

METHOD AND DEVICE FOR UNMANNED RETAIL

FIELD OF THE INVENTION

[0001] The present invention relates to the technical field of intelligent control, particularly to a method and a device for unmanned retail.

BACKGROUND OF THE INVENTION

[0002] At present, the operating manner of labor plus system is generally applied in supermarkets, convenience stores, etc. Under this manner, customers need to be served by the staff in order to complete an entire shopping process, which leads to high labor cost. Although unmanned retail has been realized as the appearance of vending machines, problems still exist, e.g., lack of variety for commodities, customers being unable to receive more information about the commodities stored in the cabinet of the vending machines to make a decision to buy them or not.

SUMMARY OF THE INVENTION

[0003] In order to overcome the abovementioned deficiencies in the prior art, an objective of the present invention is to provide a method and a device for unmanned retail, which realize unmanned retail, reduce labor cost, and make it possible for customers to touch and know more about the commodities to make a decision to buy them or not, thereby improving customers' shopping experience.

[0004] An embodiment of the present invention provides a method for unmanned retail, which is applied to an unmanned retail system, wherein the unmanned retail method comprises:

[0005] when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature;

[0006] after it is determined to open the entrance door, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information;

[0007] when the abnormal behavior occurs, broadcasting warning information against the

abnormal behavior;

[0008] when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity;

[0009] generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement; and

[0010] after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave.

[0011] An embodiment of the present invention further provides an unmanned retail device, which is applied to an unmanned retail system, wherein the unmanned retail device comprises:

[0012] a door control module, configured for: when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature;

[0013] a behavior collecting module, configured for: after it is determined to open the entrance door, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information;

[0014] a warning module, configured for: when an abnormal behavior occurs, broadcasting warning information against the abnormal behavior;

[0015] a commodity identifying module, configured for: when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity;

[0016] a settling module, configured for generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement;

[0017] wherein the door control module is further configured for: after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave.

[0018] Compared with the prior art, the present invention has the following beneficial effects:

[0019] Embodiments of the present invention provide a method and a device for unmanned retail. The unmanned retail method is applied to an unmanned retail system. When a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature; after it is determined to open the entrance door, opening the entrance door to let the customer enter; after the customer enters the shopping space, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information; if it is determined that the abnormal behavior occurs, broadcasting warning information against the abnormal behavior; when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity; generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement; and after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave. Therefore, the customer is identified and is able to enter or leave the shopping space through the entrance door or the exit door; the customer is able to know more about the commodities placed in the shopping space, and make a decision to buy them or not; by collecting behavior information, it is possible to timely detect any abnormal behavior during the shopping process; and the customer is able to pay for a selected commodity without using any intelligent device, thus reducing labor cost, and improving the customer's shopping experience.

[0020] To make the aforementioned objectives, features, and advantages of the present invention more obvious and comprehensible, the following describes the present invention in detail with reference to preferred embodiments and accompanying drawings of the present

invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] In order to describe the technical solutions of the embodiments of the present invention more clearly, the drawings in the embodiments will be briefly described below. It should be understood that the following drawings show only some embodiments of the present invention, and therefore should not be considered as a limitation to the scope of the present invention, and a person of ordinary skill in the art may still derive other related drawings according to these drawings without inventive efforts.

[0022] FIG. 1 is a schematic flowchart of an unmanned retail method according to an embodiment of the present invention;

[0023] FIG. 2 is a schematic flowchart of substeps comprised in step S110 in FIG. 1;

[0024] FIG. 3 is a schematic flowchart of substeps comprised in step S120 in FIG. 1;

[0025] FIG. 4 is a schematic flowchart of substeps comprised in step S140 in FIG. 1;

[0026] FIG. 5 is a schematic flowchart of substeps comprised in step S150 in FIG. 1; and

[0027] FIG. 6 is a schematic block diagram of an unmanned retail device according to an embodiment of the present invention.

[0028] Reference signs: 200-unmanned retail device; 210-door control module; 220-behavior collecting module; 230-warning module; 240-commodity identifying module; and 250-settling module.

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENTS

[0029] The technical solutions of the embodiments of the present invention will be clearly and completely explained below in conjunction with the figures of the embodiments. It is apparent that the described embodiments are merely some embodiments of the present invention, but are not to limit the invention in any form. The components of the embodiments of the present invention that are described and shown in the figures herein may be usually arranged and

designed in various different configurations. Therefore, the following detailed descriptions of the embodiments of the present invention are not intended to limit the scope of the claimed present invention, but only to represent the selected embodiments of the present invention. Based on the embodiments of the present invention, all other embodiments that are obtained by a person skilled in the art without inventive efforts fall within the protection scope of the present invention.

[0030] It should be noted that similar reference signs and letters indicate similar items in the following drawings. Once an item is defined in a drawing, it does not need to be further defined and explained in subsequent drawings. Moreover, in the description of the present invention, terms such as “first” and “second” are merely used for differentiating, rather than indicating or implying relative importance.

[0031] Referring to FIG. 1, FIG. 1 is a schematic flowchart of an unmanned retail method according to an embodiment of the present invention. The unmanned retail method is applied to an unmanned retail system. The specific process of the unmanned retail method is described in detail below.

[0032] Step S110: when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature.

