fruits f.

FIG. 2 FIG. 2 is a block diagram for explaining the peak-ripeness-period calculating system 1 according to the embodiment of the present invention.

FIG. 3 FIG. 3 is a diagram for explaining a table stored in an algorithm storage unit 11 in which attributes of the fruits f are linked with a peak-ripeness-period calculating algorithm.

FIG. 4 FIG. 4 is a schematic view for explaining a production phase.

FIG. 5 FIG. 5 is a schematic view for explaining a sales phase.

FIG. 6 FIG. 6 is a schematic view for explaining a consumption phase.

FIG. 7 FIG. 7 is a schematic view for explaining an example of a dedicated site that is provided by the peak-ripeness-period calculating system

1 and displayed in a display of an information processing terminal 30C.

FIG. 8 FIG. 8 is a schematic view for explaining an example of the dedicated site that is provided by the peak-ripeness-period calculating system 1 and displayed in the display of the information processing terminal 30C.

FIG. 9 FIG. 9 is a diagram for explaining the peak-ripeness-period calculating algorithm.

FIG. 10 FIG. 10 is a diagram for explaining a master curve created for each fruit f.

FIG. 11 FIG. 11 is a diagram for explaining individual curves calculated from the master curve and a correction of the individual curves.

FIG. 12 FIG. 12 is a diagram for explaining the correction of the individual curve executed by an algorithm correcting unit 14.

FIG. 13 FIG. 13 is a flowchart for explaining a correction process of the peak-ripeness-period calculating algorithm in a peak-ripeness-period calculating method according to this embodiment.

FIG. 14 FIG. 14 is a flowchart for explaining a selection process of the peak-ripeness-period calculating algorithm in the peak-ripeness-period calculating method according to this embodiment.

FIG. 15 FIG. 15 is a schematic view for explaining the newly registered peak-ripeness-period calculating algorithm.

DESCRIPTION OF EMBODIMENTS

[0010] A peak-ripeness-period calculating system according to an embodiment of the present invention calculates a suitable time period as a peak ripeness period of a fruit. The peak-ripeness-period calculating system according to this embodiment will be described with an example situation in

which the peak-ripeness-period calculating system is applied.

[0011] FIG. 1 is a schematic view showing a case in which the peak-ripeness-period calculating system 1 according to the embodiment of the present invention is applied to the market channel MC of the fruits f.

[0012] The market channel MC of the fruits f consists of a producer F who produces the fruits f, a sales store M who sells the produced fruits f, and consumers C who purchase the fruits f from the sales store M. The peak-ripeness-period calculating system 1 according to the embodiment of the present invention is interposed between these three constituents.

[0013] FIG. 1 shows that the fruits f that have been produced by the producer F are shipped (a shipment S). In addition, FIG. 1 shows that the fruits f are purchased by the consumers C at the sales store M (a purchase P).

[0014] FIG. 1 also shows that, separately from distribution channels of the fruits f, the producer F can access to the peak-ripeness-period calculating system 1 in the production phase of the producer F (see FIG. 1, an arrow F1). In addition, FIG. 1 shows that, in the sales phase of the sales store M, the sales store M can access to the peak-ripeness-period calculating system 1 (see FIG. 1, an arrow M1). Even furthermore, FIG. 1 shows that, in the consumption phase of the consumers C, the consumers C can access to the peak-ripeness-period calculating system 1 (see FIG. 1, an arrow C1).

[0015] Details of the production phase, the sales phase, the consumption phase in the market channel MC will be described later.

[0016] [Peak-ripeness-period Calculating System]

<Configuration Of System>

Next, the peak-ripeness-period calculating system 1 according to the embodiment of the present invention will be described in detail with reference

to the drawings. FIG. 2 is a block diagram for explaining the peak-ripeness-period calculating system 1 according to the embodiment of the present invention.

[0017] The peak-ripeness-period calculating system 1 refers to a system for calculating the suitable time period (hereinafter, it may also be expressed as the peak ripeness period) suitable for consuming the fruits f.

[0018] The peak-ripeness-period calculating system 1 includes the algorithm storage unit 11, a suitable-period calculating unit 12, a judgement unit 13, and an the algorithm correcting unit 14. These components are connected to an internal bus 15 so as to be able to mutually send and receive data.

[0019] The peak-ripeness-period calculating algorithm is stored in the algorithm storage unit 11. In addition, in the algorithm storage unit 11, a table in which predetermined attributes and the peak-ripeness-period calculating algorithm are linked is stored. The algorithm storage unit 11 consists of a storage medium such as a hard disk drive, a semiconductor memory, and so forth.

[0020] In the above, the peak-ripeness-period calculating algorithm refers to an algorithm for calculating the peak ripeness period of the fruits f on the basis of firmness of the fruits f and a measurement date on which measurement of the firmness has been made. Details of the peak-ripeness-period calculating algorithm will be described later.

[0021] In addition, the attributes refer to information for identifying a fruit subjected to the calculation of the peak ripeness period. The attributes include at least one of a kind of the fruit f, a cultivar of the fruit f, and a production condition of the fruit f. The production condition includes a

production site and a producer name.

[0022] FIG. 3 is a diagram for explaining the table that is stored in the algorithm storage unit 11 and in which the attributes of the fruits f and the peak-ripeness-period calculating algorithm are linked.

[0023] In this table, the kind, the cultivar, the production site, and the producer name of the fruits f are linked to the peak-ripeness-period calculating algorithm to be applied to these attributes. The table shown in FIG. 3 shows that different peak-ripeness-period calculating algorithms are applied when the production sites are different even if the cultivars (for example, the cultivar: a peach A) are the same.

[0024] The suitable-period calculating unit 12 calculates the suitable time period suitable for consuming the fruits f from the firmness of the fruits f and the measurement date thereof obtained from the producer F on the basis of the peak-ripeness-period calculating algorithm. When the peak-ripeness-period calculating algorithm is to be corrected (details of which will be described later), the corrected peak-ripeness-period calculating algorithm is used to calculate the suitable time period.

[0025] The judgement unit 13 judges whether or not evaluation information for evaluating the suitable time period that has been calculated by the suitable-period calculating unit 12 satisfies specific conditions. Here, in this embodiment, the evaluation information refers to information (see FIG. 1, the arrow C1) that is provided to the peak-ripeness-period calculating system 1 in the consumption phase via a network, such as an internet, etc. from an information processing terminal owned by the consumers C, such as a mobile phone, a personal computer, and so forth. Details of the evaluation information will be described later.

[0026] When it is judged that the evaluation information satisfies the specific condition by the judgement unit 13, the algorithm correcting unit 14 corrects the peak-ripeness-period calculating algorithm. The corrected peak-ripeness-period calculating algorithm is sent to the suitable-period calculating unit 12.

[0027] In addition to the above-mentioned configuration, the peak-ripeness-period calculating system 1 includes an interface 16 for obtaining a measurement result of the firmness of the fruits f and the measurement date from the producer F, the evaluation information from the consumers C, information related to the attributes of the fruits f, and so forth. In this embodiment, the interface 16 refers to an interface that is connectable in a wireless or wired manner to a router (not shown) that is connectable to the network, such as the internet.

