DOCUMENT SORTING METHOD, DEVICE, SYSTEM AND COMPUTER-READABLE STORAGE MEDIUM

TECHNICAL FIELD

The present disclosure relates generally to a technical field of document production device, and more particularly, to a document sorting method, a document sorting device, a document sorting system and a computer-readable storage medium.

BACKGROUND

In the process of document production, it is necessary to typewrite and print personal information on document surface to distinguish the ownership of the document. After processing the personal information of the document, it is necessary to classify and package the document, so as to deliver the document to corresponding document issuance authority or directly to the individual.

In the common process of document classification and sorting, the document check-out manners are classified before production. That is to say, if the document is applied for in place A, the document is produced at a document production authority, and then returned to place A. While, if the user applies for the document in place A and needs to acquire the document in place B, the document needs to be returned to place A after production, and then delivered from place A to place B. As a result, the process of document delivery to user is cumbersome. In additional, during the document delivery process, the document should be identified and delivered manually, which is difficult to ensure the efficiency of document sorting and the accuracy of document delivery. On the other hand, the common sorting and

classification of document employ manual packaging operation. The long period of mechanized work is prone to operational errors. Accordingly, the wrong issuance of document or the missing issuance of document happen frequently. Therefore, there is still a lack of a method that can improve the efficiency and accuracy of document sorting.

SUMMARY

The object of the present disclosure is to provide a document sorting method, a document sorting device, a document sorting system and a computer-readable storage medium, aiming at the technical problem discussed above.

In a first aspect, a document sorting method is provided, including:

generating a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate a feeding area;

determining document information of at least one document of a delivery device and acquiring feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area; and

determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, and generating a corresponding document storage instruction according to the target box.

In an embodiment of this disclosure, determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, includes:

when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box;

on the contrary, when there is no box information which is corresponding to the feature information in the plurality of pieces of the box information, acquiring the document storage box with the box information that the document storage box is stored with no document, and determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box.

In an embodiment of this disclosure, determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box, includes:

when there are a plurality of document storage boxes with the box information that the document storage box is stored with no document, determining the document storage box, which is adjacent to the delivery device from the plurality of document storage boxes, as the target box.

In an embodiment of this disclosure, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, includes:

when there are a plurality of pieces of the box information which are corresponding to the feature information, acquiring storage state information in each piece of the box information which is corresponding to the feature information, and determining the document storage box with a smallest storage quantity in the storage state information as the target box; or

when there are a plurality of pieces of the box information which are corresponding to the feature information, acquiring storage state information in each piece of the box information which is corresponding to the feature information, and determining the document storage box with a greatest storage quantity in the storage state information as the target box; or

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining the document storage box, which is adjacent to the delivery device, from the plurality of document storage boxes with the plurality of pieces of the box information which are corresponding to the feature information, as the target box.

In an embodiment of this disclosure, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, includes:

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining the document storage box, which is adjacent to the delivery device, as the target box.

In an embodiment of this disclosure, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, includes:

when there is just one piece of the box information which is corresponding to the feature information, determining the document storage box with the box information which is corresponding to the feature information, as the target box; and

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining arbitrary one document storage box with the box information which is corresponding to the feature information, as the target box.

In an embodiment of this disclosure, generating a parking instruction according to box information of a plurality of document storage boxes, includes:

acquiring storage state information in each piece of the box information, and determining the document storage box with a smallest storage quantity in the storage state information; and

determining an area which is adjacent to the document storage box with the smallest storage quantity as the feeding area, and generating the parking instruction.

In an embodiment of this disclosure, the document sorting method further includes:

acquiring all areas for parking, and determining an unoccupied area as the feeding area.

In an embodiment of this disclosure, the document sorting method further includes:

when a new document storage box is detected, acquiring box information of the new document storage box;

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box includes no feature information, determining feature information with a highest frequency according to the document information of all stored documents, and adding or replacing said feature information into the box information of the new document storage box.

In an embodiment of this disclosure, the document sorting method further includes:

when a new document storage box is detected, acquiring box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box.

In an embodiment of this disclosure, the document sorting method further includes:

when a new document storage box is detected, acquiring box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box includes no feature information, determining feature information with a highest frequency according to the document information of all the stored documents, and adding or replacing said feature information into the box information of the new document storage box.

In a second aspect, a document sorting device is provided, including:

at least one document sorting cabinet, each document sorting cabinet is arranged with a plurality of holding grooves, which are configured to locate and place a document storage box, and at least one side of the document sorting cabinet is arranged with a feeding area;

an identification mechanism, which is arranged at the document sorting cabinet;

a mechanical arm, which is arranged adjacent to the identification mechanism, and configure to clamp a document; and

a main control circuit, which is electrically connected with the document sorting cabinet, the identification mechanism and the mechanical; wherein, the main

control circuit is configured to generate a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate the feeding area, the main control circuit is further configured to determine document information of at least one document of the delivery device and acquire feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area; the main control circuit is further configured to determine one document storage box as a target box according to the feature information and a plurality of pieces of the box information, and generate a corresponding document storage instruction according to the target box;

the mechanical arm is configured to execute the document storage instruction.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets, which are arranged side by side.

In an embodiment of this disclosure, a slide rail is arranged between two adjacent document sorting cabinets and the mechanical arm is slidably arranged at the slide rail.

