and the image within the local area is analyzed, the quality of the image within the local area largely affects the image recognition result. In the first related art, changes in the brightness of the image due to time, weather, and the like is adjusted by a diaphragm adjusting mechanism provided to the imaging means. However, even though the average brightness of the entire imaging screen is optimized, the brightness inside the local area is not necessarily optimized. As described in the second and third related art, while imaging means having a function of controlling exposure so as to optimize the brightness of an area designated by a user or an area irradiated by a headlight of a vehicle have been proposed, in a configuration in which an area for exposure control designated by a user or an area irradiated by a headlight is set without any reference to the local area for performing image recognition processing, the image quality in the local area for performing image recognition processing is not optimized.

[0009]

Embodiments of the present invention provide an image recognition device which solves the above-described problem, that is, a problem that the image quality of an area for performing image recognition processing is not optimized in a configuration in which an area defined in an imaging screen, to be used for controlling exposure of an imaging means, is set without any reference to an area defined in the imaging screen for performing image recognition processing.

[0010]

~~According to a first aspect of the present invention, there is provided an image recognition device comprising: imaging means for generating an image of a subject; local area storage means for storing information relating to a plurality of local areas set in an imaging screen of the imaging means; and image data processing means for performing exposure control of the imaging means and detection of an intruding object; wherein the image data processing means includes: selection means for, from among the plurality of the local areas, selecting cyclically a one local area to be processed; local area image extraction means for, in a state that a certain one local area is selected by the selection means, when the image is newly generated by the imaging means, extracting an image within the selected local area from the newly generated image; exposure control means for, generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and intruding object detection means for detecting an intruding object based on the extracted image within the local area.~~

According to a first aspect of the present invention, there is provided an image recognition device comprising: imaging means for generating an image of a subject; local area storage means for storing information relating to a local area in the imaging means; exposure control means for performing exposure control of the imaging means , based on the image within the local area specified by the information stored in the local area storage means, of

the image generated by the imaging means; and intruding object detection means for detecting an image of an intruding object after the exposure of the image has been controlled based on the control signal

[0011]

~~According to a second aspect of the present invention, there is provided an image recognition method implemented by an image recognition device including imaging means, local area storage means for storing information relating to a plurality of local areas set in an imaging screen of the imaging means, and image data processing means, the method comprising: by the imaging means, generating an image of a subject, and by the image data processing means, performing exposure control of the imaging means and detection of an intruding object; and in the exposure control and the detection of an intruding object, from among the plurality of the local areas, selecting cyclically a one local area to be processed; in a state that a certain one local area is selected by the selection means, when the image is newly generated by the imaging means, extracting an image within the selected local area from the newly generated image; generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and detecting an intruding object based on the extracted image within the local area.~~

According to a second aspect of the present invention, there is provided an image recognition method implemented by an image recognition device including imaging means, local area storage means for storing information relating to a plurality of local areas set in an imaging screen of the imaging means, exposure control means, and intruding object detection means , the method comprising: by the imaging means, generating an image of a subject, by the exposure control means, performing exposure control of the imaging means, and by the intruding object detection means for detecting an intruding object which intrudes the local area of the image which is controlled by the exposure control means.

[0012]

~~According to a third aspect of the present invention, there is provided a non-transitory computer readable medium storing a program for causing a computer to function as, the computer being connected with imaging means for generating an image of a subject and including a memory for storing information relating to a plurality of local areas set in an imaging screen of the imaging means, image data processing means for performing exposure control of the imaging means and detection of an intruding object; wherein the image data processing means includes: selection means for, from among the plurality of the local areas, selecting cyclically a one local area to be processed; local area image extraction means for, in a state that a certain one local area is selected by the selection means, when the image is newly generated by~~

~~the imaging means, extracting an image within the selected local area from the newly generated image; exposure control means for, generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and intruding object detection means for detecting an intruding object based on the extracted image within the local area.~~

According to a third aspect of the present invention, there is provided a program for causing a computer to function as image data processing means, wherein the computer being connected with imaging means for generating an image of a subject and including a memory for storing information relating to a local area set in an imaging screen of the imaging means, exposure control means for performing exposure control of the imaging means, based on the image within the local area specified by the information stored in the memory, of the image generated by the imaging means; and an intruding object detection unit that detects an intruding object which intrudes the local area of the image which is controlled by the exposure control means.