[0033] Referring to FIG. 2, FIG. 2 is a schematic flowchart of substeps comprised in step S110 in FIG. 1. Step S110 comprises substep S111, substep S112, and substep S113.

[0034] Substep S111: comparing the obtained biological feature with the biological feature stored in the database to determine whether the database comprises the obtained biological feature or not.

[0035] In this embodiment, as the biological feature in the database is the biological feature of a registered customer, by comparing the obtained biological feature with the biological feature stored in the database, it can be determined whether the customer is registered or not.

[0036] When the database comprises the obtained biological feature, substep S112 is

performed.

[0037] Substep S112: determining to open the entrance door.

[0038] In this embodiment, if the database comprises the obtained biological feature, the customer is registered, then the entrance door shall be opened to let the customer enter the shopping space for shopping. The unmanned retail system may further comprise an entrance electronic lock disposed at the entrance door configured for controlling the entrance door. After it is determined to open the entrance door, a control device controls the entrance electronic lock to open the entrance door.

[0039] When the database does not comprise the obtained biological feature, substep S113 is performed.

[0040] Substep S113: reminding the customer to register, and after a registration is completed, storing registration information to the database and determining to open the entrance door.

[0041] In this embodiment, if the database does not comprise the obtained biological feature, the customer is unregistered. As it is inconvenient for an unregistered customer to pay for a selected commodity, the unregistered customer is not allowed to enter the shopping space. In this case, reminding the customer to register via a display screen. Different routes to registration are provided, e.g., scanning a two-dimensional barcode or visiting a website shown on the display screen, scanning a two-dimensional barcode shown on a picture disposed at the entrance door, etc. During a registration process, it is required to obtain the biological feature of the customer and a payment method (e.g., linking a payment account, or setting a preset payment confirmation gesture, etc.) set by the customer, so that during a commodity settlement process a payment can be made based on the preset payment method. After the registration is completed, storing the registration information to the database, and controlling the entrance door to be opened. The registration information is comprised in customer information.

[0042] Optionally, the unregistered customer can complete the registration via a mobile terminal.

[0043] Further, in an implementation in this embodiment, the customer information further

comprises a no-entering identifier or a normal-entering identifier. After the registration is completed by the customer for the first time, adding a normal-entering identifier to the registration information. If no abnormal behavior of the customer (e.g., damaging a commodity or stealing a commodity) occurs in at least one shopping performed after the registration, the normal-entering identifier in the customer information of the customer remains unchanged. If an abnormal behavior of the customer occurs in the at least one shopping performed after the registration, the normal-entering identifier in the customer information of the customer is updated as the no-entering identifier. Optionally, a reason for no-entering may also be updated to the customer information of the customer.

[0044] When the database comprises the obtained biological feature, if the customer information of the customer comprises the no-entering identifier, determining not to open the entrance door, and informing the customer of the reason for no-entering; if the customer information of the customer comprises the normal-entering identifier, determining to open the entrance door.

[0045] Step S120: after it is determined to open the entrance door, collecting behavior information of the customer during a shopping process, and determining whether the abnormal behavior occurs or not according to the behavior information.

[0046] Referring to FIG. 3, FIG. 3 is a schematic flowchart of substeps comprised in step S120 in FIG. 1. Step S120 comprises substep S121 and substep S122.

[0047] Substep S121: obtaining a behavior type according to the behavior information.

[0048] Substep S122: determining whether or not a behavior of the customer is abnormal according to the behavior type.

[0049] In this embodiment, multiple behavior collectors are disposed in the shopping space. After the entrance door is opened and the customer enters the shopping space, obtaining the behavior information of the customer during the shopping process via the behavior collectors. The control device may comprise a behavior identifying model configured for identifying the behavior. After obtaining the behavior information, the control device obtains the behavior type corresponding to the behavior information via the behavior identifying model.

[0050] In an implementation of this embodiment, the control device stores preset types of abnormal behavior (e.g., stealing a commodity, damaging a commodity, leaving with an unpaid commodity, etc.). When the behavior type belongs to the preset types of abnormal behavior, determining that the behavior is abnormal.

[0051] Step S130: when the abnormal behavior occurs, broadcasting warning information against the abnormal behavior.

[0052] In this embodiment, multiple broadcast devices are disposed in the shopping space. When the customer performs the abnormal behavior, the control device controls the broadcast device to broadcast the warning information against the abnormal behavior. Further, the control device may also control to limit the area, in which the broadcast device broadcasts the warning information against the abnormal behavior, to a place where the customer performing the abnormal behavior is located, so as to warn the customer of the abnormal behavior. If the customer still continues performing the abnormal behavior, the control device may send reminding information against the abnormal behavior to a terminal device of staff, so that the staff is informed of the situation.

[0053] Step S140: when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity.

[0054] Optionally, in an implementation of this embodiment, the unmanned retail system further comprises a settlement sensor (e.g., a human body infrared sensor disposing in a settlement area) communicatively connected to the control device. The control device may sense, by receiving an electric signal sent by the settlement sensor, that the customer needs to perform a settlement.

[0055] Referring to FIG. 4, FIG. 4 is a schematic flowchart of substeps comprised in step S140 in FIG. 1. In this embodiment, the unmanned retail system stores product data of each of all commodities in the shopping space, the product data of each commodity comprises standard weight information and standard image information of the commodity. Optionally, the product

data is stored in the control device. Step S140 comprises substep S141, substep S142, and substep S143.