In an embodiment of this disclosure, the document sorting device includes at least one document sorting cabinets, two identification mechanisms and two mechanical arms;

wherein one identification mechanism and one mechanical arm are arranged at one end of the document sorting cabinet, and the other one identification mechanism and the other one mechanical arm are arranged at the other end of the document sorting cabinet.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets, two identification mechanisms and two mechanical arms;

the plurality of document sorting cabinets are arranged in a straight line;

wherein one identification mechanism and one mechanical arm are arranged at one end of the document sorting cabinet which is arranged at one end of the straight line, and the other one identification mechanism and the other one mechanical arm are arranged at one end of the document sorting cabinet which is arranged at the other end of the straight line.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets, two identification mechanisms and two mechanical arms;

the plurality of document sorting cabinets are arranged in parallel;

one identification mechanism and one mechanical arm are arranged at a same end of the plurality of document sorting cabinets, and the other one identification mechanism and the other one mechanical arm are arranged at the other end of the plurality of document sorting cabinets.

In an embodiment of this disclosure, the document sorting cabinet includes a conveyor and a lifting mechanism, the lifting mechanism is located under the conveyor, and the document storage box is corresponding to the conveyor.

In a third aspect, a document sorting system is provided, including a delivery device and a document sorting device which is arranged with a feeding area at least one side;

the delivery device is configured to deliver a document;

the document sorting device is configured to generate a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate the feeding area, determine document information of at least one document of the delivery device and acquire feature information according to the document information, receiving an signal indicating that the delivery device is parked at the feeding area, determine one document storage box as a target box according to the feature information and a plurality of

pieces of the box information, and generate a corresponding document storage instruction according to the target box.

In a fourth aspect, a computer-readable storage medium, which stores a computer program, is disclosed, when the computer program is executed by a processor, the computer program enables the processor to execute steps of the document sorting method.

The embodiments of this disclosure has the following beneficial effects. This disclosure provides a document sorting method. In which, the box information of a plurality of document storage boxes is acquired to obtain the storage state of each document storage box for determining the feeding area, so that the feeding area can be adjacent to the document storage box with good storage state. For example, the document storage boxes with the storage quantity of the document, which is in a certain difference range of the average or median, can be determined from the box information of the plurality of document storage boxes and these document storage boxes can be determined as the document storage boxes with a better storage state than other document storage boxes. The positions of these document storage boxes with the better storage state can be determined to acquire an area which is adjacent to these document storage boxes as the feeding area. In this way, the delivery device can deliver the document to the feeding area, thus realizing the delivery of the document and improving the efficiency of the document storage to the document storage box. Furthermore, when receiving an signal indicating that the delivery device is parked at the feeding area, the document information of the document delivered by the delivery device can be obtained by scanning the document on the delivery device one by one, or the acquiring corresponding document information from the delivery device in batches. Then the feature information of the document to be sorted can be determined according to the document information, so as to realize the automatic sorting of the document in batches according to the feature

information and reduce the manual intervention, improve the sorting efficiency and reduce the occurrence of wrong operation. Further, one document storage box is determined as the target box according to the feature information and the plurality of pieces of the box information, and a corresponding document storage instruction is generated according to the target box, so that the document can be stored in the corresponding document storage box. The document sorting method in this disclosure realizes automatic sorting of documents in batches, reduces manual intervention, improves sorting efficiency and reduces the occurrence of misoperation.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to more clearly illustrate the technical solution in the embodiment of the present disclosure, the drawings used in the embodiments or prior arts will be briefly introduced. It is obvious that the drawings in the following description are only some embodiments of the present disclosure. For ordinary technicians in the present art, they can also obtain other drawings without paying creative labor according to these drawings.

Figure 1 is a flowchart of a document sorting method in an embodiment of this disclosure.

Figure 2 is another flowchart of a document sorting method in an embodiment of this disclosure.

Figure 3 is another further flowchart of a document sorting method in an embodiment of this disclosure.

Figure 4 is a structural diagram of a document sorting device in an embodiment of this disclosure.

Figure 5 is a frame diagram of a document sorting device in an embodiment of this disclosure.

Figure 6 is a frame diagram of a document sorting device in another embodiment of this disclosure.

Figure 7 is a frame diagram of a document sorting device in further embodiment of this disclosure.

Figure 8 is a frame diagram of a document sorting device in another further embodiment of this disclosure.

Figure 9 is a structure block diagram of a computer device in an embodiment of this disclosure.

The reference number for each component in the drawings are as follows.

Reference number	Name	Reference number	Name
1	Document sorting cabinet	4	Mechanical arm
11	Feeding area	5	conveyor
2	Document storage box	6	Lifting mechanism
3	Identification mechanism	7	Delivery device

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In order to make the object, technical scheme and advantages of the present disclosure clearer, the present disclosure will be further described in detail in combination with the drawings and the embodiments. It should be understood that the specific embodiments described herein are only used to explain the present disclosure and are not used to limit the present disclosure.

It should be noted that when an element/component is mentioned as being "fixed" or "arranged" on another element/component, it can be directly on another element/component or it may be indirectly fixed or arranged at another

element/component through a third element/component. When an element/component is mentioned as being "connected" with another element/component, it may be directly connected with another element/component or it may be indirectly connected to another element/component through a third component.

It should be noted that the technical terms, such as “length”, “width”, “upper”, “lower”, “front”, “back”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “inner”, “outer”, indicating the orientation or position relationship are based on the orientation or position relationship shown in the attached drawings. They are just for the description convenience and simplifying, rather than indicating or implying that the device or element referred to must have the specific orientation, or be constructed and operated in the specific orientation, and cannot be understood as the limitation of the present disclosure.

