IMAGE PROCESSING METHOD FOR SUPERVISORY CONTROLLER OF ELEVATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image processing method for a supervisory controller of an elevator, and more particularly, to an improved image processing method for a supervisory controller of an elevator which is capable of effectively performing supervisory and security functions by displaying an internal condition of the elevator as an image.

2. Description of the Prior Art

According to a rapid development of a personal computer (PC) and applied techniques thusly corresponding thereto, the apparatuses having multifunction such as convenience, expansibility and security are increasingly required.

Especially, the importance of safety and security of a moving device (for example, an elevator) directly linked with human life is increasingly raised.

As shown in Figure 1, a supervisory controller of an elevator according to the conventional art includes elevator controllers 120a,...,120n provided in each elevator, and communication interfaces 110a,...,110n for undertaking a communication between the elevator controllers 120a,...,120n

and a management room 100.

The management room 100 includes a central processor 101 for processing all kinds of information on an elevator, a supervisory device 102 for displaying the information processed in the central processor 101, an input unit 103 and an output unit 104. The central processor 101 includes a communication card 10 for carrying out a serial communication with the communication interfaces 110a,...,110n, and a central processing unit 11 (hereinafter, called CPU) and a memory 12.

The operation of a supervisory controller of an elevator according to the conventional art having the above construction will now be described in detail.

First, the elevator controllers 120a,...,120n output control data to control the elevators and output data on an operating condition.

The data on the operating condition is converted into a numerical unit through each communication interface 110a,...,110n and the data converted into a numerical unit is transmitted to the CPU 11 in the central processor 101 through the communication card 10.

The CPU 11 re-processes the numerical data inputted through the communication card 10 to store in the memory 12 each kind of faults of an elevator, a supervision of an operation, a control history and a condition information, and outputs information on an operation condition of an elevator

to the supervisory device 102 to perform a supervisory function.

That is, the CPU 11 displays the operation condition on the supervisory device 102, and performs a controlling operation through the input unit 103 and then outputs data on a control history to the output unit 104.

Each management and controlling through the input unit 103 is performed by controlling the elevator controllers 120a,...,120n through the communication card 10 if a specific event occurs.

However, since the conventional supervisory controller of an elevator performs a supervisory function on a fault or an operation of an elevator, when a sudden accident occurs in the elevator, a passenger pushes an emergency call button positioned in the elevator and only verbally communicates with the management room through an interphone, to his disadvantage.

Accordingly, since a supervisor cannot see the internal condition of the elevator and depends only on a verbal communication to observe the condition occurring in the elevator, he or she cannot properly judge and cope with a present accident, and especially, when the passenger cannot use the emergency call button, no action can be taken at all.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved image processing method for a supervisory controller of an elevator which is capable of reading at a time all information on a specific cage by supervising a condition in the elevator through an image input processor and storing an image inputted through the image input unit.

To achieve the above object, in a supervisory controller of an elevator which includes an image input unit and an image processor in a plurality of elevators, respectively, in order to supervise and control an operating and internal condition of an elevator, there is provided an improved image processing method for a supervisory controller of an elevator according to the present invention which includes receiving an image from an image input unit every predetermined time, re-processing the inputted image data to be a value of a representative color and performing an image precompression, removing similarities and redundancies from the image precompression, and comparing an image from which similarities and redundancies are removed with the value of the representative color and storing a using frequency of the representative color.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood

from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, wherein:

Figure 1 is a block diagram showing a supervisory controller of an elevator according to the conventional art;

Figure 2 is a block diagram showing a supervisory controller of an elevator according to the present invention;

Figure 3 is a view showing a task provided in a central processor in Fig. 2;

Figure 4 is a flow chart showing a communication processing among tasks in Fig. 2;

Figure 5 is an exemplary view showing an allocation of a data base in Fig. 2;

Figure 6 is a flow chart showing a data processing among tasks in Fig. 3;

