according to an embodiment.

FIG. 2 is a flowchart of image processing performed by an image processing apparatus 35.

FIG. 3 is an illustrative diagram of a movement vector computed using optical flow.

FIG. 4A shows an example of an image indicated by a frame (image data) included in moving image data.

FIG. 4B is an illustrative diagram in which movement amounts at respective pixels computed using optical flow are visualized.

FIGS. 5A and 5B are graphs that indicate relationships between the action amount and the feeding state of an automated feeding apparatus 20.

FIG. 6 is an overall configuration diagram of a feeding system 10 according to the second embodiment.

Description of Embodiments

[0010] At least the following content will be apparent from the following specification and the drawings.

[0011] A feeding system will be apparent that includes a feeding apparatus for supplying food to cultivated fish in a fish enclosure; a camera; and an image processing apparatus for analyzing motion of an image indicated by image data acquired by the camera, wherein, if an amount indicating the motion of the image has become smaller than or equal to a predetermined amount while the feeding apparatus is supplying food, the feeding apparatus is caused to stop supplying food. According to this feeding system, appropriate feeding can be realized by controlling feeding in accordance with the eating behavior of cultivated fish.

[0012] It is desirable that the image processing apparatus computes the amount

surface opposing a feeding opening). The second embodiment is advantageous in that the camera 32 does not need to be installed in the water.

[0050] In the second embodiment as well, similarly to the above-described first embodiment, the image processing apparatus 35 analyzes moving image data acquired by the camera 32, computes a movement vector of each pixel using dense optical flow, computes the sum of the absolute magnitudes (movement amounts) of the movement vectors of the respective pixels, and computes the resulting value as the action amount.

[0051] If the cultivated fish eat while the automated feeding apparatus 20 is supplying food, a water splash occurs on the water surface, which increases the value of the action amount computed based on image data. On the other hand, if the cultivated fish no longer eat, the water surface becomes calm, and thus the value of the action amount computed based on image data decreases.

[0052] In the second embodiment as well, similarly to the above-described first embodiment, the action amount computed in step S005 is compared with a threshold indicating a predetermined amount (S006). If the action amount exceeds the threshold (YES in S006), the image processing apparatus 35 transmits, to the control unit 33, an instruction to cause the automated feeding apparatus 20 to continue the feeding operation (S007). On the other hand, if the action amount computed in step S005 has become smaller than or equal to the threshold (NO in S006), the image processing apparatus 35 transmits, to the control unit 35, an instruction to cause the automated feeding apparatus 20 to stop the feeding operation (S008). Thus, the automated feeding apparatus 20 can stop the feeding operation before the preset feeding time and feeding amount are reached, making it possible to suppress the case where excessive food is