In addition, the terms "first" and "second" are used for descriptive purposes only and cannot be understood as indicating or implying the relative importance or implicitly indicating the number of technical features. Thus, the features defined with "first" and "second" can explicitly or implicitly include one or more of these features. In the description of the present disclosure, “several” or “a plurality of” means two or more, unless otherwise is specifically defined. In addition, the meaning of "and/or" in this disclosure includes three parallel schemes. Take "A and/or B as an example", which includes scheme A, or scheme B, or a scheme that both A and B satisfy. In addition, the technical solutions of various embodiments can be combined with each other, however, such combination should substrate on the realization of common technical personnel in the art. When the combination of technical solutions is contradictory or impossible to achieve, it should be considered that the combination of such technical solutions does not exist and never falls into the protection scope required by this disclosure.

The embodiment of this disclosure discloses a document sorting device, which is configured to implement a document sorting method of this disclosure. It can be understood that the document sorting method shown in the embodiment can be executed by a server or by electronic devices such as a document sorting device, which is not limited here, that is, a software corresponding to the document sorting method shown in the embodiment can be loaded on the server, one or more electronic devices, such as document sorting devices, there is no limitation for this here. This embodiment takes the application on a background server as an example to explain.

The embodiment of this disclosure is a document sorting method, which is applied to a document sorting device. As shown in Figure 1, Figure 4, Figure 5, Figure 6, Figure 7 and Figure 8, the document sorting device at least includes: a document sorting cabinet 1, a document storage box 2, an identification mechanism 3 and a mechanical arm 4. Optionally, the document sorting cabinet 1 and/or mechanical arm 4 can load the document sorting method, and then cooperate with each other to deliver the documents to the document storage box 2 of the corresponding document sorting cabinet 1 to realize the document sorting operation for a plurality of documents in batches. At the same time, it is also convenient for the operator to lift the document storage box 2 to realize the cross-region delivery of documents and effectively improve the efficiency of document sorting and classification.

In order to improve the efficiency of document classification and sorting, this disclosure proposes a document sorting method in combination with Figure 1 to reduce manual operation and improve the efficiency and accuracy of document sorting. The document sorting method includes the following steps: generating a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate a feeding area;

determining document information of at least one document of a delivery device and acquiring feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area; and determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, and generating a corresponding document storage instruction according to the target box.

In this embodiment, the box information of a plurality of document storage boxes is acquired to obtain the storage state of each document storage box for determining the feeding area, so that the feeding area can be adjacent to the document storage box with good storage state. For example, the document storage boxes with the storage quantity of the document, which is in a certain difference range of the average or median, can be determined from the box information of the plurality of document storage boxes and these document storage boxes can be determined as the document storage boxes with a better storage state than other document storage boxes. The positions of these document storage boxes with the better storage state can be determined to acquire an area which is adjacent to these document storage boxes as the feeding area. In this way, the delivery device can deliver the document to the feeding area, thus realizing the delivery of the document and improving the efficiency of the document storage to the document storage box. Furthermore, when receiving an signal indicating that the delivery device is parked at the feeding area, the document information of the document delivered by the delivery device can be obtained by scanning the document on the delivery device one by one, or the acquiring corresponding document information from the delivery device in batches. Then the feature information of the document to be sorted can be determined according to the document information, so as to realize the automatic sorting of the document in batches according to the feature information and reduce the manual intervention, improve the sorting efficiency and reduce the occurrence

of wrong operation. Further, one document storage box is determined as the target box according to the feature information and the plurality of pieces of the box information, and a corresponding document storage instruction is generated according to the target box, so that the document can be stored in the corresponding document storage box. The document sorting method in this disclosure realizes automatic sorting of documents in batches, reduces manual intervention, improves sorting efficiency and reduces the occurrence of misoperation.

Specifically, in step S101, a parking instruction is generated according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate a feeding area.

It can be understood that the box information of each document storage box can be acquired, and then identified and calculated to obtain storage state information and then determine a storage quantity of the storage state information of each document storage box. Then the median and average for the storage quantity of the plurality of document storage boxes, are determined and taken as a reference value. Then the document storage boxes with the storage quantity, which is greater than or smaller than the median or average for a preset threshold range, can be determined as the document storage boxes with a better storage state than other document storage boxes. Such that, the better feeding area is determined and the parking instruction is generated according to the position of the feeding area.

The preset threshold can be any value of 3, 5, 10, 15, 20, 30 and 40. Take the value of 5 as an example. When the difference between the storage quantity of documents stored in the document storage box and the median or average is within 5, the corresponding document storage box belongs to the document storage box with a better storage state than other document storage boxes.

In another embodiment, after acquiring the document storage box with the better storage state based on the above, the area which is adjacent to the delivery

device and corresponding to the document storage box can be selected as the feeding area. Optionally, arrangement state of the document storage boxes with better storage state are determined, and if there are several document storage boxes arranged in a centralized way, the area which is adjacent to these centralized document storage boxes, is selected as the feeding area.

In another embodiment, when all the document storage boxes are newly placed, and each document storage box has no stored document, any area which is adjacent to the delivery device can be randomly defined as the feeding area.

In another embodiment, if the delivery device has recorded the document information of the delivered document, that is, without taking out the document on the delivery device, the document information of the delivered document of the delivery device can be known, and the adjacent area corresponding to the document storage box associated with the document information can be selected as the feeding area.