[0028] In addition, the peak-ripeness-period calculating system 1 further includes an algorithm selection unit 17. When the information related to the attributes of the fruits f is obtained from an outside via the interface 16, the algorithm selection unit 17 selects the attributes similar to the obtained attributes from the above-mentioned table, and further selects the peak-ripeness-period calculating algorithm that is linked to the similar attributes.

[0029] <Production Phase>

Next, the production phase will be described. FIG. 4 is a schematic view for explaining the production phase. In the production phase, labels L1 on which the suitable time period suitable for consuming the fruits f is printed are respectively attached to the fruits f that have been produced by the producer F, and the fruits f are shipped to the sales store M.

[0030] In the production phase, a measurement device 20F and an information processing terminal 30F, such as a personal computer (hereinafter, referred to as a PC), etc., are used. The measurement device 20F is provided with a sensor for measuring the firmness of the fruits f that is used for the calculation of the suitable time period as the peak ripeness period. In addition, a printer 40F for recording various information on the labels L1 that are respectively attached to the fruits f is also used.

[0031] It is preferable that the labels L1 used in this embodiment be labels that are each provided with a built-in antenna and a built-in IC chip and that meet the RFID (Radio Frequency Identification) specifications so as to send and receive the information via a wireless communication.

[0032] When the RFID specification labels L1 are used, the printer 40F is an RFID label printer that prints visible information on the labels L1 and that has a function capable of writing and reading information to and from the built-in IC chip.

[0033] In the production phase, the producer F measures the firmness of the fruits f by using the measurement device 20F. The attribute information that relates to the fruits f, the measured firmness of the fruits f, the measurement date, and so forth is sent to the peak-ripeness-period calculating system 1 by the information processing terminal 30F via a network NW (see FIG. 1, the arrow F1).

[0034] In addition, in the peak-ripeness-period calculating system 1, the information processing terminal 30F obtains the information related to the suitable time period that has been calculated (the peak ripeness period) in the peak-ripeness-period calculating system 1 via the network NW on the basis of the information such as the attribute information related to the fruits f, the

measured firmness of the fruits f , the measurement date, and so forth.

[0035] By the printer 40F, the information related to the suitable time period, etc. obtained by the information processing terminal 30F from the peak-ripeness-period calculating system 1 is printed on the labels L1 so as to be visible and is written in the IC chip as data.

[0036] By using the configuration described above, the following processes are performed in the production phase. In other words, the firmness of the fruits f that have been produced by the producer F is measured by the producer F . The information related to the measured firmness of the fruits f is sent to the peak-ripeness-period calculating system 1 via the network NW. In the peak-ripeness-period calculating system 1, the suitable time period suitable for consumption is calculated on the basis of the information related to the firmness of the fruits f obtained from the information processing terminal 30F of the producer F and the peak-ripeness-period calculating algorithm. The calculated suitable time period is returned to the information processing terminal 30F. The information related to the peak ripeness period received from the peak-ripeness-period calculating system 1 is printed on the labels L1 by the printer 40F. The fruits f are shipped to the sales store M after the labels L1 are respectively attached thereto.

[0037] <Sales Phase>

Next, the sales phase will be described. FIG. 5 is a schematic view for explaining the sales phase. In the sales phase, the fruits f that have been purchased from the producer F are sold to the consumers C while presenting the suitable time period suitable for consumption. In addition, in the sales phase, because there is a possibility that the suitable time period is changed due to storage conditions and temperature change during the course of the

distribution, the information related to the suitable time period is recalculated and replaced as required.

[0038] Similarly to the production phase, in the sales phase, a measurement device 20M provided with a sensor for measuring the firmness of the fruits f and an information processing terminal 30M such as the PC, etc. are used. In addition, a printer 40M for recording various information on labels L2 that are respectively attached to the fruits f is used.

[0039] It is preferable that the labels L2 used in this embodiment be labels that meet the RFID specifications, similarly to the labels L1. When the RFID specification labels L2 are used, the printer 40M is the RFID label printer.

[0040] As the labels L2, it may be possible to use labels that are configured such that, in addition to the suitable time period, the information directed more specifically to the consumers C, such as, for example, the cultivar, the production site, the producer name, a message to the consumers, and so forth can be written therein.

[0041] In the sales phase, similarly to the production phase, the sales store M can measure the firmness of the fruits f by using the measurement device 20M. The measured firmness of the fruits f and its measurement date and the attribute information related to the fruits f are sent to the peak-ripeness-period calculating system 1 by the information processing terminal 30M via the network NW (see FIG. 1, the arrow M1).

[0042] In addition, in the sales phase, the sales store M can input the attributes required for the table shown in FIG. 3 described above by using the information processing terminal 30M. For example, the input attribute information is used for a management, etc. of the fruits f and its supplier.

[0043] In addition, the information processing terminal 30M obtains the

information related to the suitable time period that has been calculated via the network NW in the peak-ripeness-period calculating system 1 on the basis of the attribute information related to the fruits f, the measured firmness of the fruits f, the measurement date, and so forth. When there is no change in the attribute information of the fruits f, the peak-ripeness-period calculating system 1 performs the calculation of the suitable time period by using the same algorithm as the peak-ripeness-period calculating algorithm applied in the production phase.

[0044] When the measurement of the firmness is performed in the sales phase, the information processing terminal 30M sends the information related to the firmness measured in the sales phase to the peak-ripeness-period calculating system 1 via the network NW.

[0045] The suitable-period calculating unit 12 in the peak-ripeness-period calculating system 1 calculates the suitable time period of the peak ripeness period on the basis of the firmness of the fruits f received from the information processing terminal 30M.

[0046] In the peak-ripeness-period calculating system 1, when the suitable time period that has been calculated in the sales phase on the basis of the measured firmness is different from the suitable time period that has been measured in the production phase, the peak-ripeness-period calculating system 1 sends the suitable time period that has been newly calculated to the information processing terminal 30M.

[0047] By the printer 40M, the suitable time period, the cultivar, the production site, the producer name, and the message to the consumers obtained by the information processing terminal 30M from the peak-ripeness-period calculating system 1 are printed on the labels L2 so as to

be visible and are written in the IC chip as data.

[0048] In the sales phase, the fruits f are sold after respectively attaching, to the fruits f, the labels L2 in which the information related to the suitable time period, etc. obtained from the peak-ripeness-period calculating system 1 is written.

[0049] By using the configuration described above, the following processes are performed in the sales phase. In other words, the sales store M measures the firmness of the purchased fruits f and sends it to the peak-ripeness-period calculating system 1. In the peak-ripeness-period calculating system 1, the suitable time period suitable for consumption is calculated on the basis of the information related to the firmness of the fruits f obtained from the information processing terminal 30M of the sales store M and the peak-ripeness-period calculating algorithm. The calculated suitable time period is returned to the information processing terminal 30M. The information related to the peak ripeness period received from the peak-ripeness-period calculating system 1 is printed on the labels L2 by the printer 40M. The fruits f are sold to the consumers C after the labels L2 are respectively attached thereto.