[0013]

Embodiments of the present invention are able to control exposure of an imaging means so as to optimize the image quality of an area used for performing image recognition processing.

BRIEF DESCRIPTION OF DRAWINGS

[0014]

Fig. 1 is a block diagram showing a first exemplary embodiment of the present invention.

Fig. 2 is a block diagram showing a second exemplary embodiment of the present invention.

Fig. 3 is a diagram showing an exemplary configuration of a local area memory according to the second exemplary embodiment of the present invention.

Fig. 4 is a block diagram showing a management device according to the second exemplary embodiment of the present invention.

Fig. 5 is a flowchart showing an exemplary operation of setting a local area according to the second exemplary embodiment of the present invention.

Fig. 6 is a flowchart showing an exemplary operation of exposure control and detection of an intruding object detection to the second exemplary embodiment of the present invention.

Fig. 7 is a block diagram showing a third exemplary embodiment of the present invention.

CLAIMS

1. An image recognition device comprising:

imaging means for generating an image of a subject;

local area storage means for storing information relating to a ~~plurality of~~ local ~~areas~~ area ~~set in an imaging screen of~~ in the imaging means; ~~and~~

~~image data processing~~ exposure control means for performing exposure control of the imaging means ~~and detection of an intruding object~~, based on the image within the local area specified by the information stored in the local area storage means, of the image generated by the imaging means; and ~~wherein~~

~~the image data processing means includes:~~

~~selection means for, from among the plurality of the local areas, selecting cyclically a one local area to be processed;~~

~~local area image extraction means for, in a state that a certain one local area is selected by the selection means, when the image is newly generated by the imaging means, extracting an image within the selected local area from the newly generated image;~~

~~exposure control means for, generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and~~

intruding object detection means for detecting an image of an intruding object ~~based on the extracted image within the local area~~ after the exposure of the image has been controlled based on the control signal.

2. The image recognition device according to Claim 1, further comprising

local area image extraction means for extracting the image within the local area specified by the information stored in the local area storage means, from the image generated by the imaging means;

wherein the exposure control means performs the exposure control of the imaging means based on brightness of the extracted image within the local area; and

the intruding object detection means performs the image recognition processing for detecting an intruding object, on the extracted image within the local area.

3. The image recognition device according to Claim 1, further comprising:

local area image extraction means for extracting the image within the local area specified by the information stored in the local area storage means as a first image, and

extracting the image within an area defined by expanding the local area specified by the information stored in the local area storage means, by a certain amount or a certain ratio, as a second image, from the image generated by the imaging means;

wherein the exposure control means perform the exposure control of the imaging means based on brightness of the extracted second image; and

the intruding object detection means performs the image recognition processing for detecting an intruding object on the extracted first image.

4. The image recognition device according to Claim 1, wherein the local area storage means stores information relating to a plurality of the local areas, and the exposure control means divides, in a time axis direction, a plurality of the images generated by the imaging means into a plurality of groups which correspond to the respective local areas on a one-to-one basis, and for each of the groups, performs the exposure control of the imaging means based on the image within the local area corresponding to each of the groups.

5. The image recognition device according to Claim 4, further comprising:

group selection means for sequentially selecting a group to be processed, from among the plurality of the groups; and

local area image extraction means for extracting the image within the local area corresponding to the selected group, from the image generated by the imaging means;

wherein the exposure control means for generating an exposure control signal based on brightness of the extracted image within the local area, and with use of the generated exposure control signal, controlling exposure of the imaging means when an image of the selected group is captured next time; and

the intruding object detection means for performing the image recognition processing for detecting an intruding object, on the extracted image within the local area.

~~2~~6. The image recognition device according to ~~Claim 1~~any one of claims 1 to 5, further comprising

communication means for transmitting the image generated by the imaging means to a management device over a network, receiving information specifying the local area from the management device over the network, and storing the information in the local area storage means.