Based on the above, the document information of all the documents delivered by the delivery device can be acquired and the feature information of the document information can be extracted to accumulate the same feature information, and a corresponding document storage box is matched based on the feature information with a highest frequency. The adjacent area corresponding to the corresponding document storage box is used as the feeding area. Among them, if there are a plurality of corresponding document storage boxes, the adjacent area corresponding to the document storage box with the better storage state is selected as the feeding area. Optionally, a quantity of the documents to be sorted and a quantity of the documents which can be further stored by the document storage box, are compared. When they are matched with each other, the adjacent area, which is corresponding to the document storage box having the matched quantities, is selected as the feeding area. Of course, the adjacent area, which is corresponding to the document storage

box having a greater storage quantity comparing with quantity of the documents to be sorted, can also be selected as the feeding area. Alternatively, when the storage quantities of the documents which can be further stored by all the document storage boxes, are respectively smaller or greater than the quantity of the documents to be sorted, the adjacent area which is corresponding to arbitrarily one document storage box can be randomly selected as the feeding area. The above is one of the schemes that can realize this embodiment, and its specific implementation scheme is not limited here.

In step 102, document information of at least one document of a delivery device is determined and feature information is determined according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area. When there is no delivery device parked in the feeding area, the feeding area is monitored at a predetermined time interval. When there is no delivery device driving in exceeding a predetermined time period, an indication instruction can be selectively generated to determine whether there is a device error.

Based on the above step S102, document information of at least one document of a delivery device is determined and feature information is determined according to the document information.

In step S103, one document storage box is determined as a target box according to the feature information and a plurality of pieces of the box information, and a corresponding document storage instruction is generated according to the target box. The following embodiments are provided.

In one embodiment, the document information of the document delivered by the delivery device can be acquired one by one, and then the corresponding target box can be matched one by one to realize the storage of the document.

In another embodiment, the document information of the document delivered by the delivery device can be acquired in batches, which can be understood as having the following options.

In option 1, the delivery device can be arranged to store the document information of the delivered document, and the delivery device can broadcast and send out the document information.

In option 2, when the document is placed on the delivery device, the document information of the document can be partially exposed to facilitate identification by the identification mechanism. The identification mechanism can be arranged as a camera or a card reader.

In an embodiment of this disclosure, as shown in Figure 2, in step S103, determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, includes;

S1031, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box. That is to say, when the box information of the document storage box has information corresponding to the feature information, it is determined that the document storage box is used to store such document, and the corresponding document storage box is used as the target box, so that the documents can be stored in the corresponding document storage box. In this way, human operations are effectively reduced, automatic document sorting is realized, and the accuracy and efficiency of sorting are improved.

Understandably, when there are a plurality of document storage boxes whose box information corresponds to the feature information, arbitrary one document storage box, or the document storage box nearest to the feeding area, can be selected as the target box.

On the contrary, determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, includes;

S1032, when there is no box information which is corresponding to the feature information in the plurality of pieces of the box information, acquiring the document storage box with the box information that the document storage box is stored with no document, and determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box.

Understandably, when there is no document storage box that can be used to store corresponding document, a new unused document storage box can be determined as the target box to store such document. In order to avoid that the quantity of document features is greater than the quantity of document storage boxes that can store the documents, it is generally understood that the quantity of document storage boxes can be freely expanded according to actual requirements.

On the other hand, the box information of the document storage box can be defined to contain corresponding feature information when placing a new document storage box. For example, the box information of the new document storage box can determine that the document storage box can be used to document with feature information of category A.

In an embodiment of this disclosure, determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box, includes:

when there are a plurality of document storage boxes with the box information that the document storage box is stored with no document, determining the document storage box, which is adjacent to the delivery device from the plurality of document storage boxes, as the target box.

In this way, the rapid delivery of documents to the target box is facilitated, the efficiency of document storage to the target box, as well as the efficiency of document sorting, are improved.

In one embodiment of this disclosure, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, includes following embodiments.

In the first embodiment, when there are a plurality of pieces of the box information which are corresponding to the feature information, storage state information in each piece of the box information, which is corresponding to the feature information, is acquired, and the document storage box with a smallest storage quantity in the storage state information is determined as the target box. In this way, a better document storage box can be selected to store document and realize the balanced storage of documents in the plurality of document storage boxes. That is to say, the storage quantity of documents stored in the document storage box that stores the same type of documents should reach a relatively balanced value as far as possible. When sorting operations are completed, it is convenient for the operator to take away the plurality of document storage boxes that are full or nearly full of the same type of documents at one time, thus improving the utilization rate of the document storage box, and also reducing the times of users for checking the state of the document storage box.

In the second embodiment, when there are a plurality of pieces of the box information which are corresponding to the feature information, storage state information in each piece of the box information, which is corresponding to the feature information, is acquired. Then the document storage box with a greatest storage quantity in the storage state information is determined as the target box to facilitate the principle of first storing and first taking away, and the operator can take

away the document storage box in batches, thus improving the mobility and flexibility of document delivery.

In the third embodiment, when there are a plurality of pieces of the box information which are corresponding to the feature information, the document storage box, which is adjacent to the delivery device, is determined as the target box. That is, the document storage box adjacent to the delivery device is determined as the target box for reducing the time of document delivery and improving the efficiency of document sorting.

In an embodiment of this disclosure, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, includes:

when there is just one piece of the box information which is corresponding to the feature information, determining the document storage box with the box information which is corresponding to the feature information, as the target box;

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining arbitrary one document storage box with the box information which is corresponding to the feature information, as the target box; and/or

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining one document storage box which is adjacent to the delivery device, as the target box.

