

CLAIMS

1. A method for filtrating images, comprising:

obtaining a first image, wherein the first image is an image frame in a video stream obtained by collecting images of a target area;

detecting the first image to obtain a first detection result of a target object in the first image;

determining a state of a target object which state is to be determined according to the first detection result of the target object in the first image and a second detection result of the target object which state is to be determined, wherein the target object which state is to be determined is one target object in the first image, the second detection result of the target object which state is to be determined is a detection result of the target object which state is to be determined in at least one second image frame in N image frames, adjacent to the first image, in the video stream, obtained by detecting the second image, and N is a positive integer; and

determining a quality level of an image in a bounding box of the target object which state is to be determined according to the state of the target object which state is to be determined, wherein the bounding box of the target object which state is to be determined, is determined according to the first detection result of the target object which state is to be determined.

2. The method according to claim 1, wherein the state of the target object which state is to be determined comprises an occlusion state and a motion state, and the determining a state of a target object which state is to be determined according to the first detection result of the target object in the first image and a second detection result of the target object which state is to be determined comprises:

determining a motion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and the second detection result of the target object which state is to be determined;

determining whether the motion state of the target object which state is to be determined satisfies a preset motion state condition; and

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and a first detection result of other target objects in the first image except the target object which state is to be determined.

3. The method according to claim 2, wherein the first detection result of the target object in

the first image comprises a bounding box of the target object in the first image, and the in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and a first detection result of other target objects in the first image except the target object which state is to be determined comprises:

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined.

4. The method according to claim 3, wherein the target object which state is to be determined is a first-category target object, and the video stream is collected at an overhead view of the target area; and the in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined comprises:

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of each of other target objects in the first image except the target object which state is to be determined is less than or equal to zero, determining that the target object which state is to be determined is in an unoccluded state; and

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of at least one of other target objects in the first image except the target object which state is to be determined is greater than zero, determining that the target object which state is to be determined is in an occluded state.

5. The method according to claim 3, wherein the target object which state is to be determined is a second-category target object, and the video stream is collected at a side view of

the target area; and the in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined comprises:

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of each of other target objects in the first image except the target object which state is to be determined is less than or equal to zero, determining that the target object which state is to be determined is in an unoccluded state.

6. The method according to claim 3, wherein the target object which state is to be determined is a second-category target object, and the video stream is collected at a side view of the target area; and the in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determining an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined comprises:

in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of at least one of other target objects in the first image except the target object which state is to be determined is greater than zero, determining, according to the position of the target object which state is to be determined in a synchronous image, the position of the other target object with the intersection-over-union of a bounding box and the bounding box of the target object which state is to be determined greater than zero in the synchronous image, and the position of an image collection device for collecting the video stream, whether the distance between the target object which state is to be determined and the image collection device for collecting the video stream is less than the distance between the other target object with the intersection-over-union of the bounding box and the bounding box of the target object which state is to be determined greater than zero and the image collection device for collecting the video stream, wherein the synchronous image is collected synchronously with the first image at the overhead view of the

target area;

in response to that the distance between the target object which state is to be determined and the image collection device for collecting the video stream is less than the distance between any target object with the intersection-over-union of the bounding box and the bounding box of the target object which state is to be determined greater than zero and the image collection device for collecting the video stream, determining that the target object which state is to be determined is in an unoccluded state; and

in response to that the distance between the target object which state is to be determined and the image collection device for collecting the video stream is greater than the distance between one target object with the intersection-over-union of the bounding box and the bounding box of the target object which state is to be determined greater than zero and the image collection device for collecting the video stream, determining that the target object which state is to be determined is in an occluded state.

7. The method according to any one of claims 2 to 6, wherein the determining a motion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and the second detection result of the target object which state is to be determined comprises:

determining a first position of the target object which state is to be determined in the first image according to the first detection result of the target object which state is to be determined;

determining a second position of the target object which state is to be determined in the second image according to the second detection result of the target object which state is to be determined;

determining a motion speed of the target object which state is to be determined according to the first position, the second position, the time when the first image is collected, and the time when the second image is collected; and

determining the motion state of the target object which state is to be determined according to the motion speed of the target object which state is to be determined; and

the determining whether the motion state of the target object which state is to be determined satisfies a preset motion state condition comprises:

determining whether the motion state of the target object which state is to be determined satisfies the preset motion state condition according to the motion speed of the target object which state is to be determined and an image collection frame rate of the image collection device

for collecting the video stream.

