such as a person or baskets moving in a shop, defining a region of the moving object, and imaging the moving object while keeping tracking movement of the moving object;

a shelf product recognition means for constantly imaging a state of a shelf in the shop, comparing captured images before and after an object is taken out from the shelf, defining a region of a product of a recognition target from the images, and specifying a product from the defined image region; and

a checkout means for checking out the specified product.

[0006A]

In another aspect, there is provided an information processing system used when a person moves and purchases a first object as a product in a shop regardless of whether a person carries an information terminal and a container. The information processing system can include:

- a moving object tracking unit, when the person is discovered as the moving object, an individual identifier used only in the shop is assigned, and the moving object is tracked while updating a position information in association with the identifier;
- an object entering/leaving detecting unit for detecting entry/leaving of the first object into/from a predetermined area;
- a product specifying unit that attempts to specify the first object as a product that is a candidate for purchase in response to detection by the object entering/leaving

detecting unit without an operation to make the person determine when specifying the product;

- an associating unit that associates the moving object with the first object that has been detected to enter and leave; and
- a remote-control unit having a remote-control function capable of resolving a predetermined error state from inside and outside the shop via a communication means, which may occur in a state where the first object and the moving object are associated with each other by the associating unit.

Effects of the Invention

[0007]

According to the present invention, it is possible to provide an information processing system which is capable of implementing automation of payment for products and reduction of a time taken for paying for products when purchasers purchase products displayed in shops and preventing misbehaviors by shoppers or cash register personnel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a diagram illustrating a list of main points of first to fourth embodiments of an information processing system according to the present invention.

Fig. 2 is a diagram illustrating a layout example of a convenience store employing a product recognition system in a first embodiment.

Fig. 3 is a schematic perspective view illustrating a

shelf camera-based product specifying unit 3603, a moving object product associating unit 3604, a moving object-associated product list management unit 3606, a shelf camera-based object entering/leaving detecting unit 3608, a product unspecifying determining unit 3609, a label recognizing unit 3610, and a discount seal recognizing unit 3611 illustrated in Fig. 36.

[0261]

In the CPU 501 of the checkout gate 5, as illustrated in Fig. 33, a checkout unit 535, an input control unit 536, and an output control unit 537 function.

[0262]

When the moving object region being continuously tracked enters the checkout area 45, the checkout unit 535 receives the product information (a list of products) associated with one or more moving object regions from the server 1 via the communication unit 509, and determines a checkout amount and checkout target products. The input control unit 536 receives a signal from the input unit 506 such as the checkout button or the information reading unit installed in the gate main body. The output control unit 537 causes the checkout amount to be displayed on the output unit 507, outputs information to the checkout device 5a, and causes the opening/closing member to be opened or closed.

[0263]

Further, when the moving object Mo being continuously tracked, that is, a person who makes a payment enters the

In step S407, the shelf camera-based product specifying unit 3603 specifies the product to which the object belongs, similarly to the third embodiment. If the specified product is the selling-restricted product, the selling-restricted product is associated with the moving object Mo. Further, even when the product to which the object belongs is unable to be specified, the object of product unspecifying is associated with the moving object Mo. Information indicating that the error state caused by the product unspecifying is presented to the information terminal 9a, the information terminal 9b, and the server 1, and the clerk Mt who has recognized the error state may resolve the error state by remote control (naturally, the clerk Mt may directly release the error state). Further, in step S407, the label recognizing unit may recognize the associated label depending on the specified product. Further, in step S407, the discount seal recognizing unit may recognize the attached discount seal depending on the specified product. In step S407, the ceiling camera-based product specifying unit may specify the product for the object region acquired by the ceiling camera-based object acquisition recognizing unit.

[0281]

In step S408, the moving object Mo product associating unit 354 associates the moving object Mo with the specified product.