Figure 7 is a flow chart showing an operation of an image processor in Fig. 2;

Figure 8 is a flow chart showing an image compression in Fig. 7;

Figure 9 is a flow chart for performing an image precompression in Fig. 8;

Figure 10 is a flow chart for removing similar or duplicated data in Fig. 8; and

Figure 11 is a flow chart for performing a final image

compression in Fig. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in Figure 2, a supervisory controller of an elevator according to the present invention further includes image input units 140a,...,140n disposed on a ceiling inside elevators 150a,...,150n, and image processors 130a,...,130n for outputting the image outputted from the image input units 140a,...,140n to communication interfaces 110a,...,110n, in comparison with the supervisory controller of an elevator according to the conventional art. And the identical numerals are put to the same elements as in the conventional art.

The operation of the supervisory controller of an elevator according to the present invention having the above construction will now be described in detail.

When the operation of an elevator starts, a CPU 11 in a central processor 101 transmits a control information of elevators 150a,...,150n through a communication card 10, and the transmitted control information is inputted to elevator controllers 120a,...,120n through the communication interfaces 110a,...,110n.

Then, the elevator control unit 120a,...,120n controls an operation of the elevators 150a,...,150n in accordance with control information, and transmits again the operating

condition of each elevator 150a,...,150n to the communication interfaces 110a,...,110n.

Here, the image input units 140a,...,140n receive an image in each elevator 150a,...,150n, and the image is compressed in the image processors 130a,...,130n and transmitted to the communication interfaces 110a,...,110n.

Accordingly, the communication interfaces 110a,...,110n transmits information on an operating condition transmitted from the elevator control units 120a,...,120n and information on compressed image transmitted from the image processor 130a,...,130n, to the CPU 11 through the communication card 10. The CPU 11 processes and stores the inputted information on the operating condition and image, and display an operation history and internal condition of the elevators 150a,...,150n on the supervisory device 102 and an output unit 104.

Here, as shown in Figure 3, in the central processor 100, there are provided seven tasks which carry out their respective peculiar functions, having associated relations to another task, respectively.

A communication task (t1) performs the receiving and transmission of data with each communication interface 110a,...,110n, an image information collecting task (t2) and a condition information collecting task (t3) collects information on an operating condition of each elevator 150a,...,150n through the communication task (t1) such as an

operating direction, a position, and an error, and collect the image information in each elevator 150a,...,150n, then performing the function of storing the thusly collected information in a data base (ta).

Here, the data base (ta) is used for managing input and output of the data generated by each task.

A data processing task (t4) receives the condition information and the image information stored in the data base (ta) and processes the received information to be data fit for graphic expression on the supervisory device 102, and an output processing task (t5) performs a function of outputting each kind of data to the output unit 104.

A image processing task (t6) displays the data processed in the data processing task (t4) in graphic on the supervisory device 102, and a control data processing task (t7) processes the control signal of an elevator inputted through the input unit 103 and outputs it to the communication task (t1), thereby performing an operation control of the elevators 150a,...,150n.

Here, the above-described tasks are classified into a full line region 160 for undertaking a data processing and a dotted line region 170 for undertaking a communication processing.

Here, the communication processing among the tasks positioned in the dotted line region will now be described in

detail with reference to Figure 4.

When the central processor 100 is carrying out a normal communication with the elevator controllers 120a,...,120n and the elevators 150a,...,150n through each interface 110a,...,110n, the communication task (t1) checks whether the inputted data is a control data or an image information data.(14)(15)

Here, if the inputted data is a control data, the communication task (t1) transmits the control data processed in the control data processing task (t7) to the communication interfaces 110a,...,110n(16), and if the inputted data is the image information data, the data is stored in a corresponding region of the data base (ta), through the image information collecting task (t2).(17)

If neither is the case, but the condition information data, the communication task (t1) compares the present data with the previous data (18), and then if there is any difference found in the two data, the communication task (t1) stores the changed data in the regions of each elevator 150a,...,150n allocated in the regions of the data base (ta) and returned to its initial condition.(17)

Here, as shown in Figure 5, each region of each elevator 150a,...,150n allocated in the regions of the data base (ta) has each space for respectively storing the condition information and the image information in each elevator

150a,...,150n, and a position for each information to be stored is fixed.