[0056] Substep S141: comparing the weight information of the to-be-settled commodity with the standard weight information of each of all the commodities in the shopping space, and according to a comparison result, screening out at least one suspected to-be-settled commodity, whose standard weight information is the same as the weight information of the to-be-settled commodity, from all of the commodities in the shopping space.

[0057] Substep S142: calculating an image similarity between the image information of the to-be-settled commodity and the standard image information of the suspected to-be-settled commodity.

[0058] Substep S143: considering the suspected to-be-settled commodity with a highest image similarity as the to-be-settled commodity to identify the to-be-settled commodity.

[0059] In this embodiment, comparing the weight information of the to-be-settled commodity with the standard weight information of each of all the commodities, and considering the commodity, whose standard weight information is the same as the weight information of the to-be-settled commodity, as the suspected to-be-settled commodity. If there is only one suspected to-be-settled commodity, directly considering the suspected to-be-settled commodity as the to-be-settled commodity, thus identifying the to-be-settled commodity.

[0060] If there is more than one suspected to-be-settled commodity, calculating the image similarity between the standard image information of each suspected to-be-settled commodity and the image information of the to-be-settled commodity, and screening out the to-be-settled commodity from the suspected to-be-settled commodities according to the image similarity, thus identifying the to-be-settled commodity.

[0061] Optionally, identifying the to-be-settled commodity merely according to the image information, or identifying the to-be-settled commodity merely according to the weight information. Further, only when failing to identify the to-be-settled commodity according to the image information, identifying the to-be-settled commodity according to a combination of the image information and the weight information.

[0062] In this embodiment, the unmanned retail system further stores the commodity information of each of all the commodities, wherein the commodity information corresponds to the product data; the step of obtaining the commodity information of the to-be-settled commodity comprises:

[0063] In the unmanned retail system, searching for the commodity information corresponding to the product data of the suspected to-be-settled commodity with the highest image similarity, and considering the found commodity information as the commodity information of the to-be-settled commodity.

[0064] Therefore, after the to-be-settled commodity is identified, by the foregoing step of searching, the commodity information of the to-be-settled commodity is obtained. Repeating the foregoing steps, the commodity information of all to-be-settled commodities is obtained. The commodity information comprises but is not limited to a commodity unit price, a commodity name, or the like.

[0065] Step S150: generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement.

[0066] In this embodiment, after obtaining the commodity information of all to-be-settled commodities, generating the shopping list according to the commodity information. A display device is disposed in the settlement area. After the shopping list is generated, sending the shopping list to the display device for displaying to let the customer check the shopping list.

[0067] Referring to FIG. 5, FIG. 5 is a schematic flowchart of substeps comprised in step S150 in FIG. 1. The unmanned retail system stores the database. The database comprises the customer information of the registered customer. The customer information comprises the biological feature, and the payment account and the preset payment confirmation gesture that both correspond to the biological feature. Optionally, the database is stored in the control device. Step S150 comprises substep S151, substep S152, substep S153, and substep S154.

[0068] Substep S151: during the commodity settlement, collecting the biological feature of the

customer.

[0069] Substep S152: matching the biological feature of the customer collected during the commodity settlement with the biological feature of the customer collected at the entrance of the shopping space and stored in the database of the unmanned retail system to obtain the stored payment account and preset payment confirmation gesture of the customer.

[0070] Substep S153: comparing an actual payment confirmation gesture of the customer with the preset payment confirmation gesture stored in the database to determine whether the customer confirms the payment or not.

[0071] Substep S154: when the customer confirms the payment, deducting a payment amount matching the shopping list from the payment account to complete the payment.

[0072] In this embodiment, when the customer is registered, the payment account and the preset payment confirmation gesture for confirming the payment are set as well. After the customer enters the settlement area, obtaining the biological feature of the customer who currently performs the settlement via a camera or other collecting devices disposed in the settlement area. After obtaining the collected biological feature of the customer who currently performs the settlement, searching for the collected biological feature in the database to obtain the customer information corresponding to the collected biological feature, thereby obtaining the stored payment account and preset payment confirmation gesture of the customer.

[0073] After the shopping list is displayed, collecting a behavior image of the customer to obtain the payment confirmation gesture of the customer. Comparing the actual payment confirmation gesture of the customer with the preset payment confirmation gesture of the customer stored in the database; if the actual payment confirmation gesture is the same as the preset payment confirmation gesture stored in the database, the customer confirms the payment. In this case, deducting the payment amount matching the shopping list from the payment account stored in the database, so that the customer completes the payment without using any intelligent device, thereby improving the customer's shopping experience.

[0074] Further, if the payment is successful, displaying information about a payment success via the display device to inform the customer. If the payment is unsuccessful due to an

insufficient balance in the payment account or other factors, displaying information about a payment failure via the display device to inform the customer; the factor for the payment failure may also be displayed, so that the customer can perform the payment in another manner.

[0075] Step S160: after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave.

[0076] In this embodiment, after the customer completes the commodity settlement, the control device receives a notification that the commodity settlement is completed. When detecting that the customer is going to leave, the control device controls the exit door to be opened via an exit electronic lock of the exit door to let the customer leave.