[0050] <Consumption Phase>

Next, the consumption phase will be described. FIG. 6 is a schematic view for explaining the consumption phase.

[0051] In the consumption phase, the consumers C consume the fruits f purchased from the sales store M. In this embodiment, the consumers C can evaluate whether or not the suitable time period shown on the labels L2 attached to the consumed fruits f was suitable.

[0052] In the consumption phase, the consumers C can perform the evaluation of the suitable time period by using the information processing

terminal 30C, such as the PC, the mobile phone (i.e. smartphone), and so forth.

[0053] The consumers C use the information processing terminal 30C to send the evaluation information related to evaluation A for the suitable time period of the fruits f to the peak-ripeness-period calculating system 1 via the network NW.

[0054] An example of an evaluation method includes an input operation to be performed by the consumers C in accordance with a predetermined procedure on a dedicated site that is provided by the peak-ripeness-period calculating system 1 and that can be accessed with the information processing terminal 30C.

[0055] With such a method, the consumers C can evaluate the suitable time period by using the information processing terminal 30C. In addition, the evaluation information can be provided to the peak-ripeness-period calculating system 1 by using the information processing terminal 30C.

[0056] In this embodiment, an address information of the dedicated site is printed on the labels L2 as a bar code or a two-dimensional code together with other information for identifying the fruit. As the consumers C capture the bar code or the two-dimensional code by using a function of the information processing terminal 30C, the information processing terminal 30C can access the dedicated site for inputting the evaluation of the fruits f.

[0057] FIG. 7 is a schematic view for explaining an example of the dedicated site that is provided by the peak-ripeness-period calculating system 1 and displayed on the display of the information processing terminal 30C. FIG. 7 describes a state in which "a peak ripeness period evaluation button", "a tastiness evaluation button", and "a price evaluation button" are displayed on

a display 31C of the information processing terminal 30C.

[0058] FIG. 8 is a schematic view for explaining an example of the dedicated site that is provided by the peak-ripeness-period calculating system 1 and displayed on the display of the information processing terminal 30C. FIG. 8 describes a state in which the buttons for selecting "too early (not ripen)", "too late (ripen too much)", and "right timing" are displayed after "the peak ripeness period evaluation button" in a displayed view shown in FIG. 7 has been selected.

[0059] By selecting any one of the above-mentioned buttons, the consumers C can evaluate whether or not the suitable time period of the fruits f shown on the labels L2 was overlapped with the actual peak ripeness period.

[0060] An evaluation result is sent to the peak-ripeness-period calculating system 1 via the network NW and is used for a correction process of the peak-ripeness-period calculating algorithm, which will be described later.

[0061] [Peak-ripeness-period Calculating Algorithm]

Next, the peak-ripeness-period calculating algorithms will be described. In this embodiment, two peak-ripeness-period calculating algorithms will be described. The peak-ripeness-period calculating algorithms described below can be selected depending on the kind of the target fruits f, the course of the distribution, a mode of the distribution, and so forth.

[0062] <First Peak ripeness period Algorithm>

FIG. 9 is a diagram for explaining a first peak-ripeness-period calculating algorithm.

[0063] In the embodiment of the present invention, the peak-ripeness-period calculating algorithm is expressed by a correlation between a value representing the firmness of the fruits f and the number of

elapsed days after the measurement date on which the firmness has been measured.

[0064] More specifically, the first peak-ripeness-period calculating algorithm is represented in terms of a linear function between a value H representing the firmness of the fruits f and the number of elapsed days D since the measurement date on which the firmness has been measured.

[0065] This linear function is derived on the basis of a demonstration experiment using a sample as a reference. This linear function is obtained by applying a least square regression analysis to a group of plots obtained by plotting the firmness of the reference samples on a harvest date on which the fruits f are harvested and the firmness corresponding to the number of elapsed days after the harvest date.

[0066] In a case in which the increasing direction of the firmness H is taken in the increasing direction of the y-axis, because the greater the number of elapsed days after the harvest date is, the softer the fruits f become by being ripened, this linear function has a negative gradient.

[0067] In addition, in the demonstration experiment, when the firmness of the fruit harvested from the reference sample is measured, a sensory test is used to determine whether or not the peak ripeness period is suitable. The suitable time period is set on the basis of the number of elapsed days after the harvest date corresponding to a range of the firmness H of the fruits f in which the peak ripeness period corresponds to "suitable".

[0068] As described above, it is possible to derive a peak-ripeness-period calculating algorithm $Y0$ corresponding to the attributes including the fruit, the cultivar, the production site, and the producer that are used in the demonstration experiment.

[0069] Then, by applying the derived peak-ripeness-period calculating algorithm Y0 to a fruit harvested from another tree of the same cultivar as the reference sample, it is possible to calculate the peak ripeness period of the cultivar that is the same as that of the reference sample as the number of elapsed days after the day on which the firmness of the fruit is measured. In this case, as shown in FIG. 9, with this fruit, it is possible to predict that the firmness at the peak ripeness period (h_1 to h_2) will be achieved (d_1-d_0) days after the measurement date (d_0), and (d_2-d_1) days from day d_1 to day d_2 corresponds to the peak ripeness period.

[0070] In this embodiment, the correction of the peak-ripeness-period calculating algorithm executed by the algorithm correcting unit 14 refers to a change in the gradient of the linear function that is the peak-ripeness-period calculating algorithm Y0 of the firmness H of the fruits f and the number of elapsed days D . In addition, in this embodiment, the specific condition for correcting the peak-ripeness-period calculating algorithm is set, and when the specific condition is satisfied, the peak-ripeness-period calculating algorithm is corrected. Details of a process for correcting the algorithm will be described later.

[0071] As an example, in a case in which the predicted ratio of the number of the fruits f the actual suitable time period of which does not overlap with the calculated suitable time period with respect to the number of the fruits f the suitable time period of which has been calculated satisfies the specific condition, and in a case in which the calculated suitable time period is earlier than the actual peak ripeness period of the fruits f , the absolute value of the gradient is set so as to be relatively smaller.

[0072] This corresponds to an equation Y1 shown by a two-dot chain line in

FIG. 9. According to the corrected peak-ripeness-period calculating algorithm Y1, the suitable time period is derived to be from day d3 to day d4. By performing such a correction, it is possible to delay the beginning of the suitable time period from day d1 calculated with the peak-ripeness-period calculating algorithm Y0 such that the suitable time period becomes closer to the actual peak ripeness period.

[0073] In addition, in a case in which the predicted ratio of the number of the fruits f the actual suitable time period of which does not overlap with the calculated suitable time period with respect to the number of the fruits f the suitable time period of which has been calculated satisfies the specific condition, and in a case in which the calculated suitable time period is later than the actual peak ripeness period of the fruits f , the absolute value of the gradient is set so as to be relatively larger.

