

What is claimed is:

1. An image search system, comprising:

a video taking unit configured to take a video;

5 a search unit comprising a storage unit and configured to search for an image that is contained in the video;

an input unit configured to receive information that is input to the search unit; and

10 a display unit configured to display information that is output from the search unit,

wherein the storage unit is configured to hold information indicating shapes of trajectories that represent travel paths of a plurality of moving objects extracted from the video, and

wherein the search unit is configured to:

15 search, when information indicating a trajectory shape is input from the input unit, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the input trajectory shape; and

20 display, on the display unit, images of the moving objects that have traveled along the trajectories found through the search.

2. The image search system according to claim 1,

25 wherein the storage unit is configured to further hold information indicating image feature amounts of image areas of a plurality of types that are extracted from the video, and

wherein the search unit is configured to:

calculate, when information indicating an image feature amount of at least one type of image area, and information indicating weights of a feature amount of the input trajectory shape and each image

feature amount of the at least one type of image area are input from the input unit in addition to the information indicating a trajectory shape, similarity degree scores based on degrees of similarity between the input trajectory shape and the shapes of the trajectories of the plurality of moving objects that are held in the storage unit, degrees of similarity between the input image feature amount of the at least one type of image area and the image feature amounts held in the storage unit, and the weights; and

display, on the display unit, in an order of similarity degree scores, images of the moving objects that have traveled along the trajectories found through the search.

3. The image search system according to claim 1,

wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

wherein the search unit is configured to:

display a map of the space on the display unit;

convert, when information indicating a trajectory shape on the map of the space is input, the input trajectory shape into a trajectory shape on a video taken by the video taking unit, based on the conversion information; and

search the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the trajectory shape created by the conversion.

4. The image search system according to claim 1,

wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter

5 for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

wherein the search unit is configured to:

10 convert the trajectory shapes found through the search into trajectory shapes on the map of the space, based on the conversion information; and

display the map of the space and the trajectory shapes created by the conversion on the display unit.

5. The image search system according to claim 1,

15 wherein the storage unit is configured to further hold information indicating movement time points of the plurality of moving objects, and

wherein the search unit is configured to:

20 search, when information indicating a plurality of trajectory shapes is input from the input unit, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories of a plurality of moving objects that are similar to the plurality of trajectory shapes input and that fulfill a given condition with regard to the movement time points; and

25 display, on the display unit, images of the plurality of moving objects that have traveled along the trajectories found through the search.

6. An image search apparatus, comprising:

a processor; and

a storage unit coupled to the processor,

wherein the storage unit is configured to hold information indicating shapes of trajectories that represent travel paths of a plurality of moving objects extracted from a video taken by a video taking unit, and

wherein the processor is configured to:

5 search, when information indicating a trajectory shape is input, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the input trajectory shape; and

10 output images of the moving objects that have traveled along the trajectories found through the search.

7. The image search apparatus according to claim 6,

15 wherein the storage unit is configured to further hold information indicating image feature amounts of image areas of a plurality of types that are extracted from the video, and

wherein the processor is configured to:

20 calculate, when information indicating an image feature amount of at least one type of image area, and information indicating weights of a feature amount of the input trajectory shape and each image feature amount of the at least one type of image area are input in addition to the information indicating a trajectory shape, similarity degree scores based on degrees of similarity between the input trajectory shape and the shapes of the trajectories of the plurality of moving objects that are held in the storage unit, degrees of similarity between the input image feature amount of the at
25 least one type of image area and the image feature amounts held in the storage unit, and the weights; and

output information for displaying, in an order of similarity degree scores, images of the moving objects that have traveled along the trajectories found through the search.

8. The image search apparatus according to claim 6,
wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

5 and

conversion information for identifying a conversion parameter
for conversion between coordinates on a map of the space and coordinates
on a video taken by the video taking unit, and

wherein the processor is configured to:

10 output a map of the space;
convert, when information indicating a trajectory shape on the
map of the space is input, the input trajectory shape into a trajectory shape
on a video taken by the video taking unit, based on the conversion
information; and

15 search the trajectories of the plurality of moving objects that
are held in the storage unit for trajectories that are similar to the trajectory
shape created by the conversion.