The data processing among the tasks positioned in the full line region 160 will now be described in detail with reference to Figure 6.

When a main program in the central processor 101 is normally operated, the CPU 11 waits until a request signal for a condition information or an image information data on an arbitrary elevator is detected through the input unit 103.(20)

Here, if a signal for the request is detected, the communication task (t1) checks whether or not the communication with the corresponding elevator is normal,(21) and if the result comes off as normal, the communication task (t1) checks whether or not the signal is a request signal for an image data.(22) If the resultant signal is the request signal for an image data, the communication task (t1) restores a transmitted compressed image data in the data processing task (t4) to display on the supervisory device 102, and checks whether an output of the image data is required.(23)

If the output of the image data is required, the communication task (t1) outputs the restored image data to the output unit 104 through the output processing task (t6)(24), and processes the image data to be a data fit for expressing in graphic through the image processing task (t6) to display on the scene(25)(26), and finally stores the image data in the

data base (ta).(27)

However, when the restored image data is not required to be outputted in the above course and outputted in the memory 12,(23) the task (t1) stores the image data in the memory 12 ,(29)(30), processes the image data to be a data fit for expressing in graphic to display on the scene(26), and then stores the same in the data base(27). When the restored image data is not required to be stored, the task (t1) display the data on the scene (26) and then stores the image data in the data base(ta).(27)

Further, in the above course(22), when the inputted data is not a request signal for the image data, but for the condition information, the task (t1) compares the inputted data with the previous data,(31) and in case there is any change in the inputted data, the changed data is transmitted and displayed on the scene(32)(33), stored in the data base (ta) and then the task (t1) returns to the initial condition. (27)(28)

When the data inputted in the above course(31) is identical to the previous data, the task (t1) returns to the initial condition at once.(28)

Generally, since the amount of the image information is much greater than that of the condition information data, receiving and transmitting data through a serial communication accompanies much difficulty.

However, since the communication interfaces 110a,...,110n and the communication card 10 receive and transmit data through the serial communication, the image information data is compressed to be transmitted for achieving more efficient communication.

The above-mentioned procedure is carried out in the image processors 130a,...,130n, and the signal flow between the image processors 130a,...,130n and the image input units 140a,...,140n of the elevator 150a,...,150n is illustrated in Figure 7.

Since overload tends to occur when image is inputted successively to the image processors 130a,...,130n, the image processors 130a,...,130n do not receive the image successively, but image outputted from the image input units 140a,...,140n, having a predetermined interval therebetween.

When the image processors 130a,...,130n reach an image input time,(30) they compress the image inputted from the image input units 140a,...,140n, using an image compression algorithm and then stored the result.(32)(33)

That is, as shown in Figure 8, when the image is accurately inputted to the image processor 130a,...,130n, they perform an image precompression(34), and removes the similarities and redundancies from the precompressed image and finally compresses the image again.(35)(36)

The image input units 140a,...,140n can sense

miscroscopic portions of material much more precisely and accurately than the human eye can. Namely, since human eye can hardly the microscopic portions of material, it senses the colors of neighboring basic units (pixel) of image as the same color.

Accordingly, using the above quality, after the neighboring pixels are sensed as the same colors, the image precompression is performed so that an inputted image is compressed to a level which human eye can recognize.