[0074] This corresponds to an equation Y2 shown by a two-dot chain line in FIG. 9. According to the corrected peak-ripeness-period calculating algorithm Y2, the suitable time period is derived to be from day d5 to day d6. By performing such a correction, it is possible to make the beginning of the suitable time period earlier from day d1 calculated with the peak-ripeness-period calculating algorithm (Y0) such that the suitable time period becomes closer to the actual peak ripeness period.

[0075] <Second Peak-ripeness-period Calculating Algorithm>

The inventors have obtained findings that there may be a case in which a curve approximation fits better to an actual behavior for the relationship between the kind of the fruits f and the firmness from the harvest date to the peak ripeness period.

[0076] In addition, the inventors have noticed a fact that although the fruit

f should ripen easily in a higher temperature, there is a case in which the fruits shipped to a region with a higher average atmospheric temperature tend to ripen slower, and thus, the inventors have obtained findings that a temperature history of the fruit f, such as a room temperature, etc., is one of more important factors that determines the tendency of ripening of the fruit f than an atmospheric temperature in a shipped place (sales site) of the fruit f.

[0077] After repeated considerations, the inventors have found that the change in the tendency of ripening of the fruit f (in other words, the change in the firmness) depends on an integrated value of an environment temperature exposed to the fruit f and that a correlation between the firmness of the fruit f and the integrated value of the environment temperature has a behavior characteristic to the kind of the fruits f.

[0078] On the basis of such findings, the inventors have arrived to a second peak-ripeness-period calculating algorithm. In the following description, the integrated value obtained by integrating the environment temperature exposed to the fruit f and measured at a defined time in a day over the number of elapsed days after a reference date is referred to as an integrated temperature.

[0079] With the second peak-ripeness-period calculating algorithm, the firmness of the fruit f is first measured for each kind of the fruits f in an actual test. In addition, the integrated temperature of the fruit f after the reference date is calculated. Here, the reference date is defined as the measurement date on which the firmness of the fruit f has been measured. Then, a correlation curve between the firmness and the integrated temperature is created. In this embodiment, this correlation curve is referred to as the master curve.

[0080] FIG. 10 is a diagram for explaining the master curve created for each

kind of the fruits f .

[0081] The master curve shows a correlation between the firmness of the fruit f and the integrated temperature of the environment temperature exposed to the fruit f after the harvest date. The greater the number of days elapsed after the harvest date (the measurement date) is, the softer the fruit f becomes by being ripened. Therefore, in a case in which the increasing direction of the firmness H is taken in the increasing direction of the y -axis, a tangent of the correlation curve is shown with the negative the gradient. The master curve is a curve characteristic to each of the fruits f .

[0082] Next, a survey is conducted for the tastiness of each of the firmness by the sensory test, and the suitable time period of the peak ripeness period is determined on the master curve.

[0083] FIG. 11 is a diagram for explaining the individual curves calculated from the master curve.

[0084] In this embodiment, on the basis of the master curve shown in FIG. 10, the individual curve for predicting the peak ripeness period of the fruit f is created. In this embodiment, the suitable time period of the peak ripeness period is obtained by dividing a range from $T1$ to $T2$ of the integrated temperature corresponding to a specific range from $H1$ to $H2$ of the firmness that corresponds to the peak ripeness period of the fruit f , in the master curve shown in FIG. 10, by the environment temperature exposed to the fruit f . In this embodiment, an average value Ta of the environment temperature is used.

[0085] In other words, when the average value of the environment temperature at a given point is assumed to be Ta , a value $D1$ obtained by $(T1/Ta)$ corresponds to the number of days after the measurement date. A period from $D1$ to a value $D2$ obtained by $(T2/Ta)$ is the suitable time period.

This period is expressed as a reference suitable time period in this embodiment.

[0086] In addition, for example, an average room temperature in a detached house in Hokkaido (point Q) in March is assumed to be 27 °C, and the average room temperature in an apartment in Tokyo (point R) in March is assumed to be 22 °C. In this case, the peak ripeness period of the fruit f (the suitable time period) in Hokkaido can be predicted as $(T2/27)-(T1/27) = DA1-DA2$. In addition, the peak ripeness period of the fruit f (the suitable time period) in Tokyo can be predicted as $(T2/22)-(T1/22) = DB1-DB2$.

[0087] In other words, the fruit f ripens faster at the point where the average value of the environment temperature is higher and a shorter period is required until it reaches the peak ripeness period, and the fruit f ripens less easily at the point where the average value of the environment temperature is lower and a longer period is required until it reaches the peak ripeness period.

[0088] As described above, with the second peak-ripeness-period calculating algorithm, it is possible to predict the peak ripeness period in accordance with the environment temperature exposed to the fruit f. Therefore, it is possible to predict peak ripeness period with higher accuracy in accordance with the environment temperature of the point to which the fruit f is shipped, more specifically, the environment temperature of the storage site of the fruit f.

[0089] In this embodiment, an initial date for calculation of the integrated temperature is defined as the harvest date by assuming the harvest date matches with the measurement date on which the firmness has been measured. However, even if the harvest date does not match with the measurement date by few days, it is treated to be within an allowable error

range.

[0090] With the peak-ripeness-period calculating system 1 according to this embodiment, it is possible to correct the individual curve obtained from the master curve. Specifically, the algorithm correcting unit 14 executes the correction of the individual curve that is the peak-ripeness-period calculating algorithm.

[0091] FIG. 12 is a diagram for explaining the correction of the individual curve executed by the algorithm correcting unit 14. In FIG. 12, the periods before and after the correction are shown with excessively large difference therebetween to an unrealistic extent for the sake of ease of explaining the change by the correction.

[0092] In an example of the correction method, the algorithm correcting unit 14 changes the average value T_a of the environment temperature to be used for the division of the master curve. In other words, the environment temperature of a given point is adjusted. In this case, the corrected individual curve is shown by a one-dot chain line in FIG. 12. Because values of denominators in the division are different, the corrected individual curve will be different curve from the original individual curve.

[0093] In addition, in a different correction method, a predetermined value is added or subtracted to or from the predicted suitable time period by the algorithm correcting unit 14 in a suitable curve obtained by dividing the master curve by the average value T_a . Specifically, the algorithm correcting unit 14 shifts the original individual curve obtained from the master curve in parallel with the y-axis direction. In this case, the correction is shown by the two-dot chain line in FIG. 12. It is the correction in which the line is shifted in parallel in the direction of open arrows.

[0094] By doing so, it is possible to adjust the suitable time period between intersection points between the firmness at the peak ripeness period and the suitable curve is adjusted in the x-axis direction. Therefore, it is possible to perform the correction such that the suitable time period of the peak ripeness period is shifted so as to be earlier or later.

[0095] In addition, in this embodiment, the specific condition for determining whether or not the individual curve is to be corrected is set, and when the specific condition is satisfied, the algorithm correcting unit 14 can correct the individual curve using the above-mentioned method.

[0096] In an example, in a case in which the predicted ratio of the number of the fruits f the actual suitable time period of which does not overlap with the calculated suitable time period with respect to the number of the fruits f the suitable time period of which has been calculated satisfies the specific condition, and in a case in which the calculated suitable time period is earlier than the actual peak ripeness period of the fruits f , the individual curve is corrected such that the beginning of the suitable time period is delayed by using the former or the latter method.