[0282]

In step S409, the moving object-associated product list management unit 355 keeps managing the product list associated

CLAIMS

1. An information processing system used when a person moves and purchases a first object as a product in a shop regardless of whether a person carries an information terminal and a container, the information processing system comprising:

a moving object tracking unit, when the person is discovered as the moving object, an individual identifier used only in the shop is assigned, and the moving object is tracked while updating a position information in association with the identifier.

an object entering/leaving detecting unit for detecting entry/leaving of the first object into/from a predetermined area;

a product specifying unit that attempts to specify the first object as a product that is a candidate for purchase in response to detection by the object entering/leaving detecting unit without an operation to make the person determine when specifying the product;

an associating unit that associates the moving object with the first object that has been detected to enter and leave; and

a remote-control unit having a remote-control function capable of resolving a predetermined error state from inside and outside the shop via a communication means, which may occur in a state where the first object and the moving object are associated with each other by the associating unit.

2. The information processing system according to claim 1, wherein

one or more of each of the first objects is arranged in a predetermined place including shelves as a product for sale in a shop, the predetermined area is an area indicating the place.

3. The information processing system according to claim 1 or 2, wherein the product specifying unit attempts to specify the first object as a product via a predetermined image processing method.

4. The information processing system according to any one of claims 1 to 3, further comprising

a product specifying unit that attempts to specify the first object as a product via verification function by matching product candidates listed by different algorithms.

5. The information processing system according to any one of claims 1 to 4, further comprising

a display unit that presents a checkout amount determined from the information of the product specified.

6. The information processing system according to any one of claims 1 to 5, further comprising

a checkout unit that performs a checkout process for the product associated with the moving object as a checkout for the person.

7. The information processing system according to any one of claims 1 to 6, wherein

the moving object tracking unit assigns the identifier to each of the one or more moving objects, and groups the one or more moving objects using the identifier.

8. The information processing system according to any one of claims 1 to 7, further comprising

an acquisition unit that acquires information about the moving object.

9. The information processing system according to any one of claims 1 to 8, wherein

when the first object associated with the moving object to be tracked is transferred to a person different from the moving object, the moving object tracking unit recognizes its mode, the person different from the moving object is specified as a new moving object, and the new moving object is set as a tracking target; and

the associating unit associates the transferred first object with the new moving object.

10. The information processing system according to any one of claims 1 to 9, further comprising

a first error display unit configured to present that there is a predetermined error condition, if the first object is a selling-restricted product and the person has a possibility of subject to selling restriction.

11. The information processing system according to any one of claims 1 to 10, wherein

the associating unit associates the first object that fails in attempts to specify the product by the product specifying unit with the moving object; and

the information processing system further comprises a second error display unit configured to present a predetermined error condition if attempts to specify the product by the product specifying unit fails.

12. The information processing system according to any one of claims 1 to 11, wherein

the moving object tracking unit further includes a clerk identifying means, tracks the moving object with the person moving in the shop where clerk exists as the moving object, and identifies between the clerk and the moving object.

13. The information processing system according to any one of claims 1 to 12, further comprising

an inventory information update means, wherein

one or more of each of the first objects is arranged in a predetermined place including shelves as a product for sale in a shop, the predetermined area is an area indicating the place,

the inventory information update means manages the inventory of each product on the place and entire shop, and when a predetermined product is purchased, the inventory of each of the place and the entire shop where the predetermined product exists is updated; and

when the inventory quantity of each product on the place or the entire shop satisfies a predetermined requirement, execution of at least one of notification to the remote-control unit and automatic ordering is controlled.

14. The information processing system according to any one of claims 1 to 13, further includes

an attribute estimation function that estimates the attribute of the person.

15. The information processing system according to any one of claims 1 to 14, wherein

the moving object tracking unit registers history information indicating a movement path of the moving object during tracking.

16. The information processing system according to any one of claims 1 to 15, wherein

the product specifying unit includes

a first specifying means that obtains a result of an attempt to specify the first object as the product using a first method in which a person who visually inspect visually confirms an image containing the first object as a subject; and

a second specifying means that attempts to specify the first object as the product by using a second method other than the first method, the second method verifies a match when specified the product for images in a plurality of scenes including the first object as a subject, and wherein

the product specifying unit specifies the product based on the result of at least one of the first specifying means and the second specifying means.

17. The information processing system according to any one of claims 1 to 16, wherein

the moving object tracking unit tracks, as the moving object, a second object that moves with the person instead of the person.