First, as shown in Figure 9, in the image precompression, after horizontal and vertical sizes of the inputted image are calculated, variables(i,j=1) are initialized to perform the image compression algorithm.(40)

Next, when the variable (i) is compared with the vertical size of the inputted image and is larger than the size,(41) it means that the image precompression algorithm is done and the processing course returns to its initial condition, and when the variable (i) is smaller than the vertical size of the inputted signal, the variable (j) is to be compared with the horizontal size of the inputted image.(42)

Here, when the variable is larger than the horizontal size of the inputted image, the pixel corresponding to i-th and i+1-th line among the inputted images is to be analyzed. When the analysis is completed, in order to move to a next line (that is, i+2-th line), the value of the variable (i) is

increased by two (2) and the value of the variable (j) is initialized to be zero (0) to move to the above course (41).(43)

However, when the variable (j) is smaller than a horizontal size of the inputted image, the color values on the (i,j)-th, (i,j+1)-th, (i+1,j)-th and (i+1,j+1)-th coordinates are read,(44) and of the four coordinates that have been read, the color with the largest distribution is set as a representative color.

The value of the representative color is stored in a position in the internal memory of the image processors 130a,...,130n of the corresponding to the four coordinates,(45) and when the storing is completed, the variable(j) is increased by two (2) to perform the course.(42)

Then, when the image precompression is performed through the above course, as shown in Fig. 8, the similarities and redundancies are to be removed.(35)

First, as shown in Figure 10, the variables (i,j) are initialized in order to remove the similarities and redundancies from the compressed image data.(50)

Then, the variable (i) is compared with the vertical size of the precompressed image, and when the variable (i) is larger than the size, it means that the similarities and the redundancies are all removed from the precompressed image. Therefore, the algorithm is completed and the course returns

to its initial condition.

When the variable (i) is smaller than the vertical size of the precompressed image, and the variable (j) is larger than the horizontal size of the precompressed image, it means the similarities and the redundancies of the pixels corresponding to i-th line are removed. Therefore, in order to move to a next line, the value of the variable (i) is increased by one (1) and the value of the variable (j) is initialized to be one (1) to move to a next course (51).(53)

However, when the variable (j) is smaller than the horizontal size of the precompressed image, the color values on the (i,j)-th and (i+1,j)-th coordinates are read,(54) and when the values are similar, they are recognized as the same color. Then, the color value on the (i,j)-th coordinate is stored in the internal memory of the image processor 130a,...,130n as the color values on the (i,j)-th and (i+1,j)-th coordinates.(55) Then, when the storing is completed, the variable (j) is increased by one (1) to perform the course(52).

Through the above course, when the similarities and redundancies are removed from the precompressed image, a final image compression is carried out as shown in Fig. 8.(36)

That is, the algorithm is carried out that the color value of the continuously varied and compressed image data and the using frequency of the color are calculated to finally

store in the internal memory of the image processor 130a,...,130n.

First, as shown in Figure 11, in order to perform the final course of the image compression, the variables are initialized.(60)

Then, the variable (i) is compared with the vertical size of the image from which the similarities and redundancies are removed, and if the variable (i) is larger than the vertical size of the image,(61) it means that the final image compression is completed. Then, the final image compression is completed and the initial condition is restored.

When the variable (i) is smaller than the vertical size of the image from which the similarities and redundancies are removed and the variable (j) is larger than the horizontal size of the image from which the similarities and redundancies are removed, it means that data on the i-th line is finally compressed. Therefore, in order to move to a next line, the value of the variable (i) is increased by one (1) and the value of the variable (j) is initialized to be one (1) so as to move to a next course (61).(63)

However, when the variable (j) is smaller than the horizontal size of the image from which the similarities and redundancies are removed, the color value on the (i,j)-th coordinate is read to be compared with the representative color(64),(65) and when the color value on the read (i,j)-th

coordinate is identical to the value of the representative color, the using frequency of the representative color is increased by one (1) and the variable is increased by one (1) to perform the course(62).

When the color value on the read (i,j)-th coordinate is different from the value of the representative color, the values and the using frequency of the representative color so far used are stored in the internal memory of the image processor 130a,...,130n, and the color value on the (i,j)-th coordinate is newly set as the value of the representative color, and the using frequency of the new representative color is initialized to be zero(0).

