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FACSIMILE APPARATUS

The present invention relates to a facsimile apparatus, which changes the transmission resolution in correspondence with the resolution at a reception side and further displays the transmission resolution.

In recent years, many facsimile apparatuses have optional resolutions, which are permitted to use, in advance as well as a standard resolution as possible transmission or reception resolutions.

On the other hand, some facsimile apparatuses have a function of temporarily storing read document information in a memory, and then transmitting the stored document information, and sequentially use the stored document information in, e.g., a multi-address communication mode.

In a general communication procedure of a facsimile communication, setting of a call, identification of capability (e.g., a resolution) of a facsimile apparatus on the other end of a line, transfer of document information, release of a call, and the like are executed. Of these operations, in identification of the capability of the facsimile apparatus on the other end of the line, a transmission-side facsimile apparatus identifies information indicating a possible reception resolution, which information is sent from a reception-

side facsimile apparatus. In transfer of document information, document data having a resolution other than the resolution indicated by the resolution information as the capability of a facsimile apparatus on the other end of the line must not be transmitted.

Therefore, in a facsimile apparatus which temporarily stores read document information in a memory, and then transmits the stored document information, when document information to be transmitted is converted into one having a resolution different from a reading resolution, the reading resolution does not often coincide with that of document information to be actually transmitted.

In the conventional facsimile apparatus, means for informing the resolution of document information to be actually transmitted to an operator is insufficient. For this reason, the operator cannot confirm whether or not document information is transmitted at a desired resolution.

Even when a display unit for displaying the resolution of document information is arranged on a facsimile apparatus, and a transmission resolution is displayed on the display unit, since a reading resolution and the transmission resolution cannot be displayed at the same time, an operator cannot

adequately recognize whether or not the reading resolution is changed upon transmission.

It is an object of the present invention to provide a facsimile apparatus which displays a transmission resolution when a resolution of read document information does not coincide with the transmission resolution, whereby an operator can be clearly informed of a coincidence/non-coincidence between the reading resolution and the transmission resolution.

In order to achieve the above object, according to the present invention, a facsimile apparatus comprises: input means for inputting image data; means for designating the transmission resolution of image data which is input by said input means; means for identifying the possible reception resolution of a reception-side facsimile apparatus; discrimination means for discriminating whether or not the designated resolution coincides with the possible reception resolution; conversion means for, when said discrimination means determines that the two resolutions do not coincide with each other, converting the designated resolution into the possible reception resolution; and display means for displaying the converted resolution as a transmission resolution, wherein said display means displays said converted resolution so that it can be discriminated whether the designated resolution is converted into the possible reception resolution of the reception-side facsimile apparatus.

It is preferable that the conversion means determines the maximum value of possible reception

resolutions, which value does not exceed the original reading resolution, as the possible reception resolution.

It is also preferable that the display means displays the transmission resolution only when the possible reception resolution does not coincide with the designated original reading resolution.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing an arrangement of a facsimile apparatus according to an embodiment of the present invention;

Figs. 2, 3, and 4 are flow charts showing a control procedure in the facsimile apparatus according to the embodiment;

Fig. 5 is a chart showing a signal sequence in the facsimile apparatus;

Fig. 6 shows a format of resolution information included in a capability value information signal;

Fig. 7 is a detailed flow chart of transmission resolution discrimination processing;

Fig. 8 is a view showing the internal arrangement of a RAM for storing resolution information; and

Fig. 9 is a detailed flow chart of transmission resolution display processing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment according to the present invention will be described in detail hereinafter with reference to the accompanying drawings.

Fig. 1 is a block diagram showing an arrangement of a facsimile apparatus according to an embodiment of the present invention. In Fig. 1, a facsimile apparatus is constituted by a main body 1, a scanner 2, a printer 3, a communication line 4, a keyboard 5 for performing various operations, a first display unit 6 for displaying a reading resolution, and a second display unit 7 for displaying a transmission resolution, and other messages.