~~3~~7. An image recognition method implemented by an image recognition device including imaging means, local area storage means for storing information relating to a plurality of local areas set in an imaging screen of the imaging means, ~~and image data processing means~~ exposure control means, and intruding object detection means , the method comprising:

by the imaging means, generating an image of a subject, ~~and~~

by the ~~image data processing~~ exposure control means, performing exposure control of the imaging means ~~and detection of an intruding object;,~~ and

by the intruding object detection means for detecting an intruding object which intrudes the local area of the image which is controlled by the exposure control means

~~in the exposure control and the detection of an intruding object,~~

~~from among the plurality of the local areas, selecting cyclically a one local area to be processed;~~

~~in a state that a certain one local area is selected by the selection means, when the image is newly generated by the imaging means, extracting an image within the selected local area from the newly generated image;~~

~~generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and~~

~~detecting an intruding object based on the extracted image within the local area~~.

8. The image recognition method according to Claim 7, wherein the image recognition device including a local area image extraction means:

extracting the image within the local area specified by the information stored in the local area storage means, from the image generated by the imaging means;

performing the exposure control of the imaging means based on brightness of the extracted image within the local area; and

performing the image recognition processing for detecting an intruding object, on the extracted image within the local area.

9. The image recognition method according to Claim 7, wherein the performing the exposure control and the image recognition processing includes,

by the local area image extraction means:

extracting the image within the local area specified by the information stored in the local area storage means as a first image, and extracting the image within an area defined by

expanding the local area specified by the information stored in the local area storage means, by a certain amount or a certain ratio, as a second image, from the image generated by the imaging means;

by the exposure control unit, performing the exposure control of the imaging means based on brightness of the extracted second image; and

by the intruding object detection unit, performing the image recognition processing for detecting an intruding object on the extracted first image.

10. The image recognition method according to Claim 7, wherein
the local area storage means stores information relating to a plurality of the local areas,
and the performing the exposure control and the image recognition processing includes,

by the image data processing means, dividing, in a time axis direction, a plurality of the images generated by the imaging means into a plurality of groups which correspond to the respective local areas on a one-to-one basis, and for each of the groups, performing the exposure control of the imaging means and detection of an intruding object based on the image within the local area corresponding to each of the groups.

11. The image recognition method according to Claim 10, wherein
the image recognition device including local area image extraction means:

by the local area image extraction unit, sequentially selecting a group to be processed, from among the plurality of the groups;

by the local area image extraction unit, extracting the image within the local area corresponding to the selected group, from the image generated by the imaging means;

by the exposure control unit, generating an exposure control signal based on brightness of the extracted image within the local area, and with use of the generated exposure control signal, controlling exposure of the imaging means when an image of the selected group is captured next time; and

by the intruding object detection unit, performing the image recognition processing for detecting an intruding object on the extracted image within the local area.

412. The image recognition method according to any one of Claims ~~3~~7 to 11, further comprising

~~by the image processing means,~~ transmitting the image generated by the imaging means to a management device over a network, receiving information specifying the local area from the

management device over the network, and storing the information in the local area storage means.

~~5~~13. A ~~non-transitory computer readable medium storing a~~ program for causing a computer to function as image data processing means, wherein the computer being connected with imaging means for generating an image of a subject and including a memory for storing information relating to a ~~plurality of~~ local ~~areas~~ area set in an imaging screen of the imaging means,

~~image data processing~~ exposure control means for performing exposure control of the imaging means ~~and detection of an intruding object; wherein~~, based on the image within the local area specified by the information stored in the memory, of the image generated by the imaging means; and

~~the image data processing means includes:~~

~~selection means for, from among the plurality of the local areas, selecting cyclically a one local area to be processed;~~

~~local area image extraction means for, in a state that a certain one local area is selected by the selection means, when the image is newly generated by the imaging means, extracting an image within the selected local area from the newly generated image;~~

~~exposure control means for, generating and saving an exposure control signal based on brightness of the extracted image within the local area, outputting the saved exposure control signal to the imaging means at a timing when the certain one local area is selected again next time by the selection means for controlling exposure of the imaging means; and~~

an intruding object detection unit ~~means for detecting~~ that detects an intruding object ~~based on the extracted image within the local area~~ which intrudes the local area of the image which is controlled by the exposure control means.