

CLAIMS

[Claim 1]

A crowd monitoring system that obtains a density of an object on the basis of image information, comprising:

an image acquiring unit that acquires a plurality of images;

an image feature quantity acquiring unit that obtains an image feature quantity of the object in the acquired image;

a motion line acquiring unit that obtains a motion line of the object in the acquired image;

a motion feature quantity acquiring unit that obtains a motion feature quantity of the object on the basis of the obtained motion line;

a storage unit that stores information of a relation between the image feature quantity and the density of the object acquired in advance, and a relation between the motion feature quantity and the density of the object acquired in advance; and

a density acquiring unit that determines the density of the object,

wherein the density acquiring unit obtains

a first density estimation value of the object on the basis of the obtained image feature quantity and a relation between the stored image feature quantity and the density of the object,

a second density estimation value of the object on the basis of the obtained motion feature quantity and a relation

between the stored motion feature quantity and the density of the object, and

wherein the motion feature quantity is a magnitude of a horizontal swaying with respect to an advancing direction of the object obtained from the plurality of acquired images.

[Claim 2]

The crowd monitoring system according to claim 1,
wherein the image feature quantity is an edge quantity in the image.

[Claim 3]

The crowd monitoring system according to claim 1,
wherein the motion feature quantity is a distance between a start point and an end point of the motion line.

[Claim 4]

The crowd monitoring system according to claim 1,
wherein the motion line acquiring unit obtains a feature point with respect to an object in the entire monitoring region in the acquired image, and acquires the motion line by tracking the obtained feature point.

[Claim 5]

The crowd monitoring system according to claim 4,
wherein the motion line acquiring unit obtains feature points with respect to a plurality of objects in the entire monitoring region in the acquired image, and acquires a plurality of the motion lines by tracking the plurality of

obtained feature points.

[Claim 6]

The crowd monitoring system according to claim 5,
wherein the motion feature quantity acquiring unit sends an average value of the motion feature quantities acquired on the basis of the plurality of obtained motion lines to the density acquiring unit.

[Claim 7]

The crowd monitoring system according to claim 1,
wherein the density acquiring unit employs any one of the first density estimation value and the second density estimation value on the basis of the obtained first density estimation value, the obtained second density estimation value, and a predetermined threshold.

[Claim 8]

The crowd monitoring system according to claim 7,
wherein the density acquiring unit employs the first density estimation value in a case where the obtained first density estimation value is smaller than the predetermined threshold.

[Claim 9]

The crowd monitoring system according to claim 7,
wherein the density acquiring unit employs the second density estimation value in a case where the obtained first density estimation value is larger than the predetermined

threshold.

[Claim 10]

The crowd monitoring system according to claim 7,
wherein the density acquiring unit employs the first density estimation value in a case where the obtained first density estimation value is smaller than the predetermined threshold, and does not obtain the second density estimation value.

[Claim 11]

A crowd monitoring system that obtains a density of an object on the basis of image information, comprising:

an image acquiring unit that acquires a plurality of images;

an image feature quantity acquiring unit that obtains an image feature quantity of the object in the acquired image;

a motion line acquiring unit that obtains a motion line of the object in the acquired image;

a motion feature quantity acquiring unit that obtains a motion feature quantity of the object on the basis of the obtained motion line;

a storage unit that stores information of a relation between the image feature quantity and the density of the object acquired in advance, and a relation between the motion feature quantity and the density of the object acquired in advance; and

a density acquiring unit that determines the density of

the object,

wherein the density acquiring unit obtains

a first density estimation value of the object on the basis of the obtained image feature quantity and a relation between the stored image feature quantity and the density of the object,

a second density estimation value of the object on the basis of the obtained motion feature quantity and a relation between the stored motion feature quantity and the density of the object, and

wherein the motion feature quantity acquiring unit obtains the motion feature quantity on the basis of a value obtained by dividing a length of the obtained motion line by a distance between a start point and an end point of the motion line.

[Claim 12]

The crowd monitoring system according to claim 11,

wherein the image feature quantity is an edge quantity in the image.

[Claim 13]

The crowd monitoring system according to claim 11,

wherein the motion feature quantity is a distance between a start point and an end point of the motion line.

[Claim 14]

The crowd monitoring system according to claim 11,

wherein the motion line acquiring unit obtains a feature

point with respect to an object in the entire monitoring region in the acquired image, and acquires the motion line by tracking the obtained feature point.

[Claim 15]

The crowd monitoring system according to claim 14,
wherein the motion line acquiring unit obtains feature points with respect to a plurality of objects in the entire monitoring region in the acquired image, and acquires a plurality of the motion lines by tracking the plurality of obtained feature points.

[Claim 16]

The crowd monitoring system according to claim 15,
wherein the motion feature quantity acquiring unit sends an average value of the motion feature quantities acquired on the basis of the plurality of obtained motion lines to the density acquiring unit.

[Claim 17]

The crowd monitoring system according to claim 11,
wherein the density acquiring unit employs any one of the first density estimation value and the second density estimation value on the basis of the obtained first density estimation value, the obtained second density estimation value, and a predetermined threshold.

[Claim 18]

The crowd monitoring system according to claim 17,

wherein the density acquiring unit employs the first density estimation value in a case where the obtained first density estimation value is smaller than the predetermined threshold.

[Claim 19]

The crowd monitoring system according to claim 17,

wherein the density acquiring unit employs the second density estimation value in a case where the obtained first density estimation value is larger than the predetermined threshold.

[Claim 20]

The crowd monitoring system according to claim 17,

wherein the density acquiring unit employs the first density estimation value in a case where the obtained first density estimation value is smaller than the predetermined threshold, and does not obtain the second density estimation value.