8. The method according to any one of claims 1 to 6, wherein the state of the target object which state is to be determined comprises an occlusion state and a motion state, the occlusion state of the target object which state is to be determined comprises an unoccluded state and an occluded state, and the motion state of the target object which state is to be determined comprises satisfying the preset motion state condition and dissatisfying the preset motion state condition;

the determining the quality level of an image in a bounding box of the target object which state is to be determined according to the state of the target object which state is to be determined comprises:

in the case that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the target object which state is to be determined is in the unoccluded state, determining that the image in the bounding box of the target object which state is to be determined is a first quality image;

in the case that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the target object which state is to be determined is in the occluded state, determining that the image in the bounding box of the target object which state is to be determined is a second quality image; and

in the case that the motion state of the target object which state is to be determined dissatisfies the preset motion state condition, determining that the image in the bounding box of the target object which state is to be determined is a third quality image.

9. The method according to any one of claims 1 to 8, further comprising:

determining a quality classification result of the image in the bounding box of the target object which state is to be determined in the first image via a neural network, wherein the neural network is trained with sample images annotated with quality levels, and one sample image comprises at least one target object which state is to be determined; and

in response to that the quality classification result of the image in the bounding box of the target object which state is to be determined, determined by the neural network is consistent with the quality level of the image in the bounding box of the target object which state is to be determined, determined according to the state of the target object which state is to be determined, taking the quality level of the image in the bounding box of the target object which state is to be determined, as the target quality level of the image in the bounding box of the target object

which state is to be determined.

10. An apparatus for filtrating images, comprising:

an image obtaining unit, configured to obtain a first image, wherein the first image is an image frame in a video stream obtained by collecting images of a target area;

a detection result obtaining unit, configured to detect the first image to obtain a first detection result of a target object in the first image;

a state determining unit, configured to determine a state of a target object which state is to be determined according to the first detection result of the target object in the first image and a second detection result of the target object which state is to be determined, wherein the target object which state is to be determined is one target object in the first image, the second detection result of the target object which state is to be determined is a detection result of the target object which state is to be determined in at least one second image frame in N image frames, adjacent to the first image, in the video stream, obtained by detecting the second image, and N is a positive integer; and

a quality determining unit, configured to determine a quality level of an image in a bounding box of the target object which state is to be determined according to the state of the target object which state is to be determined, wherein the bounding box of the target object which state is to be determined is determined according to the first detection result of the target object which state is to be determined.

11. The apparatus according to claim 10, wherein the state determining unit is specifically configured to: determine a motion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and the second detection result of the target object which state is to be determined; determine whether the motion state of the target object which state is to be determined satisfies a preset motion state condition; and in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determine an occlusion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and a first detection result of other target objects in the first image except the target object which state is to be determined.

12. The apparatus according to claim 11, wherein the first detection result of the target object in the first image comprises a bounding box of the target object in the first image, the state determining unit configured to determine an occlusion state of the target object which state is to be determined according to the first detection result of the target object which state is to be

determined and a first detection result of other target objects in the first image except the target object which state is to be determined in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, is specifically configured to: in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, determine an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined.

13. The apparatus according to claim 12, wherein the target object which state is to be determined is a first-category target object, and the video stream is collected at an overhead view of the target area; the state determining unit configured to determine an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, is specifically configured to: in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of each of other target objects in the first image except the target object which state is to be determined is less than or equal to zero, determine that the target object which state is to be determined is in an unoccluded state; and in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of at least one of other target objects in the first image except the target object which state is to be determined is greater than zero, determine that the target object which state is to be determined is in an occluded state.

14. The apparatus according to claim 12, wherein the target object which state is to be determined is a second-category target object, and the video stream is collected at a side view of the target area; the state determining unit configured to determine an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, is specifically configured to: in response to that the motion state of

the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of each of other target objects in the first image except the target object which state is to be determined is less than or equal to zero, determine that the target object which state is to be determined is in an unoccluded state.