In an embodiment of this disclosure, generating a parking instruction according to box information of a plurality of document storage boxes, includes: acquiring storage state information in each piece of the box information, and determining the document storage box with a smallest storage quantity in the storage state information; and determining an area which is adjacent to the document storage box

with the smallest storage quantity as the feeding area, and generating the parking instruction.

In this embodiment, the area of the document storage box with the smallest storage quantity is determined as the feeding area, and the parking instruction is generated so that the document storage box corresponding to the area where the delivery device can be parked is the document storage box with a better storage state. That is, in general, the document storage box with smaller storage quantity can contain more documents, so that the documents can be directly delivered from the delivery device to the nearest document storage box, thus reducing the long-distance document storage.

In an optional embodiment of this disclosure, when there are more than two document storage boxes with the minimum storage quantity, the area adjacent to any one document storage box can be selected as the feeding area to facilitate the parking of the delivery device.

In an embodiment of this disclosure, the document sorting method further includes: acquiring all areas for parking, and determining an unoccupied area as the feeding area.

In this embodiment, in combination with all the above embodiments, the optimal area may be parked by other delivery device. Accordingly, all the areas for parking the delivery device can be acquired and then the unoccupied area can be selected to replace the original feeding area with a new feeding area, so as to effectively park the delivery device and avoid the occurrence of the queuing and parking accident of the delivery devices.

In an embodiment of this disclosure, combined with Figure 3, the document sorting method further includes: when a new document storage box is detected, acquiring box information of the new document storage box; when storage state information of the box information of the new document storage box is arranged as

that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box; and/or, when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box includes no feature information, determining feature information with a highest frequency according to the document information of all the stored documents, and adding or replacing said feature information into the box information of the new document storage box.

The above scheme can be disassembled as follows:

step S301, when a new document storage box is detected, acquiring box information of the new document storage box;

step S302, when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box; and/or

step S303, when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box includes no feature information, determining feature information with a highest frequency according to the document information of all the stored documents, and adding or replacing said feature information into the box information of the new document storage box.

Based on the above steps S301 to S303, it can be understood that the document sorting device applied in this scheme has a removable document storage box

structure, which can replace a new document storage box according to the storage state of the document storage box, thus effectively improving the mobility of document delivery, so that the document storage box full or nearly full of documents can be replaced in time, thus improving the efficiency of document sorting.

Optionally, the new document storage box can also be a document storage box with box information of preset corresponding feature information.

Optionally, whether to assign the feature information corresponding to the box information of the new document storage box, can be determined according to the documents to be stored. That is, the feature information of the corresponding document in the box information of the document storage box can be determined during the process of document sorting, which effectively improves the flexibility of document sorting, that is, to allocate resources reasonably when needed.

This disclosure further proposes a document sorting device, which is used to implement above the document sorting method, in combination with Figure 4, Figure 5, Figure 6, Figure 7 and Figure 8. Therefore, the document sorting device has the beneficial effect brought by the document sorting method, which is not described here. The device includes:

at least one document sorting cabinet 1, each document sorting cabinet 1 is arranged with a plurality of holding grooves, which are configured to locate and place the document storage box, and at least one side of the document sorting cabinet 1 is arranged with the feeding area 11;

an identification mechanism 3, which is arranged at the document sorting cabinet 1;

a mechanical arm 4, which is arranged adjacent to the identification mechanism 3, and configure to clamp the document; and

a main control circuit, which is electrically connected with the document sorting cabinet 1, the identification mechanism 3 and the mechanical arm 4; wherein,

the main control circuit is configured to generate the parking instruction according to box information of the plurality of document storage boxes, wherein the parking instruction is configured to indicate a feeding area 11, the main control circuit is further configured to determine the document information of at least one document of the delivery device and acquire the feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area 11; the main control circuit is further configured to determine one document storage box as the target box according to the feature information and the plurality of pieces of the box information, and generate the corresponding document storage instruction according to the target box; the mechanical arm 4 is configured to execute the document storage instruction.

In this embodiment, the document is delivered to the feeding area 11 corresponding to the document sorting cabinet 1 through the delivery device 7, the mechanical arm 4 clamps the document corresponding to the identification mechanism 3, and the identification mechanism 3 identifies the document identification to acquire the document information, and acquires the feature information through the processing and analysis of the main control circuit, and further determines the document storage box 2 that can be used to store this type of document, thus realizing the storage of the document.

In an embodiment of this disclosure, the feeding area 11 of the document sorting cabinet 1 can be understood as the area for parking the delivery device 7.

Optionally, the feeding area 11 of the document sorting cabinet 1 corresponds to the mechanical arm 4. When the delivery device parks at the feeding area 11, it can correspond to the mechanical arm 4 to facilitate the mechanical arm 4 to pick up the document.

Optionally, the document sorting cabinet 1 is provided with at least one feeding area corresponding the mechanical arm 4.

Optionally, the document sorting cabinet 1 is provided with a plurality of feeding area corresponding the mechanical arm 4.

Optionally, the identification mechanism 3 and the mechanical arm 4 can be structures which are combinedly mounted.

Based on the above embodiment, during the process of document storage, the document is delivered to the document storage box 2 in the following way.

In the first embodiment, the mechanical arm 4 is configured to directly clamp and deliver the document to the corresponding document storage box 2.

In the second embodiment, a conveyor 5 is arranged at the document sorting cabinet 1 to deliver the document to the corresponding document storage box 2.