9. The image search apparatus according to claim 6,
20 wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter
for conversion between coordinates on a map of the space and coordinates
25 on a video taken by the video taking unit, and

wherein the processor is configured to:

convert the trajectory shapes found through the search into
trajectory shapes on the map of the space, based on the conversion
information; and

output information indicating the map of the space and the trajectory shapes created by the conversion.

10. The image search apparatus according to claim 6,

5 wherein the storage unit is configured to further hold information indicating movement time points of the plurality of moving objects, and

wherein the processor is configured to:

search, when information indicating a plurality of trajectory shapes is input, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories of a plurality of moving objects that are similar to the plurality of trajectory shapes input and that fulfill a given condition with regard to the movement time points; and

output images of the plurality of moving objects that have traveled along the trajectories found through the search.

15 11. An image search method, which is to be executed by an image search system,

the image search system comprising:

a video taking unit configured to take a video;

20 a search unit comprising a processor and a storage unit and configured to search for an image that is contained in the video;

an input unit configured to receive information that is input to the search unit and

25 a display unit configured to display information that is output from the search unit,

the storage unit being configured to hold information indicating shapes of trajectories that represent travel paths of a plurality of moving objects extracted from the video,

the image search method comprising:

searching, by the search unit, when information indicating a trajectory shape is input from the input unit, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the input trajectory shape; and

- 5 displaying, by the search unit, on the display unit, images of the moving objects that have traveled along the trajectories found through the search.

What is claimed is:

1. An image search system, comprising:

a video taking unit configured to take a video;

5 a search unit comprising a storage unit and configured to search for an image that is contained in the video;

an input unit configured to receive information that is input to the search unit; and

10 a display unit configured to display information that is output from the search unit,

wherein the storage unit is configured to hold information indicating shapes of trajectories that represent travel paths of a plurality of moving objects extracted from the video, and

wherein the search unit is configured to:

15 search, when information indicating a trajectory shape is input from the input unit, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the input trajectory shape; and

20 display, on the display unit, images of the moving objects that have traveled along the trajectories found through the search, and

wherein the storage unit is configured to further hold information indicating image feature amounts of image areas of a plurality of types that are extracted from the video, and

wherein the search unit is further configured to:

25 calculate, when information indicating an image feature amount of at least one type of image area, and information indicating weights of a feature amount of the input trajectory shape and each image feature amount of the at least one type of image area are input from the input unit in addition to the information indicating a trajectory shape,

similarity degree scores based on degrees of similarity between the input trajectory shape and the shapes of the trajectories of the plurality of moving objects that are held in the storage unit, degrees of similarity between the input image feature amount of the at least one type of image area and the image feature amounts held in the storage unit, and the weights; and

display, on the display unit, in an order of similarity degree scores, images of the moving objects that have traveled along the trajectories found through the search.

2. The image search system according to claim 1,

wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter

for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

wherein the search unit is configured to:

display a map of the space on the display unit;

convert, when information indicating a trajectory shape on the map of the space is input, the input trajectory shape into a trajectory shape on a video taken by the video taking unit, based on the conversion information; and

search the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the trajectory shape created by the conversion.

3. The image search system according to claim 1,

wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

5 wherein the search unit is configured to:

convert the trajectory shapes found through the search into trajectory shapes on the map of the space, based on the conversion information; and

10 display the map of the space and the trajectory shapes created by the conversion on the display unit.

4. The image search system according to claim 1,

wherein the storage unit is configured to further hold information indicating movement time points of the plurality of moving objects, and

15 wherein the search unit is configured to:

search, when information indicating a plurality of trajectory shapes is input from the input unit, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories of a plurality of moving objects that are similar to the plurality of trajectory shapes input and that fulfill a given condition with regard to the movement time points; and

20 display, on the display unit, images of the plurality of moving objects that have traveled along the trajectories found through the search.