[0097] In addition, in a case in which the predicted ratio of the number of the fruits f the actual suitable time period of which does not overlap with the calculated suitable time period with respect to the number of the fruits f the suitable time period of which has been calculated satisfies the specific condition, and in a case in which the calculated suitable time period is later than the actual peak ripeness period of the fruits f , the individual curve is corrected such that the beginning of the suitable time period is made earlier by using the former or the latter method.

[0098] By performing such a correction, the suitable time period predicted

with the individual curve can be made to approach the actual peak ripeness period.

[0099] [Peak-ripeness-period Calculating Method]

Next, a peak-ripeness-period calculating method executed by using the peak-ripeness-period calculating algorithm in the above-mentioned peak-ripeness-period calculating system 1 will be described.

[0100] With the peak-ripeness-period calculating system 1 according to this embodiment, it is possible to perform the correction of the peak-ripeness-period calculating algorithm on the basis of the evaluation information from the consumers. In addition, by applying the corrected peak-ripeness-period calculating algorithm, it is possible to improve the accuracy of the suitable time period.

[0101] In addition, with the peak-ripeness-period calculating system 1 according to this embodiment, even when the peak-ripeness-period calculating algorithm appropriate for the attributes of the fruit is not prepared, the peak-ripeness-period calculating algorithm linked to the similar attributes is selected to perform the calculation of the suitable time period.

[0102] <Correction Process Of Peak-ripeness-period Calculating Algorithm>

A process of correcting the peak-ripeness-period calculating algorithm in the peak-ripeness-period calculating system 1 according to this embodiment will be explained first.

[0103] With the peak-ripeness-period calculating method according to the embodiment of the present invention, the suitable time period suitable for consuming the fruits f is calculated with the peak-ripeness-period calculating algorithm linked to the attributes of the fruits f, the evaluation information for

evaluating the calculated suitable time period is obtained, the peak-ripeness-period calculating algorithm is corrected when the evaluation information satisfies the specific condition, and a new suitable time period is calculated by using the corrected peak-ripeness-period calculating algorithm.

[0104] FIG. 13 is a flowchart for explaining the correction process of the peak-ripeness-period calculating algorithm in the peak-ripeness-period calculating method according to this embodiment.

[0105] In step S1, the peak-ripeness-period calculating system 1 calculates the suitable time period suitable for consuming the fruits f with the peak-ripeness-period calculating algorithm prepared by being associated with the attributes of the fruits f .

[0106] In step S2, the peak-ripeness-period calculating system 1 judges whether or not the evaluation information for evaluating the suitable time period that has been calculated is obtained in step S1.

[0107] When the evaluation information is obtained, in step S3, the peak-ripeness-period calculating system 1 calculates the proportion (hereinafter, referred to as a rate of divergence) of the fruits f the actual peak ripeness period of which is predicted that it does not overlap with the calculated suitable time period among the number of the fruits f the suitable time period of which has been calculated in step S1.

[0108] It is possible to take the number of the fruits f that have been harvested by the producer F and shipped after the labels $L1$ have been attached thereto as the number of the fruits f the suitable time period of which has been calculated.

[0109] When the number of the fruits f the suitable time period of which has been calculated is set as Mf , a number of sales at the present time of the

number M_f of the fruits f the suitable time period of which has been calculated is set as M_n , an evaluation response rate of all consumers who have purchased the fruits f is set as $X\%$, and a number of consumers who answered that the calculated suitable time period does not overlap with the actual peak ripeness period is set as M_p , the rate of divergence of the fruits f the actual peak ripeness period of which is predicted that it does not overlap with the calculated suitable time period among the number M_f of the fruits f the suitable time period of which has been calculated is expressed as:

$$M_p \div (X/100) \div (M_n/M_f) \div M_f \times 100 (\%).$$

[0110] In step S4, the peak-ripeness-period calculating system 1 judges whether or not the rate of divergence is greater than a specific ratio. In this embodiment, the specific ratio is set to as, for example, 20 %.

[0111] When the rate of divergence is judged to be greater than 20 %, in step S5, the peak-ripeness-period calculating system 1 corrects the peak-ripeness-period calculating algorithm.

[0112] When the rate of divergence is greater than 20 % and when a number of answers reporting that the calculated suitable time period is earlier than the actual suitable time period of the fruits f is greater than the number of answers reporting that the calculated suitable time period is later than the actual suitable time period of the fruits f or reporting that the calculated suitable time period is suitable, the absolute value of the gradient is set so as to be relatively smaller.

[0113] In addition, when the rate of divergence is greater than 20 % and when the number of answers reporting that the calculated suitable time period is later than the actual suitable time period of the fruits f is greater than the number of answers reporting that the calculated suitable time period is earlier

than the actual suitable time period of the fruits f or reporting that the calculated suitable time period is suitable, the absolute value of the gradient is set so as to be relatively larger.

[0114] For example, in a case in which the number M_f of the fruits f the suitable time period of which has been calculated is 200, the number of sales M_n at the present time of the number M_f of the fruits f the suitable time period of which has been calculated is 100, the evaluation response rate of all consumers who have purchased the fruits f is 50%, and the number of consumers M_p who answered that the calculated suitable time period does not overlap with the actual peak ripeness period is 12, the rate of divergence is calculated as 24 %. In this case, the peak-ripeness-period calculating system 1 corrects the peak-ripeness-period calculating algorithm.

[0115] In addition, when it is assumed that, among the twelve consumers, among the number of consumers who answered that the peak ripeness period does not overlap, the number of consumers who answered that the peak ripeness period is too early is 10, because the number consumers who answered that the calculated suitable time period is earlier than the actual suitable time period of the fruits f is greater than the number consumers who answered that the calculated suitable time period is later than the actual suitable time period of the fruits f , the absolute value of the gradient of the peak-ripeness-period calculating algorithm is set so as to be relatively smaller.

[0116] When the rate of divergence is judged to be smaller than 20 %, the peak-ripeness-period calculating system 1 uses the peak-ripeness-period calculating algorithm continuously without renewing it.

[0117] For example, in a case in which the number M_f of the fruits f the suitable time period of which has been calculated is 200, the number of sales

Mn at the present time of the number Mf of the fruits f the suitable time period of which has been calculated is 100, the evaluation response rate of all consumers who have purchased the fruits f is 50%, and the number of consumers Mp who answered that the calculated suitable time period does not overlap with the actual peak ripeness period is 6, the rate of divergence is calculated as 12 %. In this case, the peak-ripeness-period calculating algorithm used at the present is used continuously without being renewed.

[0118] In step S6, the peak-ripeness-period calculating system 1 adds the peak-ripeness-period calculating algorithm the gradient of which has been changed to the algorithm storage unit 11. In addition, at this time, the peak-ripeness-period calculating system 1 stores the peak-ripeness-period calculating algorithm the gradient of which has been changed and the attributes of the fruits f to which the changed peak-ripeness-period calculating algorithm has been applied such that they are linked to each other.