In addition, on the basis of the second embodiment, in order to facilitate the smooth entry of documents into the document storage box 2, a lifting mechanism 6 can be arranged at the document sorting cabinet 1. The lifting mechanism 6 is arranged corresponding to the conveyor 5. The lifting mechanism 6 can consistently deliver the documents at the conveyor 5, so that the documents can enter the document storage box 2.

Optionally, the lifting mechanism 6 can be a matching structure of a cylinder and a lifting block. Optionally, the lifting mechanism 6 can be a matching structure of an electric cylinder and a lifting block.

Optionally, the document sorting device is further in communication connection with a server. The server can also be loaded with the document sorting method to coordinate with the document sorting device to realize the document sorting.

In an optional embodiment of this disclosure, the mechanical arm 4 can be arranged independently of the document sorting cabinet 1 and the identification mechanism 3.

In an embodiment of this disclosure, the document sorting cabinet 1 is connected with the identification mechanism 3 and the mechanical arm 4 sequentially.

In an optional embodiment of this disclosure, the identification mechanism 3 can be arranged as a combination of one or more card readers and/or camera modules. For example, the identification mechanism 3 can be arranged as an OCR reader, wireless card reader, camera, etc.

In an embodiment of this disclosure, as shown in Figure 7 and Figure 8, the document sorting device includes a plurality of document sorting cabinets 1 which are arranged side by side, or arranged in a straight line.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets 1, wherein some document sorting cabinets 1 are arranged side by side, and the others are arranged in a straight line. That is to say, there are multiple channels which are composed of the plurality of document sorting cabinets 1, for sorting documents.

Based on the above, when the plurality of document sorting cabinets 1 are arranged side by side, the document sorting device can only be arranged with one mechanical arm 4. A slide rail is provided between the two adjacent document sorting cabinets 1, and the mechanical arm 4 is slidably arranged at the slide rail. Such that, one mechanical arm 4 can slide back and forth between the two document sorting cabinets 1 along the slide rail. Alternatively, each document sorting cabinet 1 can be arranged with one mechanical arm 4.

Similarly, the plurality of document sorting cabinets can also be arranged with only one identification mechanism 3. Alternatively, each document sorting cabinet 1 can be arranged with one identification mechanism 3.

In an embodiment of this disclosure, the document sorting device includes at least one document sorting cabinet 1, two identification mechanisms 3 and two

mechanical arm 4. One identification mechanism 3 and one mechanical arm 4 are arranged at one end of the document sorting cabinet 1, while the other identification mechanism 3 and the other mechanical arm 4 are arranged at the other end of the document sorting cabinet 1. It can be understood that the identification mechanism 3 and mechanical arm 4 are arranged at both ends of the document sorting cabinet 1, so that the delivery device 7 can be parked at both ends, thus improving the document sorting speed, as well as the efficiency of document sorting.

In an embodiment of this disclosure, the corresponding mechanical arm 4 of the document sorting cabinet 1 is provided with at least one feeding area 11. The feeding area 11 is a spatial area under the mechanical arm 4, rather than a specific structure, and the feeding area 11 can be understood as at least one or more areas in which the mechanical arm 4 can clamp documents.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets 1, two identification mechanisms 3 and two mechanical arm 4. The plurality of document sorting cabinets 1 are arranged side by side, one identification mechanism 3 and one mechanical arm 4 are arranged at a same end of the plurality of document sorting cabinets 1, and the other one identification mechanism 3 and mechanical arm 4 are arranged at the other end of the plurality of document sorting cabinets 1.

In an embodiment of this disclosure, the document sorting device includes a plurality of document sorting cabinets 1, two identification mechanisms 3 and two mechanical arms 4. The plurality of document sorting cabinets 1 are arranged in parallel, one identification mechanism 3 and one mechanical arm 4 are arranged at a same end of the plurality of document sorting cabinets 1, and the other one identification mechanism 3 and the other mechanical arm 4 are arranged at the other end of the plurality of document sorting cabinets 1.

In an embodiment of this disclosure, the document sorting device includes: a plurality of document sorting cabinets 1, two identification mechanisms 3 and two mechanical arms 4. The plurality of document sorting cabinets 1 are arranged in a straight line, one identification mechanism 3 and one mechanical arm 4 are arranged at one end of the document sorting cabinet at one end of the straight line, and the other one identification mechanism 3 and the other mechanical arm 4 are arranged at one end of the document sorting cabinet which is arranged at the other end of the straight line. In other words, on the basis of Figure 6, a plurality of document sorting cabinets 1 are added, and the plurality of document sorting cabinets 1 are arranged in a straight line.

In an embodiment of this disclosure, the document sorting device includes: a plurality of document sorting cabinets 1, one identification mechanism 3 and one mechanical arm 4. The plurality of document sorting cabinets 1 are arranged side by side, and the one identification mechanism 3 and one mechanical arm 4 are arranged at the same end of the plurality of document sorting cabinets 1.

In an embodiment of this disclosure, the document sorting device includes: a plurality of document sorting cabinets 1, one identification mechanism 3 and one mechanical arm 4. The plurality of document sorting cabinets 1 are arranged in a straight line, wherein one identification mechanism 3 and one mechanical arm 4 are arranged at one end of the document sorting cabinet 1 which is arranged at one end of the straight line.

In an embodiment of this disclosure, the document sorting cabinet 1 includes a conveyor 5 and a lifting mechanism 6. The lifting mechanism 6 is located below the conveyor 5, and the document storage box 2 is located above the conveyor 5. The conveyor 5 is corresponding to a plurality of document storage boxes 2.