[0077] There are lots of manners of opening the entrance door and the exit door, and the manners are not specifically described herein. The entrance door and the exit door may be the same or different.

[0078] It may be understood that the specific devices of the unmanned retail system described above are only exemplary, and the unmanned retail system may further comprise more or fewer components, or have a configuration different from the foregoing text. The devices may be implemented by using hardware, software, or a combination thereof.

[0079] Referring to FIG. 6, FIG. 6 is a schematic block diagram of an unmanned retail device 200 according to an embodiment of the present invention. The unmanned retail device 200 is applied to an unmanned retail system. The unmanned retail device 200 comprises a door control module 210, a behavior collecting module 220, a warning module 230, a commodity identifying module 240, and a settling module 250. The door control module 210 is configured for: when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature.

[0080] In this embodiment, the unmanned retail system stores a database, the database comprises customer information of a registered customer, and the customer information comprises a biological feature of the registered customer. The manner, in which the door control module 210 is configured for: when the customer is located at the entrance of the shopping space,

collecting the biological feature of the customer, and determining whether or not to open the entrance door according to the biological feature, comprises:

[0081] comparing the obtained biological feature with the biological feature stored in the database to determine whether the database comprises the obtained biological feature or not;

[0082] when the database comprises the obtained biological feature, determining to open the entrance door; and

[0083] when the database does not comprise the obtained biological feature, reminding the customer to register, and after the registration is completed, storing registration information in the database and determining to open the entrance door.

[0084] In this embodiment, the customer information in the database may further comprise a no-entering identifier or a normal-entering identifier; the manner, in which the door control module 210 is configured for: when the customer is located at the entrance of the shopping space, collecting the biological feature of the customer, and determining whether or not to open the entrance door according to the biological feature, further comprises:

[0085] in the case that the database has stored the biological feature, if the customer information of the customer comprises the no-entering identifier, determining not to open the entrance door; and

[0086] in the case that the database has stored the biological feature, if the customer information of the customer comprises the normal-entering identifier, determining to open the entrance door.

[0087] In this embodiment, the door control module 210 is configured for performing step S110 in FIG. 1, and for specific description of the door control module 210, refer to the description of step S110 in FIG. 1.

[0088] The behavior collecting module 220 is configured for: after it is determined to open the entrance door, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information.

[0089] In this embodiment, the manner, in which the behavior collecting module 220 is

configured for collecting the behavior information of the customer during the shopping process and determining whether the abnormal behavior occurs or not according to the behavior information, comprises:

[0090] obtaining a behavior type according to the behavior information; and

[0091] determining whether a behavior of the customer is abnormal or not according to the behavior type.

[0092] In this embodiment, the behavior collecting module 220 is configured for performing step S120 in FIG. 1, and for specific description of the behavior collecting module 220, refer to the description of step S120 in FIG. 1.

[0093] The warning module 230 is configured for: when the abnormal behavior occurs, broadcasting warning information against the abnormal behavior.

[0094] In this embodiment, the warning module 230 is configured for performing step S130 in FIG. 1, and for specific description of the warning module 230, refer to the description of step S130 in FIG. 1.

[0095] The commodity identifying module 240 is configured for: when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity.

[0096] In this embodiment, the unmanned retail system stores a product data of each of all commodities in the shopping space, the product data of each commodity comprises standard weight information and standard image information of the commodity; the manner, in which the commodity identifying module 240 is configured for identifying the to-be-settled commodity according to the image information and the weight information, comprises:

[0097] comparing the weight information of the to-be-settled commodity with the standard weight information of each of all the commodities in the shopping space, and according to a comparison result, screening out at least one suspected to-be-settled commodity, whose standard weight information is the same as the weight information of the to-be-settled commodity, from

all of the commodities in the shopping space;

[0098] calculating an image similarity between the image information of the to-be-settled commodity and the standard image information of the suspected to-be-settled commodity; and

[0099] considering the suspected to-be-settled commodity with a highest image similarity as the to-be-settled commodity to identify the to-be-settled commodity.

[0100] In this embodiment, the unmanned retail system further stores commodity information of each of all the commodities in the shopping space, wherein the commodity information corresponds to the product data of the commodity; the manner, in which the commodity identifying module 240 is configured for obtaining the commodity information of the to-be-settled commodity, comprises:

[0101] in the unmanned retail system, searching for the commodity information corresponding to the product data of the suspected to-be-settled commodity with the highest image similarity, and considering the found commodity information as the commodity information of the to-be-settled commodity.

[0102] In this embodiment, the commodity identifying module 240 is configured for performing step S140 in FIG. 1, and for specific description of the commodity identifying module 240, refer to the description of step S140 in FIG. 1.

[0103] The settling module 250 is configured for generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement.

[0104] In this embodiment, the customer information further comprises a payment account and a preset payment confirmation gesture that both correspond to the biological feature. The manner, in which the settling module 250 is configured for identifying the payment confirmation gesture of the customer to complete the commodity settlement, comprises:

[0105] during the commodity settlement, collecting the biological feature of the customer;

[0106] matching the biological feature of the customer collected during the commodity settlement with the biological feature of the customer collected at the entrance of the shopping

space and stored in the database of the unmanned retail system to obtain the stored payment account and preset payment confirmation gesture of the customer;

[0107] comparing an actual payment confirmation gesture of the customer with the preset payment confirmation gesture stored in the database to determine whether the customer confirms the payment or not; and

[0108] when the customer confirms the payment, deducting a payment amount matching the shopping list from the payment account to complete the payment.