[0119] Next, in step S7, the peak-ripeness-period calculating system 1 calculates the suitable time period by using the corrected peak-ripeness-period calculating algorithm.

[0120] <Selection Process Of Peak-ripeness-period Calculating Algorithm>

Next, a process of selecting the peak-ripeness-period calculating algorithm in the peak-ripeness-period calculating system 1 according to this embodiment will be described.

[0121] The peak-ripeness-period calculating system according to this embodiment extracts, when predetermined attributes are obtained, the peak-ripeness-period calculating algorithm associated with the attributes similar to the obtained attributes from the prepared peak-ripeness-period calculating algorithm and calculates the suitable time period by applying the

extracted peak-ripeness-period calculating algorithm.

[0122] FIG. 14 is a flowchart for explaining the selection process of the peak-ripeness-period calculating algorithm in the peak-ripeness-period calculating system according to this embodiment.

[0123] In step S11, the peak-ripeness-period calculating system 1 prompts input of the information related to the attributes of the fruits f.

[0124] In step S12, the peak-ripeness-period calculating system 1 judges whether or not there is the attribute information that matches with all of the attribute information input in step S11.

[0125] When there is the relevant attribute information, in step S13, the peak-ripeness-period calculating system 1 selects the appropriate peak-ripeness-period calculating algorithm, and the process proceeds to step S1, which has been described in the correction process of the peak-ripeness-period calculating algorithm described above.

[0126] For example, in step S13, a case in which there is the relevant attribute information in the table shown in FIG. 3 means a case in which when "peach" is input for the fruit, "peach A" is input for the cultivar, "Yamanashi" is input for the production site, and "Fruits Firm H" is input for the producer name as the attributes in step S11, there are matched attributes such as the fruit is "peach", the cultivar is "peach A", the production site is "Yamanashi", and the producer name is "Fruits Firm H" in the table shown in FIG. 3. In this case, H-A is selected as the peak-ripeness-period calculating algorithm that is linked to the attributes that match with the input attributes.

[0127] When there is not the relevant attribute information, in step S14, the peak-ripeness-period calculating system 1 judges whether or not a relevance rate of items contained in the attribute information is greater than

the specific condition.

[0128] In step S14, in a case in which there are attributes whose relevance rate is greater than the specific condition, in other words, in a case in which there are similar attributes, in step S15, the peak-ripeness-period calculating algorithm linked to the similar attributes is selected, and the process proceeds to step S1, which has been described in the correction process of the peak-ripeness-period calculating algorithm described above.

[0129] Here, a case in which there is not the relevant attribute information, and a case in which the relevance rate is greater than the specific condition means a case in which when "peach" is input for the fruit, "peach A" is input for the cultivar, "Yamanashi" is input for the production site, and "Fruits Firm F" is input for the producer name as the attributes in step S11, and only a part of the attributes, such as the fruit is "peach", the cultivar is "peach A", and the production site is "Yamanashi" match therewith. In this case, the peak-ripeness-period calculating system 1 selects the peak-ripeness-period calculating algorithm H-A in which the cultivar and the production site are matched as the similar attributes.

[0130] In step S14, in a case in which the relevance rate is equal to or less than the specific condition, in step S16, the peak-ripeness-period calculating system 1 prompts input of the applied peak-ripeness-period calculating algorithm.

[0131] With the above-mentioned process, even when the appropriate peak-ripeness-period calculating algorithm for calculating the peak ripeness period of the fruit is not prepared, it is possible to calculate the suitable time period by using the similar peak-ripeness-period calculating algorithm (H-A shown in FIG. 3).

[0132] In addition, with the above-mentioned process, the calculation of the appropriate suitable time period of the fruit is first performed by using the peak-ripeness-period calculating algorithm in which the attributes are not in perfect match. However, because the peak-ripeness-period calculating algorithm is corrected by the correction process of the peak-ripeness-period calculating algorithm described above on the basis of the evaluation information from the consumers C, it is possible to use the corrected peak-ripeness-period calculating algorithm as the new peak-ripeness-period calculating algorithm that is associated with the new attributes.

[0133] FIG. 15 is a schematic view for explaining the newly registered peak-ripeness-period calculating algorithm.

[0134] In the table shown in FIG. 3, the peak-ripeness-period calculating algorithm that is associated with the attributes in which the fruit is "peach", the cultivar is "peach A", the production site is "Yamanashi", and the producer is "Fruits Firm F" has not been registered. However, the peak-ripeness-period calculating algorithm H-A with similar attributes has been selected, and thereafter, the peak-ripeness-period calculating algorithm H-A has been corrected by the correction process of the peak-ripeness-period calculating algorithm.

[0135] In this embodiment, the corrected peak-ripeness-period calculating algorithm is registered in the table as a peak-ripeness-period calculating algorithm H-A1 that is associated with the attributes in which the fruit is "peach", the cultivar is "peach A", the production site is "Yamanashi", and the producer is "Fruits Firm F".

[0136] [Effects And Advantages]

According to the embodiment of the present invention, the suitable time

period is calculated as the peak ripeness period of the fruits *f* with the peak-ripeness-period calculating algorithm prepared by being associated with the attributes of the fruits *f*; the evaluation information for evaluating the suitable time period is obtained; the peak-ripeness-period calculating algorithm is corrected when the evaluation information satisfies the specific condition; and a new suitable time period is calculate by using the corrected peak-ripeness-period calculating algorithm. By doing so, it is possible to calculate the suitable time period as the peak ripeness period of the fruits *f* and to improve the accuracy of the calculated suitable time period.

[0137] In addition, because the accuracy of the suitable time period can be improved, the producer *F* can use the calculated suitable time period as information for making decisions on harvesting or shipping timing. In addition, the sales store *M* can use the calculated suitable time period as information for making decisions on an amount to be purchased or selection of the supplier.

[0138] For the consumers *C*, a fact that they can consume the fruits *f* at the suitable ripened timing results in a feeling of being ensured for the quality. Therefore, it is possible to increase a motivation of the consumers *C* for purchasing the fruits. Furthermore, it is possible to increase a customer satisfaction of the consumers *C*.

[0139] In addition, for the producer *F*, it is possible to provide the consumers *C* with the fruits *f* at consistent tastiness, and therefore, it is possible to increase an added value of the fruits *f*.

[0140] In the embodiment of the present invention, because the first peak-ripeness-period calculating algorithm is expressed by a correlation between the value representing the firmness of the fruits *f* and the number of

elapsed days after the measurement date on which the firmness has been measured, it is possible to represent the peak ripeness period conveniently.

[0141] More specifically, the peak-ripeness-period calculating algorithm is represented in terms of a linear function between the value H representing the firmness of the fruits f and the number of elapsed days D since the measurement date on which the firmness has been measured. In addition, because the greater the number of days elapsed after the harvest date is, the softer the fruit f becomes by being ripened, when the increasing direction of the firmness H is taken in the increasing direction of the y-axis, the gradient of the linear function is expressed by a negative number.