Then, the operation after the course (62) is repeatedly performed with the value of the variable (j) increased, and thereby the image processors 130a,...,130n compress the image inputted from the image input units using the image compression algorithm provided in the image processors 130a,...,130n and store the result.

Then, the communication interfaces 110a,...,110n transmit the compressed image information transmitted from the image processors 130a,...,130n to the central processor 101.

As described above in detail, according to the present invention, an image input unit is provided in an elevator, and the image outputted from the image input unit is outputted to a supervisory device and an output unit to supervise the

condition in the elevator. Therefore, in an emergency, a prompt and proper action can be effectively taken.

Further, since the image outputted from the image input unit is stored in the memorizing medium, the stored data can be utilized to be an important data for the event occurring in the elevator.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as recited in the accompanying claims.

What is claimed is:

1. In a supervisory controller of an elevator which comprises an image input unit and an image processor in a plurality of elevators in order to supervise and control an operating and internal conditions of an elevator, an image processing method for a supervisory controller of an elevator, comprising:

receiving an image from an image input unit every predetermined time;

re-processing the inputted image data to be a value of a representative color and performing an image precompression;

removing similarities and redundancies from the image precompression; and

comparing an image from which similarities and redundancies are removed with the value of the representative color and storing a using frequency of the representative color.

2. The method of claim 1, wherein a second step of re-processing the inputted image data to be a value of a representative color and performing an image precompression, comprises:

initializing variables (i,j);

finishing an algorithm when the variable (i) is larger

than an horizontal size of the inputted image and comparing the second variable with the horizontal size of the inputted image when the variable (i) is smaller than a vertical size of the inputted image;

reading the color values on the (i,j)-th, (i,j+1)-th, (i+1,j)-th and (i+1,j+1)-th coordinates when the variable (j) is smaller than the horizontal size of the inputted image; and

setting a color with the largest distribution as a representative color among the four coordinates that have been read and storing the value of the representative color.

3. The method of claim 1, wherein when the variable (j) is larger than the horizontal size of the inputted image, the pixel corresponding to the i-th and i+1-th line among the inputted image is to be analyzed, and when the analysis is completed, in order to move to a next line (that is, the i+2-th line), the value of the variable (j) is increased by two (2) and the value of the variable (j) is initialized to be zero (0).

4. The method of claim 1, wherein a third step of removing similarities and redundancies from the image precompression comprises:

initializing variables (i,j);

finishing an algorithm when the variable (i) is compared

with the vertical size of the precompressed image and is larger than the size, and moving to a next line when the variable (i) is smaller than the vertical size of the precompressed image and the variable (j) is larger than the horizontal size of the precompressed image; and

comparing the color values on the (i,j)-th and (i+i,j)-th coordinates when the variable (j) is smaller than the horizontal size of the precompressed image and as a result of the comparison, when the color values on the two coordinates are similar to one another, recognizing the color values as the same color and storing the color value on the (i,j)-th and (i+1,j)-th coordinates as the color value of the (i,j)-th coordinate.

5. The method of claim 1, wherein a fourth step of comparing an image from which similarities and redundancies are removed with the value of the representative color and storing a using frequency of the representative color comprises:

initializing variables (i,j);

finishing an algorithm when the variable (i) is compared with the vertical size of the image from which similarities and redundancies are removed and as a result the variable (i) is larger than the image, and moving to a next line when the variable (i) is smaller than the image and the variable (j) is

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larger than the size;

reading a color value on the (i,j)-th coordinate, when the variable (j) is smaller than the horizontal size of the image and as a result of the reading, when the color value on the (i,j)-th coordinate is identical to the value of the representative color, increasing the using frequency of the representative color by one (1); and

storing the value and the using frequency of the representative colors that have been used so far and when the color value on the (i,j)-th coordinate is different from the value of the representative color, and setting the color value on the (i,j)-th coordinate as a new value of the representative color.