[0109] In this embodiment, the settling module 250 is configured for performing step S150 in FIG. 1, and for specific description of the settlement module 250, refer to the description of step S150 in FIG. 1.

[0110] The door control module 210 is further configured for: after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave.

[0111] In this embodiment, the door control module 210 is further configured for performing step S160 in FIG. 1, and for specific description of the access control module 210, refer to the description of step S160 in FIG. 1.

[0112] Based on the above, embodiments of the present invention provide a method and a device for unmanned retail. The unmanned retail method is applied to an unmanned retail system. When a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature; after it is determined to open the entrance door, opening the entrance door to let the customer enter; after the customer enters the shopping space, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information; if it is determined that the abnormal behavior occurs, broadcasting warning information against the abnormal behavior; when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity; generating a shopping list according to the obtained commodity

information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement; and after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave. Therefore, the customer is identified and is able to enter or leave the shopping space through the entrance door or the exit door; the customer is able to know more about the commodities placed in the shopping space, and make a decision to buy them or not; by collecting behavior information, it is possible to timely detect any abnormal behavior during the shopping process; and the customer is able to pay for a selected commodity without using any intelligent device, thus reducing labor cost, and improving the customer's shopping experience.

[0113] In addition, during the entire shopping process, an unregistered customer simply needs to register and perform a payment confirmation gesture, while a registered customer simply needs to perform a payment confirmation gesture, so that the commodity settlement can be completed. No other intelligent terminal device is needed in the entire shopping process, and a long wait time for commodity settlement by staff is avoided, thereby improving the customer's shopping experience.

[0114] The foregoing descriptions are merely preferred embodiments of the present invention, and are not intended to limit the present invention. For a person skilled in the art, the present invention may have various modifications and changes. Any modification, equivalent replacement, improvement, or the like made within the spirit and principle of the present invention should fall within the protection scope of the present invention.

CLAIMS

1. An unmanned retail method, characterized in that the unmanned retail method is applied to an unmanned retail system, and the unmanned retail method comprises:

when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature;

after it is determined to open the entrance door, collecting behavior information of the customer during a shopping process, and determining whether an abnormal behavior occurs or not according to the behavior information;

when the abnormal behavior occurs, broadcasting warning information against the abnormal behavior;

when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity;

generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement; and

after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave;

the unmanned retail system stores a database, the database comprises customer

information of a registered customer, the customer information comprises the biological feature of the registered customer, and a payment account and a preset payment confirmation gesture that both correspond to the biological feature; and the step of identifying the payment confirmation gesture of the customer to complete the commodity settlement comprises:

during the commodity settlement, collecting the biological feature of the customer;

matching the biological feature of the customer collected during the commodity settlement with the biological feature of the customer collected at the entrance of the shopping space and stored in the database of the unmanned retail system to obtain the stored payment account and the preset payment confirmation gesture of the customer;

comparing an actual payment confirmation gesture of the customer with the preset payment confirmation gesture stored in the database to determine whether the customer confirms the payment or not; and

when the customer confirms the payment, deducting a payment amount matching the shopping list from the payment account to complete the payment.

2. The unmanned retail method as claimed in claim 1, characterized in that the unmanned retail system stores product data of each of all commodities in the shopping space; the product data of each commodity comprises standard weight information and standard image information of the commodity; and the step of

identifying the to-be-settled commodity according to the image information and the weight information comprises:

comparing the weight information of the to-be-settled commodity with the standard weight information of each of all the commodities in the shopping space, and according to a comparison result, screening out at least one suspected to-be-settled commodity, whose standard weight information is the same as the weight information of the to-be-settled commodity, from all of the commodities in the shopping space;

calculating an image similarity between the image information of the to-be-settled commodity and the standard image information of the suspected to-be-settled commodity; and

considering the suspected to-be-settled commodity with a highest image similarity as the to-be-settled commodity to identify the to-be-settled commodity.

3. The unmanned retail method as claimed in claim 2, characterized in that the unmanned retail system further stores the commodity information of each of all the commodities in the shopping space; the commodity information corresponds to the product data of the commodity; and the step of obtaining the commodity information of the to-be-settled commodity comprises:

in the unmanned retail system, searching for the commodity information corresponding to the product data of the suspected to-be-settled commodity with the highest image similarity, and considering the found commodity information as

the commodity information of the to-be-settled commodity.

4. The unmanned retail method as claimed in claim 1, characterized in that the step of when the customer is located at the entrance of the shopping space, collecting the biological feature of the customer, and determining whether or not to open the entrance door according to the biological feature, comprises:

comparing the obtained biological feature with the biological feature stored in the database to determine whether the database comprises the obtained biological feature or not;

when the database comprises the obtained biological feature, determining to open the entrance door; and

when the database does not comprise the obtained biological feature, reminding the customer to register, and after the registration is completed, storing registration information in the database and determining to open the entrance door.