[0142] In addition, with the second peak-ripeness-period calculating algorithm, because it is possible to predict the suitable time period of the peak ripeness period depending on the environment temperature exposed to the fruits f , it is possible to improve the accuracy of the suitable time period of the peak ripeness period.

[0143] In addition, by using the first peak-ripeness-period calculating algorithm or the second peak-ripeness-period calculating algorithm, for example, the sales store M , etc. can visualize and display the suitable time period of the peak ripeness period by expressing it in a form of graphs. In this case, it is possible to make the suitable time period of the peak ripeness period easy to understand intuitively for the consumers C .

[0144] [Peak-ripeness-period Calculating Program]

The peak-ripeness-period calculating program according to the embodiment of the present invention causes a computer to execute, in the above-mentioned peak-ripeness-period calculating method: a step of calculating the suitable time period for consuming the fruit with the

peak-ripeness-period calculating algorithm prepared by being associated with the attributes of the fruits f ; a step of obtaining the evaluation information for evaluating the suitable time period; a step of correcting the peak-ripeness-period calculating algorithm when the evaluation information satisfies the specific condition; and a step of calculating a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.

[0145] [Storage Medium]

A storage medium according to the embodiment of the present invention stores, in a computer-readable manner, the program that causes the computer to execute, in the above-mentioned peak-ripeness-period calculating method: a step of calculating the suitable time period for consuming the fruit with the peak-ripeness-period calculating algorithm prepared by being associated with the attributes of the fruits f ; a step of obtaining the evaluation information for evaluating the suitable time period; a step of correcting the peak-ripeness-period calculating algorithm when the evaluation information satisfies the specific condition; and a step of calculating a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.

[0146] [Other Embodiments]

Although the embodiments of the present invention have been described in the above, the above-mentioned embodiments merely illustrate a part of application examples of the present invention, and the technical scope of the present invention is not intended to be limited to the specific configurations in the above-mentioned embodiments. Note that, the above-mentioned embodiment of the present invention may be subjected to various alterations that do not depart from the present invention.

[0147] It has been described that the registration of the attribute

information shown in the table shown in FIG. 3 can be executed by the sales store M using the information processing terminal 30M in the sales phase. However, it may be possible to allow the registration of the attribute information required for the above-mentioned table shown in FIG. 3 by the producer F using the information processing terminal 30F in the production phase.

[0148] The attribute information in the table shown in FIG. 3 is only an example, and the information is not limited thereto as long as the fruits f can be identified.

[0149] In the above-mentioned embodiment, a description has been given of a case in which the algorithm storage unit 11 is integrated into the peak-ripeness-period calculating system 1. However, for example, the algorithm storage unit 11 may be contained in a server, etc. on the network NW, such as the internet.

[0150] In addition, a description has been given of a case in which the interface 16 is a communication interface with the router that can be connected to the network, such as the internet. However, the interface 16 may have a function that enables a connection to the internet by its own.

[0151] A description has been given that it is preferable to use the labels L1 that meet the RFID specifications for the use in the production phase. In this case, the information such as the suitable time period, etc. only needs to be stored at least in the IC chip, and the information needs not be printed on the surface area of the labels L2. When the printing is not performed on the labels L1, the IC chip of the RFID label may be read out using the information processing terminal 30M in the sales store M to obtain the stored contents, and then, the required information may be printed on the labels L2.

[0152] Note that, in this embodiment, the labels L1 and L2 need not meet the RFID specifications.

[0153] Although a description has been given that the calculation of the peak ripeness period of the fruits f is executed in both the production phase and the sales phase in this embodiment, the calculation may be performed only one of the production phase or the sales phase.

[0154] A description has been given that the peak-ripeness-period calculating algorithm is represented in terms of a linear function between the value H representing the firmness of the fruits f and the number of elapsed days D since the measurement date on which the firmness has been measured. However, for example, a flowering date, a specific date, or the like may be taken as the origin of the linear function. By specifying the flowering date or the specific date as the reference date for the suitable time period calculated, a management of the fruit in the producer F becomes easier.

[0155] In the production phase, when the firmness H of the fruits f is measured, a timing of measurement may be before or after the harvest. Being able to predict the peak ripeness period before the harvest, it is particularly useful for a type of fruit whose post-harvest degradation of the freshness is significant.

[0156] Even when the rate of divergence is greater than the specific condition, it is conceivable that the answers from the consumers C include both of the answers reporting that the displayed suitable time period is later than the actual peak ripeness period and the answers reporting that the displayed suitable time period is earlier than the actual peak ripeness period. In this case, it may be possible to execute both of the correction in which the absolute value of the gradient of the peak-ripeness-period calculating

algorithm is set so as to be relatively smaller and the correction in which the absolute value of the gradient is set so as to be relatively larger.

[0157] In addition, when the rate of divergence of a person who answered that the displayed suitable time period is later than the actual peak ripeness period and the rate of divergence of the person who answered that the displayed suitable time period is earlier than the actual peak ripeness period are both greater than the specific condition, weighting of the correction amount of the absolute value of the gradient of the peak-ripeness-period calculating algorithm may be decided on the basis of the exceeding degree of the rate of divergence from the specific condition.

[0158] For example, in a case in which the rate of divergence of the person who answered that the displayed suitable time period is later than the actual peak ripeness period is assumed to be 21 %, and the rate of divergence of the person who answered that the displayed suitable time period is earlier than the actual peak ripeness period is assumed to be 40 %, by taking a fact that the rate of divergence of the answer reporting that the displayed suitable time period is later than the actual peak ripeness period is also greater than the specific condition into account, the amount of change in the absolute value of the gradient is set so as to be small relative to a case in which there is no answers reporting that the displayed suitable time period is later than the actual peak ripeness period.

[0159] In step S4, although the specific condition of the rate of divergence for the evaluation information is set to be 20 %, it is not limited thereto. For example, when it is set so as to be smaller than 20 %, because the correction of the peak-ripeness-period calculating algorithm is predict to be executed often, it is possible to improve the accuracy of the calculated suitable time period.

[0160] In the consumption phase, when the consumer C has accessed to the peak-ripeness-period calculating system 1 with the information processing terminal 30C by using a printed information on the label attached on the fruit f after the consumer C has purchased the fruit f but before the consumer C consumes the fruit f, it may be possible to provide the information processing terminal 30C with a function of informing the peak ripeness period.

[0161] In addition, not only the display for the evaluation but also the information related to the fruit f may be displayed on the information processing terminal 30C of the consumers C.

[0162] The evaluation method of the fruits f in the information processing terminal 30C of the consumers C may follow the following method. In other words, when the peak-ripeness-period calculating system 1 is accessed by the information processing terminal 30C, a dedicated application for the evaluation of the fruits f that can be executed in the information processing terminal 30C is downloaded. By starting up the dedicated application downloaded in the information processing terminal 30C, the consumers C can perform the evaluation of the fruits f by being guided to the dedicated site, etc. for the evaluation of the fruits f.

[0163] A Near Field Communication technique (NFC) may be used to connect the information processing terminal 30C to the peak-ripeness-period calculating system 1. As described above, the RFID specification labels may be used as the labels L1 and the labels L2. In this case, the information related to a dedicated address or the dedicated application may be stored in the IC chip. The information can be read out by using the information processing terminal 30C having a configuration capable of communicating with the built-in IC chip in the labels L1 and L2.