In an embodiment of this disclosure, the document sorting cabinet 1 includes a plurality of conveyor 5 and a plurality of lifting mechanisms 6, and the plurality of

conveyor 5 are arranged in parallel. The plurality of lifting mechanisms 6 are arranged under one conveyor 5, and the plurality of lifting mechanisms 6 are arranged at intervals along the transmission direction of the conveyor 5.

In an embodiment of this disclosure, the document sorting device can be arranged inside a same or adjacent building of the document production device. After the document is produced by the document production device, it is delivered to the document sorting device through the delivery device, and picked up and transported by the mechanical arm to the document sorting cabinet.

This disclosure further proposes a document sorting system. As shown in Figure 4, the document sorting system is configured to implement the document sorting method. Therefore, the document sorting system has the beneficial effect brought by the document sorting method, which is not described here. The document sorting system includes a delivery device 7 and a document sorting device. At least one side of the document sorting device is provided with the feeding area 11. The delivery device 7 is configured to deliver the document.

The document sorting device is configured to generate the parking instruction according to the box information of the plurality of document storage boxes 2, wherein the parking instruction is configured to indicate the feeding area 11, determine document information of at least one document of the delivery device and acquire the feature information according to the document information, receiving an signal indicating that the delivery device 7 is parked at the feeding area 11, determine one document storage box 2 as the target box according to the feature information and a plurality of pieces of the box information, and generate the corresponding document storage instruction according to the target box.

Optionally, the delivery device 7 can be configured as a vehicle or robot that carries the document to move.

Figure 9 is a structure block diagram of a computer device in an embodiment of this disclosure. The computer device can be either a terminal or a server. As shown in Figure 9, the computer device includes a processor, a memory and a network interface connected through a system bus. The memory includes non-volatile storage medium and an internal memory. The nonvolatile storage medium of the computer device stores an operating system, as well as a computer program. When the computer program is executed by a processor, the computer program enables the processor to execute steps of the document sorting method. The computer program can also be stored in the internal memory. When the computer program is executed by a processor, the computer program enables the processor to execute steps of the document sorting method. Those skilled in the art can understand that the structure shown in Figure 9 is only a block diagram of a part of the structure related to the solution of this disclosure, and does not constitute a limitation of the computer device applied to the solution of this disclosure. The specific computer device can include more or fewer components than shown in the figure, or combine some components, or have different component arrangements.

In one embodiment, a computer-readable storage medium is proposed, which stores a computer program. When the computer program is executed by the processor, the processor executes the steps of the method shown in Figure 1.

Those skilled in the art can understand that all or some processes in the methods of the above embodiments can be completed by implementing a computer program through a relevant hardware. The computer program can be stored in a non-volatile computer-readable storage medium. When the computer program is executed, it can include the processes in the embodiments of the above methods. Among them, any reference to memory, storage, database or other media used in the embodiments provided by this disclosure can include non-volatile and/or volatile memory. Non-volatile memory may include read-only memory (ROM), programmable ROM

(PROM), electrically programmable ROM (EPROM), electrically erasable programmable ROM (EEPROM) or flash memory. Volatile memory may include random access memory (RAM) or external cache memory. As an illustration but not a limitation, RAM is available in many forms, such as static RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), dual data rate SDRAM (DDRSDRAM), enhanced SDRAM (ESDRAM), synchronous link DRAM (SLDRAM), memory bus (Iambus) direct RAM (RDRAM), direct memory bus dynamic RAM (DRDRAM), and memory bus dynamic RAM (RDRAM).

The technical features of the above embodiments can be combined arbitrarily. In order to make the description concise, not all possible combinations of the technical features in the above embodiments are described. However, as long as the combination of these technical features is not contradictory, it should be considered as falling into the scope of this description.

The above embodiments only express several embodiments of this disclosure, and their descriptions are more specific and detailed. Accordingly, these embodiments cannot be understood as restrictions on the scope of this disclosure. It should be pointed out that for those skilled in the art, without departing from the concept of this disclosure, they can also make various changes and improvements, which are within the protection scope of this disclosure. Therefore, the protection scope of the patent in this disclosure shall be subject to the appended claims.

CLAIMS

1. A document sorting method, comprising:

generating a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate a feeding area;

determining document information of at least one document of a delivery device and acquiring feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area; and

determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, and generating a corresponding document storage instruction according to the target box.

2. The document sorting method to claim 1, wherein determining one document storage box as a target box according to the feature information and a plurality of pieces of the box information, comprises:

when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box;

on the contrary, when there is no box information which is corresponding to the feature information in the plurality of pieces of the box information, acquiring the document storage box with the box information that the document storage box is stored with no document, and determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box.

3. The document sorting method to claim 2, wherein determining arbitrary one document storage box with the box information that the document storage box is stored with no document, as the target box, comprises:

when there are a plurality of document storage boxes with the box information that the document storage box is stored with no document, determining the document

storage box, which is adjacent to the delivery device from the plurality of document storage boxes, as the target box.

4. The document sorting method to claim 2, wherein, when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, comprises:

when there are a plurality of pieces of the box information which are corresponding to the feature information, acquiring storage state information in each piece of the box information which is corresponding to the feature information, and determining the document storage box with a smallest storage quantity in the storage state information as the target box; or

when there are a plurality of pieces of the box information which are corresponding to the feature information, acquiring storage state information in each piece of the box information which is corresponding to the feature information, and determining the document storage box with a greatest storage quantity in the storage state information as the target box; or

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining the document storage box, which is adjacent to the delivery device, from the plurality of document storage boxes with the plurality of pieces of the box information which are corresponding to the feature information, as the target box.