5. The unmanned retail method as claimed in claim 4, characterized in that the customer information further comprises a no-entering identifier or a normal-entering identifier; and the step of when the customer is located at the entrance of the shopping space, collecting the biological feature of the customer, and determining whether or not to open the entrance door according to the biological feature, further comprises:

in the case that the database has stored the biological feature, if the customer

information of the customer comprises the no-entering identifier, determining not to open the entrance door; and

in the case that the database has stored the biological feature, if the customer information of the customer comprises the normal-entering identifier, determining to open the entrance door.

6. The unmanned retail method as claimed in claim 1, characterized in that the step of collecting the behavior information of the customer during the shopping process, and determining whether the abnormal behavior occurs or not according to the behavior information, comprises:

obtaining a behavior type according to the behavior information; and

determining whether or not a behavior of the customer is abnormal according to the behavior type.

7. An unmanned retail device, characterized in that the unmanned retail device is applied to an unmanned retail system, and the unmanned retail device comprises:

a door control module, configured for: when a customer is located at an entrance of a shopping space, collecting a biological feature of the customer, and determining whether or not to open an entrance door according to the biological feature;

a behavior collecting module, configured for: after it is determined to open the entrance door, collecting behavior information of the customer during a shopping

process, and determining whether an abnormal behavior occurs or not according to the behavior information;

a warning module, configured for: when the abnormal behavior occurs, broadcasting warning information against the abnormal behavior;

a commodity identifying module, configured for: when a commodity settlement needs to be performed, obtaining image information and weight information of a to-be-settled commodity, identifying the to-be-settled commodity according to the image information and the weight information, and obtaining commodity information of the to-be-settled commodity;

a settling module, configured for generating a shopping list according to the obtained commodity information, displaying the shopping list, and identifying a payment confirmation gesture of the customer to complete the commodity settlement;

wherein the door control module is further configured for: after the commodity settlement is completed, controlling an exit door to be opened to let the customer leave;

the unmanned retail system stores a database, the database comprises customer information of a registered customer, the customer information comprises the biological feature, and a payment account and a preset payment confirmation gesture that both correspond to the biological feature; the manner, in which the settling module is configured for identifying the payment confirmation gesture of the customer to complete the commodity settlement, comprises:

during the commodity settlement, collecting the biological feature of the customer;

matching the biological feature of the customer collected during the commodity settlement with the biological feature of the customer collected at the entrance of the shopping space and stored in the database of the unmanned retail system to obtain the stored payment account and preset payment confirmation gesture of the customer;

comparing an actual payment confirmation gesture of the customer with the preset payment confirmation gesture stored in the database to determine whether the customer confirms the payment or not; and

when the customer confirms the payment, deducting a payment amount matching the shopping list from the payment account to complete the payment.

8. The unmanned retail device as claimed in claim 7, characterized in that the unmanned retail system stores product data of each of all commodities in the shopping space, the product data of each commodity comprises standard weight information and standard image information of the commodity, and the manner, in which the commodity identifying module is configured for identifying the to-be-settled commodity according to the image information and the weight information, comprises:

comparing the weight information of the to-be-settled commodity with the standard weight information of each of all commodities in the shopping space, and

according to a comparison result, screening out at least one suspected to-be-settled commodity, whose standard weight information is the same as the weight information of the to-be-settled commodity, from all of the commodities in the shopping space;

calculating an image similarity between the image information of the to-be-settled commodity and the standard image information of the suspected to-be-settled commodity; and

considering the suspected to-be-settled commodity with a highest image similarity as the to-be-settled commodity to identify the to-be-settled commodity.