[0164] In a case in which the second peak-ripeness-period calculating algorithm is applied, it is possible to provide in the labels L1 and L2 the IC chips capable of recording temperature changes over a period from the shipping of the fruits f to the consumption the fruits f.

[0165] In addition, the information stored in the IC chip may be obtained by the information processing terminal 30M, the information processing terminal 30C, and so forth, and the information may then be sent to the peak-ripeness-period calculating system 1.

[0166] In the peak-ripeness-period calculating system 1, when the fruits f are those predicted to be exposed to similar environments, it is possible to apply temperature values based on the actual environment temperature as the temperature information used as the denominator when the individual curve is to be obtained. By doing so, it is possible to improve the accuracy of the suitable time period of the peak ripeness period.

[0167] The present application claims a priority based on Japanese Patent Application No. 2016-129948 filed with the Japan Patent Office on June 30, 2016, all the contents of which are hereby incorporated by reference.

CLAIMS

1. A peak-ripeness-period calculating method for calculating a suitable time period of a fruit as a peak ripeness period, comprising:

a step of calculating the suitable time period with a peak-ripeness-period calculating algorithm prepared by being associated with an attribute of the fruit;

a step of obtaining evaluation information for evaluating the suitable time period;

a step of correcting the peak-ripeness-period calculating algorithm when the evaluation information satisfies a specific condition; and

a step of calculating a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.

2. The peak-ripeness-period calculating method according to claim 1, wherein

the evaluation information is a ratio of, with respect to a number of the fruit the suitable time period of which has been calculated, a number of fruit an actual suitable time period of which does not overlap with the calculated suitable time period, and

the peak-ripeness-period calculating algorithm is corrected when the evaluation information satisfies the specific condition.

3. The peak-ripeness-period calculating method according to claim 1 or 2, wherein

the peak-ripeness-period calculating algorithm is expressed by

a correlation between a value representing firmness of the fruit and a number of elapsed days after a measurement date on which the firmness has been measured.

4. The peak-ripeness-period calculating method according to claim 3, wherein

the peak-ripeness-period calculating algorithm is

a linear function between the value representing the firmness of the fruit and the number of elapsed days after the measurement date on which the firmness has been measured, the linear function having a negative gradient, and

the suitable time period is

set on the basis of a period expressed by subtracting a smallest value from a largest value of the number of elapsed days corresponding to a specific range of the value representing the firmness.

5. The peak-ripeness-period calculating method according to claim 4, wherein

in a case in which the ratio of, with respect to the number of the fruits f the suitable time period of which has been calculated, the number of the fruit the actual suitable time period of which does not overlap with the suitable time period satisfies the specific condition, and in a case in which the suitable time period is earlier than the actual suitable time period of the fruit, an absolute value of the gradient is set so as to be relatively smaller, and

in a case in which the ratio of, with respect to the number of the fruit the suitable time period of which has been calculated, the number of the fruit the

actual suitable time period of which does not overlap with the suitable time period satisfies the specific condition, and in a case in which the suitable time period is later than the actual suitable time period of the fruit, the absolute value of the gradient is set so as to be relatively larger.

6. The peak-ripeness-period calculating method according to claim 1 or 2, wherein

the peak-ripeness-period calculating algorithm is expressed by

the correlation between the value representing the firmness of the fruit and an integrated value of environment temperature exposed to the fruit after the measurement date on which the firmness has been measured, and

the suitable time period is obtained by

dividing a range of the integrated value corresponding to the specific range of the value representing the firmness by the environment temperature exposed to the fruit.

7. The peak-ripeness-period calculating method according to claim 6, wherein

in a case in which the ratio of, with respect to the number of the fruits f the suitable time period of which has been calculated, the number of the fruit the actual suitable time period of which does not overlap with the suitable time period satisfies the specific condition,

the environment temperature upon the division of the integrated value is changed.

8. The peak-ripeness-period calculating method according to claim 6,

wherein

in a case in which the ratio of, with respect to the number of the fruits f the suitable time period of which has been calculated, the number of the fruit the actual suitable time period of which does not overlap with the suitable time period satisfies the specific condition,

a predetermined value is added or subtracted to or from the suitable time period obtained by dividing the range of the integrated value corresponding to the specific range of the value representing the firmness by the environment temperature exposed to the fruit.

9. The peak-ripeness-period calculating method according to any one of claims 1 to 8, wherein

when a predetermined attribute is obtained, a peak-ripeness-period calculating algorithm associated with an attribute similar to the obtained attribute is extracted from the prepared peak-ripeness-period calculating algorithm, and

the extracted peak-ripeness-period calculating algorithm is applied to calculate the suitable time period.

10. The peak-ripeness-period calculating method according to claim 9, wherein

the attribute includes at least one of a kind of the fruit, a cultivar of the fruit, and a production condition of the fruit.

11. The peak-ripeness-period calculating method according to any one of claims 1 to 10, wherein

the prepared peak-ripeness-period calculating algorithm includes a peak-ripeness-period calculating algorithm derived based on a demonstration experiment.

12. A peak-ripeness-period calculating system for calculating a suitable time period as a peak ripeness period of a fruit, comprising:

an algorithm storage unit in which a peak-ripeness-period calculating algorithm is stored, the peak-ripeness-period calculating algorithm being prepared by being associated with an attribute of the fruit;

a suitable-period calculating unit configured to calculate the suitable time period with the peak-ripeness-period calculating algorithm;

a judgement unit configured to judge whether or not evaluation information satisfies a specific condition, the evaluation information being obtained from an outside for evaluating the suitable time period; and

an algorithm correcting unit configured to correct the peak-ripeness-period calculating algorithm when it is judged that the evaluation information satisfies the specific condition by the judgement unit.

13. The peak-ripeness-period calculating system according to claim 12, further comprising

an algorithm selection unit configured to extract from the algorithm storage unit the peak-ripeness-period calculating algorithm associated with the attribute similar to the obtained attribute, wherein

the suitable-period calculating unit calculates the suitable time period by applying the extracted peak-ripeness-period calculating algorithm.

14. A peak-ripeness-period calculating program causing a computer to function so as to:

calculate, with a peak-ripeness-period calculating algorithm prepared by being associated with an attribute of a fruit, a suitable time period as a peak ripeness period of the fruit;

obtain evaluation information for evaluating the suitable time period;

correct the peak-ripeness-period calculating algorithm when the evaluation information satisfies a specific condition; and

calculate a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.

15. A computer-readable storage medium storing a program causing a computer to function so as to:

calculate, with a peak-ripeness-period calculating algorithm prepared by being associated with an attribute of a fruit, a suitable time period as a peak ripeness period of the fruit;

obtain evaluation information for evaluating the suitable time period;

correct the peak-ripeness-period calculating algorithm when the evaluation information satisfies a specific condition; and

calculate a new suitable time period by using the corrected peak-ripeness-period calculating algorithm.