25 5. An image search apparatus, comprising:

a processor; and

a storage unit coupled to the processor,

wherein the storage unit is configured to hold information indicating shapes of trajectories that represent travel paths of a plurality of moving

objects extracted from a video taken by a video taking unit, and

wherein the processor is configured to:

search, when information indicating a trajectory shape is input, the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the input trajectory shape; and

output images of the moving objects that have traveled along the trajectories found through the search, and wherein the storage unit is configured to further hold information indicating image feature amounts of image areas of a plurality of types that are extracted from the video, and

wherein the processor is further configured to:

calculate, when information indicating an image feature amount of at least one type of image area, and information indicating weights of a feature amount of the input trajectory shape and each image feature amount of the at least one type of image area are input in addition to the information indicating a trajectory shape, similarity degree scores based on degrees of similarity between the input trajectory shape and the shapes of the trajectories of the plurality of moving objects that are held in the storage unit, degrees of similarity between the input image feature amount of the at least one type of image area and the image feature amounts held in the storage unit, and the weights; and

output information for displaying, in an order of similarity degree scores, images of the moving objects that have traveled along the trajectories found through the search.

6. The image search apparatus according to claim 5,

wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

wherein the processor is configured to:

5 output a map of the space;

convert, when information indicating a trajectory shape on the map of the space is input, the input trajectory shape into a trajectory shape on a video taken by the video taking unit, based on the conversion information; and

10 search the trajectories of the plurality of moving objects that are held in the storage unit for trajectories that are similar to the trajectory shape created by the conversion.

7. The image search apparatus according to claim 5,

15 wherein the storage unit is configured to further hold:

map information of a space taken by the video taking unit;

and

conversion information for identifying a conversion parameter for conversion between coordinates on a map of the space and coordinates on a video taken by the video taking unit, and

20 on a video taken by the video taking unit, and

wherein the processor is configured to:

convert the trajectory shapes found through the search into trajectory shapes on the map of the space, based on the conversion information; and

25 output information indicating the map of the space and the trajectory shapes created by the conversion.

8. The image search apparatus according to claim 5,

wherein the storage unit is configured to further hold information

indicating movement time points of the plurality of moving objects, and
 wherein the processor is configured to:

search, when information indicating a plurality of trajectory
 shapes is input, the trajectories of the plurality of moving objects that are
 5 held in the storage unit for trajectories of a plurality of moving objects that
 are similar to the plurality of trajectory shapes input and that fulfill a given
 condition with regard to the movement time points; and

output images of the plurality of moving objects that have
 traveled along the trajectories found through the search.

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9. An image search method, which is to be executed by an image
 search system,

the image search system comprising:

a video taking unit configured to take a video;

15 a search unit comprising a processor and a storage
 unit and configured to search for an image that is contained in the video;

an input unit configured to receive information that is
 input to the search unit; and

20 a display unit configured to display information that is
 output from the search unit,

the storage unit being configured to configured to hold
 information indicating shapes of trajectories that represent travel paths of a
 plurality of moving objects extracted from the video,

the image search method comprising:

25 searching, by the search unit, when information indicating a
 trajectory shape is input from the input unit, the trajectories of the plurality
 of moving objects that are held in the storage unit for trajectories that are
 similar to the input trajectory shape; and

displaying, by the search unit, on the display unit, images of the

moving objects that have traveled along the trajectories found through the search, and

wherein the storage unit is configured to further hold information indicating image feature amounts of image areas of a plurality of types that are extracted from the video, and

wherein the method further comprises:

calculating, when information indicating an image feature amount of at least one type of image area, and information indicating weights of a feature amount of the input trajectory shape and each image feature amount of the at least one type of image area are input from the input unit in addition to the information indicating a trajectory shape, similarity degree scores based on degrees of similarity between the input trajectory shape and the shapes of the trajectories of the plurality of moving objects that are held in the storage unit, degrees of similarity between the input image feature amount of the at least one type of image area and the image feature amounts held in the storage unit, and the weights; and

displaying, on the display unit, in an order of similarity degree scores, images of the moving objects that have traveled along the trajectories found through the search.