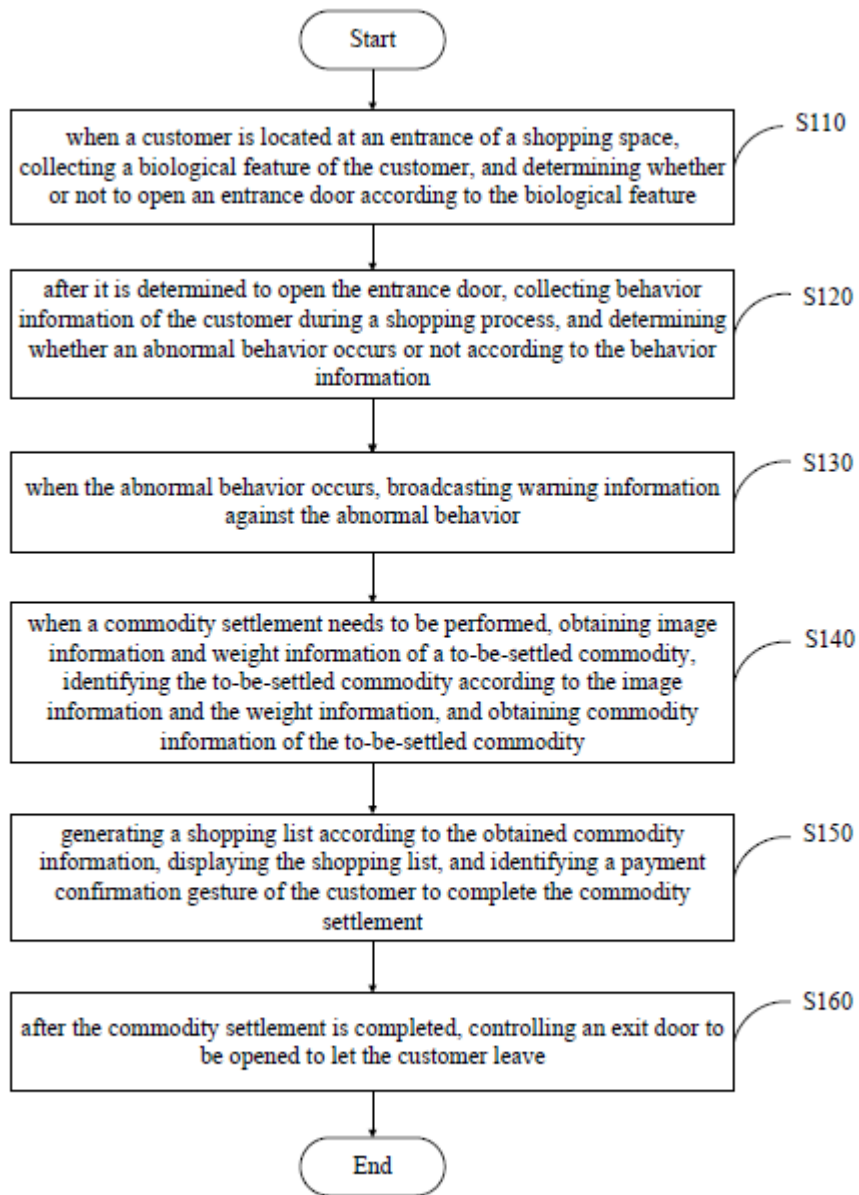


Fig. 1

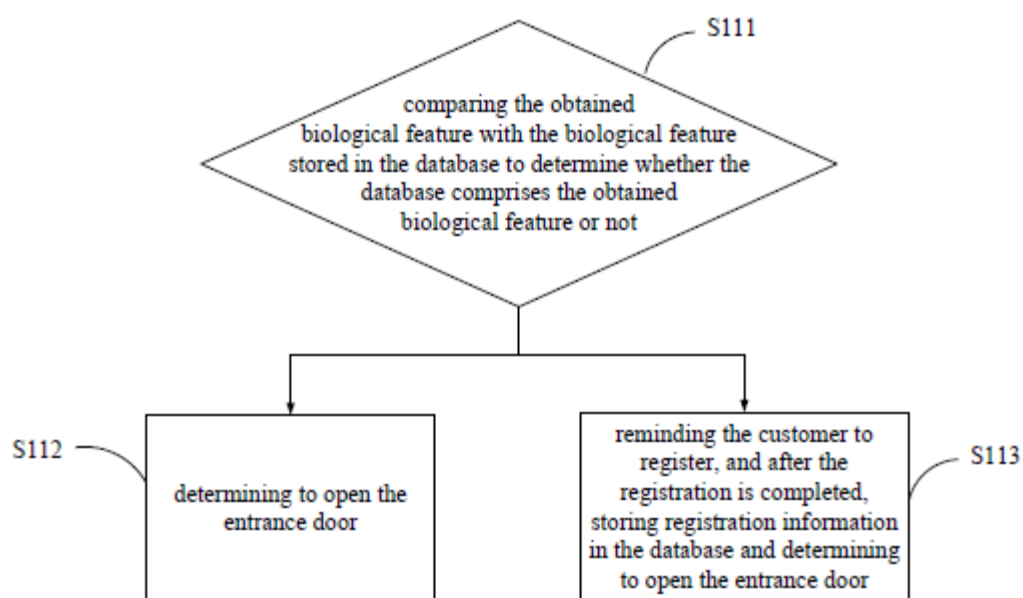


Fig. 2

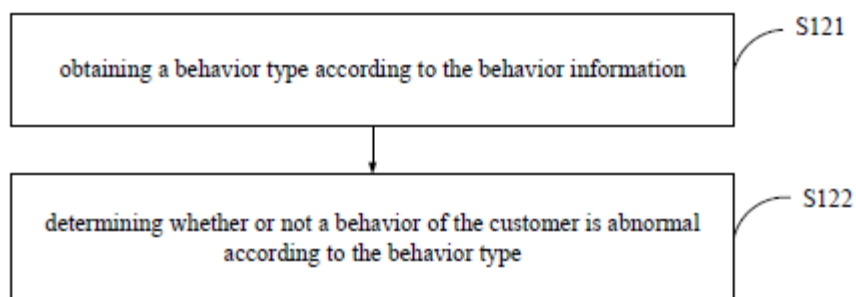


Fig. 3

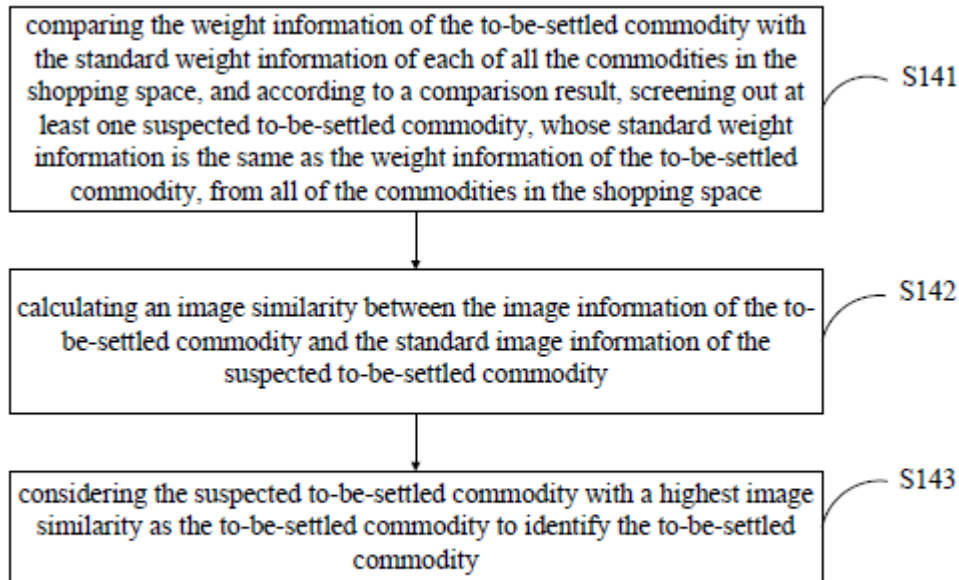