5. The document sorting method to claim 2, wherein when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, comprises:

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining the document storage box, which is adjacent to the delivery device, as the target box.

6. The document sorting method to claim 2, wherein when there is at least one piece of the box information which is corresponding to the feature information, determining the document storage box which is corresponding to the feature information as the target box, comprises:

when there is just one piece of the box information which is corresponding to the feature information, determining the document storage box with the box information which is corresponding to the feature information, as the target box; and

when there are a plurality of pieces of the box information which are corresponding to the feature information, determining arbitrary one document storage box with the box information which is corresponding to the feature information, as the target box.

7. The document sorting method to claim 1, wherein generating a parking instruction according to box information of a plurality of document storage boxes, comprises:

acquiring storage state information in each piece of the box information, and determining the document storage box with a smallest storage quantity in the storage state information; and

determining an area which is adjacent to the document storage box with the smallest storage quantity as the feeding area, and generating the parking instruction.

8. The document sorting method to claim 7, wherein the document sorting method further comprises:

acquiring all areas for parking, and determining an unoccupied area as the feeding area.

9. The document sorting method to claim 1, wherein the document sorting method further comprises:

when a new document storage box is detected, acquiring box information of the new document storage box;

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box comprises no feature information, determining feature information with a highest frequency according to the document information of all stored documents, and adding or replacing said feature information into the box information of the new document storage box.

10. The document sorting method to claim 1, wherein the document sorting method further comprises:

when a new document storage box is detected, acquiring box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with at least one document, acquiring feature information according to the document information of the document, and adding or replacing the feature information into the box information of the new document storage box.

11. The document sorting method to claim 1, wherein the document sorting method further comprises:

when a new document storage box is detected, acquiring box information of the new document storage box; and

when storage state information of the box information of the new document storage box is arranged as that the document storage box is stored with no document and the box information of the new document storage box comprises no feature information, determining feature information with a highest frequency according to the document information of all the stored documents, and adding or replacing said feature information into the box information of the new document storage box.

12. A document sorting device, comprising:

at least one document sorting cabinet, each document sorting cabinet is arranged with a plurality of holding grooves, which are configured to locate and place a document storage box, and at least one side of the document sorting cabinet is arranged with a feeding area;

an identification mechanism, which is arranged at the document sorting cabinet;

a mechanical arm, which is arranged adjacent to the identification mechanism, and configure to clamp a document; and

a main control circuit, which is electrically connected with the document sorting cabinet, the identification mechanism and the mechanical; wherein, the main control circuit is configured to generate a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate the feeding area, the main control circuit is further configured to determine document information of at least one document of the delivery device and acquire feature information according to the document information, when receiving an signal indicating that the delivery device is parked at the feeding area; the main control circuit is further configured to determine one document storage box as a target box according to the feature information and a

plurality of pieces of the box information, and generate a corresponding document storage instruction according to the target box;

the mechanical arm is configured to execute the document storage instruction.

13. The document sorting device according to claim 12, wherein the document sorting device comprises a plurality of document sorting cabinets, which are arranged side by side.

14. The document sorting device according to claim 13, wherein a slide rail is arranged between two adjacent document sorting cabinets and the mechanical arm is slidably arranged at the slide rail.

15. The document sorting device according to claim 12, wherein the document sorting device comprises at least one document sorting cabinets, two identification mechanisms and two mechanical arms;

wherein one identification mechanism and one mechanical arm are arranged at one end of the document sorting cabinet, and the other one identification mechanism and the other one mechanical arm are arranged at the other end of the document sorting cabinet.

16. The document sorting device according to claim 12, wherein the document sorting device comprises a plurality of document sorting cabinets, two identification mechanisms and two mechanical arms;

the plurality of document sorting cabinets are arranged in a straight line;

wherein one identification mechanism and one mechanical arm are arranged at one end of the document sorting cabinet which is arranged at one end of the straight line, and the other one identification mechanism and the other one mechanical arm are arranged at one end of the document sorting cabinet which is arranged at the other end of the straight line.

17. The document sorting device according to claim 12, wherein the document sorting device comprises a plurality of document sorting cabinets, two identification mechanisms and two mechanical arms;

the plurality of document sorting cabinets are arranged in parallel;

one identification mechanism and one mechanical arm are arranged at a same end of the plurality of document sorting cabinets, and the other one identification mechanism and the other one mechanical arm are arranged at the other end of the plurality of document sorting cabinets.

18. The document sorting device according to claim 12, wherein the document sorting cabinet comprises a conveyor and a lifting mechanism, the lifting mechanism is located under the conveyor, and the document storage box is corresponding to the conveyor.

19. A document sorting system comprising a delivery device and a document sorting device which is arranged with a feeding area at least one side;

the delivery device is configured to deliver a document;

the document sorting device is configured to generate a parking instruction according to box information of a plurality of document storage boxes, wherein the parking instruction is configured to indicate the feeding area, determine document information of at least one document of the delivery device and acquire feature information according to the document information, receiving an signal indicating that the delivery device is parked at the feeding area, determine one document storage box as a target box according to the feature information and a plurality of pieces of the box information, and generate a corresponding document storage instruction according to the target box.

20. A computer-readable storage medium, which stores a computer program, wherein the computer program is executed by a processor, the computer program

enables the processor to execute steps of the document sorting method according to any one of claims 1-11.