15. The apparatus according to claim 12, wherein the target object which state is to be determined is a second-category target object, and the video stream is collected at a side view of the target area; the state determining unit configured to determine an occlusion state of the target object which state is to be determined according to an intersection-over-union of the bounding box of the target object which state is to be determined and a bounding box of each of other target objects in the first image except the target object which state is to be determined in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, is specifically configured to: in response to that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the intersection-over-union of the bounding box of the target object which state is to be determined and the bounding box of at least one of other target objects in the first image except the target object which state is to be determined is greater than zero, determine, according to the position of the target object which state is to be determined in a synchronous image, the position of the other target object with the intersection-over-union of a bounding box and the bounding box of the target object which state is to be determined greater than zero in the synchronous image, and the position of an image collection device for collecting the video stream, whether the distance between the target object which state is to be determined and the image collection device for collecting the video stream is less than the distance between the other target object with the intersection-over-union of the bounding box and the bounding box of the target object which state is to be determined greater than zero and the image collection device for collecting the video stream, wherein the synchronous image is collected synchronously with the first image at the overhead view of the target area; in response to that the distance between the target object which state is to be determined and the image collection device for collecting the video stream is less than the distance between any target object with the intersection-over-union of the bounding box and the bounding box of the target object which state is to be determined greater than zero and the image collection device for collecting the video stream, determine that the target object which state is to be determined is in an unoccluded state; and in response to that the distance between the target object which state is to be determined and the image collection device for collecting the video stream is greater than the distance between one target object with the intersection-over-union of the bounding box and the bounding box of the target object which

state is to be determined greater than zero and the image collection device for collecting the video stream, determine that the target object which state is to be determined is in an occluded state.

16. The apparatus according to any one of claims 11 to 15, wherein the state determining unit configured to determine a motion state of the target object which state is to be determined according to the first detection result of the target object which state is to be determined and the second detection result of the target object which state is to be determined, is specifically configured to: determine a first position of the target object which state is to be determined in the first image according to the first detection result of the target object which state is to be determined; determine a second position of the target object which state is to be determined in the second image according to the second detection result of the target object which state is to be determined; determine a motion speed of the target object which state is to be determined according to the first position, the second position, the time when the first image is collected, and the time when the second image is collected; and determine the motion state of the target object which state is to be determined according to the motion speed of the target object which state is to be determined; and the state determining unit configured to determine whether the motion state of the target object which state is to be determined satisfies a preset motion state condition, is specifically configured to: determine whether the motion state of the target object which state is to be determined satisfies the preset motion state condition according to the motion speed of the target object which state is to be determined and an image collection frame rate of the image collection device for collecting the video stream.

17. The apparatus according to any one of claims 10 to 15, wherein the state of the target object which state is to be determined comprises an occlusion state and a motion state, the occlusion state of the target object which state is to be determined comprises an unoccluded state and an occluded state, and the motion state of the target object which state is to be determined comprises satisfying the preset motion state condition and dissatisfying the preset motion state condition; the quality determining unit is specifically configured to: in the case that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the target object which state is to be determined is in the unoccluded state, determine that the image in the bounding box of the target object which state is to be determined is a first quality image; in the case that the motion state of the target object which state is to be determined satisfies the preset motion state condition, and the target object which state is to be determined is in the occluded state, determine that the image in the bounding box of the target object which state is to be determined is a second quality image; and in the case that the motion

state of the target object which state is to be determined dissatisfies the preset motion state condition, determine that the image in the bounding box of the target object which state is to be determined is a third quality image.

18. The apparatus according to any one of claims 10 to 17, further comprising a classification unit, configured to determine a quality classification result of the image in the bounding box of the target object which state is to be determined in the first image via a neural network, wherein the neural network is trained with sample images annotated with quality levels, and one sample image comprises at least one target object which state is to be determined; and in response to that the quality classification result of the image in the bounding box of the target object which state is to be determined, determined by the neural network is consistent with the quality level of the image in the bounding box of the target object which state is to be determined, determined according to the state of the target object which state is to be determined, take the quality level of the image in the bounding box of the target object which state is to be determined, as the target quality level of the image in the bounding box of the target object which state is to be determined.

19. An electronic device, comprising a memory and a processor, wherein the memory is configured to store computer instructions run on the processor, and the processor is configured to implement the method according to any one of claims 1 to 9 when the computer instructions are executed.

20. A computer-readable storage medium having a computer program stored thereon, wherein when the program is executed by a processor, the method according to any one of claims 1 to 9 is implemented.