The facsimile apparatus main body 1 is constituted by a main controller 11 for performing control of the overall apparatus and other control operations, a scanner controller 12, a printer controller 13, an image memory 14 having a capacity capable of storing a predetermined amount of image data, an image converter 15 for performing pixel density conversion and compression/expansion of image data, a communication controller 16, a data bus 17, a ROM 18 for storing,

e.g., a control program, and a RAM 19 for storing values indicating a reading resolution, a possible reception resolution of a facsimile apparatus on the other end of a line, a transmission resolution, and the like, and other kinds of information.

The control procedure in the facsimile apparatus according to this embodiment will be described below.

Figs. 2 to 4 are flow charts showing the control procedure in the facsimile apparatus of this embodiment. In Fig. 2, it is monitored in step S1 if an incoming call is detected. If YES in step S1, normal reception processing is performed in step S21. However, if NO in step S1, an input from the keyboard 5 is monitored in step S2 to determine if a key input for designating a resolution is made. If YES in step S2, information indicating the designated resolution is displayed on the first display unit 6 in step S3. The resolution information is displayed by the following method. That is, lamps corresponding to available resolutions are arranged on the first display unit 6, only the lamp corresponding to the designated resolution is turned on, and other lamps are kept off, thus informing the designation resolution to an operator.

In step S4, it is monitored whether or not a key input for instructing a reading operation is made at the keyboard 5. If NO in step S4, it is determined that an

operator wants to change the reading resolution designated in step S2, and the flow returns to step S2 since the resolution can be changed before the reading instruction is input. However, if YES in step S4, the value indicating the reading resolution designated in step S2 is stored in a reading resolution information area (not shown) in the RAM 19 in step S5. In step S6, an instruction is supplied to the scanner controller 12 to cause the scanner 2 to read an original at the designated resolution, and the read image data is stored in the image memory 14.

It is monitored in step S7 whether a calling instruction is input. If YES in step S7, it is checked in step S8 whether an image to be transmitted is stored in the image memory 14. If YES in step S8, a dial number input from the keyboard 5 is accepted in step S9, and a calling request signal 21 is sent to a facsimile apparatus on the other end of the line through the communication controller 16 and the communication line 4.

If it is determined in step S2 that no resolution designation is made, the flow jumps to step S7. If it is determined in step S7 that a calling instruction is detected, since an image to be transmitted is not stored (since steps S5 and S6 are not executed), NO is determined in step S8, and the flow returns to step S1.

After the calling request signal 21 is sent in step S9 in Fig. 2, the control waits for an incoming call accept signal from the facsimile apparatus on the other end of the line in step S10 in Fig. 3 (see the signal sequence chart of Fig. 5). If an incoming call accept signal is received, a capability value inquiry signal is sent in step S11. When a capability value information signal is received in step S12, the flow advances to step S13 to analyze resolution information included in the capability value information signal according to the format shown in Fig. 6. The analysis result is stored in a possible reception resolution information area (not shown) in the RAM 19.

In step S14, a transmission resolution is discriminated by a method to be described later, and the discrimination result is written in a transmission resolution information area (not shown) in the RAM 19. In step S15, the contents of the reading resolution information area and the transmission resolution information area are compared with each other. If the contents in these areas coincide with each other, the flow jumps to step S17. However, if the contents do not coincide with each other, resolution conversion is performed in step S16, and thereafter, the flow advances to step S17. In step S17, the actual transmission resolution is displayed on the second display unit 7.

Note that details of the processing in step S17 will be described later.

In step S18, image data is transmitted. After the transmission of the image data is ended, a release request signal is sent in step S19 in Fig. 4. In step S20, the controller waits for a response from the facsimile apparatus on the other end of the line. When a release confirmation signal is received, this processing is ended.

The transmission resolution discrimination processing in step S14 in Fig. 3 will be described in detail below with reference to the flow chart shown in Fig. 7. In this embodiment, as a value indicating each resolution, a larger value is assigned as the resolution becomes denser. Fig. 8 shows the internal arrangement of the RAM 19 for temporarily storing resolution information. In the flow chart shown in Fig. 7, contents indicated by addresses of the RAM 19 are expressed by the addresses with parentheses.