Fig. 4

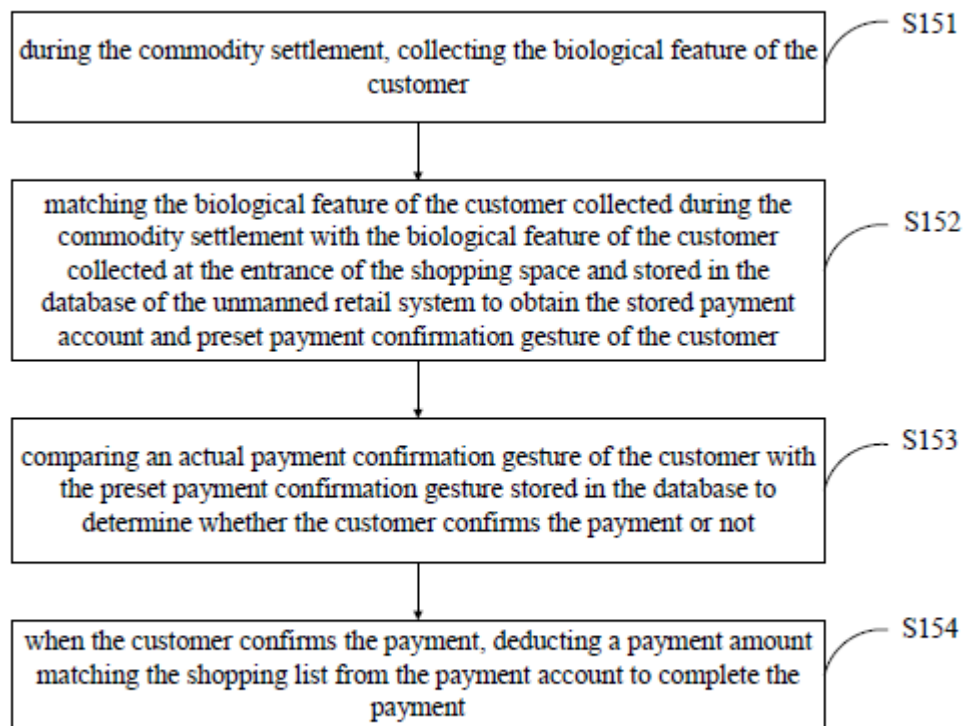


Fig. 5

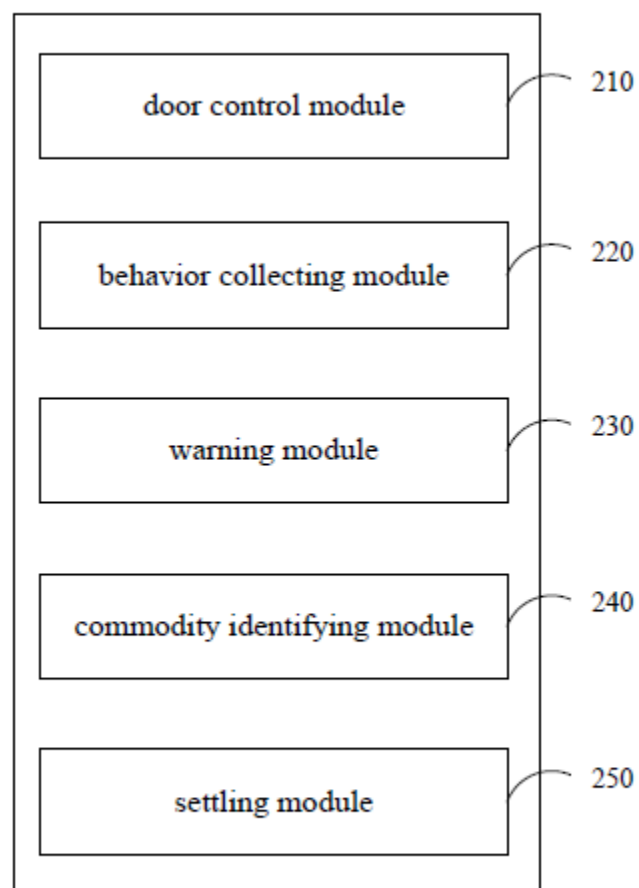
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Fig. 6