In Fig. 7, in step S61, transmission resolution information 42 corresponding to an address as shown in Fig. 8 is initialized to a value corresponding to an indispensable resolution in the facsimile communication standard. In step S62, the value of an index indicating pieces of possible reception resolution information (A_1) to (A_N) is set to be "1". In step S63, it is checked if

the index value (A_n) is equal or smaller than a maximum value N. If YES in step S63, possible reception resolution information ($A(A_n)$) corresponding to the index value is compared with a reading resolution (A_R) in step S64. If ($A(A_n)$) $\leq$ (A_R), the flow advances to step S65. In step S65, it is checked if ($A(A_n)$) $\geq$ (A_S). If YES in step S65, ($A(A_n)$) is written in (A_S) in step S66, and the index value (A_n) is incremented in step S67. Thereafter, the flow returns to step S63. These processing operations are repeated until $(A_n) > N$ is satisfied.

With this processing, resolution information, the value of which is equal to or smaller than the reading resolution, and is maximum (densest) within a range of a reception resolution information can be determined as transmission resolution information. On the other hand, if it is determined in step S64 that ($A(A_n)$) > (A_R), since the reception resolution is higher than the reading resolution, its value is not used as the transmission resolution. If it is determined in step S65 that ($A(A_n)$) < (A_S), since the reception resolution is lower than the maximum resolution already searched in the previous step, its value is not used as the transmission resolution.

The flow chart of Fig. 9 shows details of step S17 in Fig. 3. In Fig. 9, in step S71, transmission

resolution information (A_S) and reading resolution information (A_R) are compared with each other. If the two pieces of information do not coincide with each other, the flow advances to step S72, and a message corresponding to the transmission resolution information is displayed on the second display unit 7.

If YES in step S71, the flow returns without displaying resolution information.

In this manner, when a resolution of a facsimile apparatus on the other end of the line is within a range capable of receiving data from a transmission side and the maximum value of an original reading resolution designated by an operator is determined as a transmission resolution and when the designated reading resolution and the actual transmission resolution are different from each other, the transmission resolution is visually displayed. Thus, when the reading resolution is changed upon transmission, an operator can adequately recognize the change state.

In the above embodiment, only when the reading resolution does not coincide with the transmission resolution, the transmission resolution is displayed. It is permissible to adopt an arrangement in which, when the reading resolution does not coincide with the transmission resolution, the display of the transmission resolution may be caused to flash at a predetermined

cycle; when the two resolutions coincide with each other, the transmission resolution may be continuously displayed. In this manner, a coincidence/non-coincidence between the reading resolution and the transmission resolution can be more clearly informed.

Further, an arrangement can be adopted in which the transmission information displayed on the second display unit may be a pattern such as a pictorial pattern according to resolution information or a lamp indication corresponding to the resolution in place of characters.

As many apparently widely different embodiments of the present invention can be made without departing from the scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

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CLAIMS

1. A facsimile apparatus, comprising:

input means for inputting image data;

means for designating the transmission resolution of image data which is input by said input means;

means for identifying the possible reception resolution of a reception-side facsimile apparatus;

discrimination means for discriminating whether or not the designated resolution coincides with the possible reception resolution;

conversion means for, when said discrimination means determines that the two resolutions do not coincide with each other, converting the designated resolution into the possible reception resolution; and

display means for displaying the converted resolution as a transmission resolution,

wherein said display means displays said converted resolution so that it can be discriminated whether the designated resolution is converted into the possible reception resolution of the reception-side facsimile apparatus.

2. The apparatus according to claim 1, wherein said conversion means determines the maximum value of possible reception resolution, which value is less than or equal to the original reading resolution, as the possible reception resolution.

3. The apparatus according to claim 1, wherein said display means is arranged to display the transmission resolution only when the possible reception resolution does not coincide with the designated original reading resolution.

4. The apparatus according to claim 1, wherein said display means is arranged to display simultaneously the designated original reading resolution and the transmission resolution.

5. The apparatus according to claim 1, wherein said display means is arranged to display the transmission resolution using a predetermined pictorial pattern.