CLAIMS

1. A body and hand correlation method, comprising:

in an image to be detected of which an image content comprises a body to be correlated and a hand to be correlated, determining a first correlation probability between a body detection box of the body to be correlated and a hand detection box of the hand to be correlated;

when the first correlation probability is greater than a first threshold, determining, based on key points in the body detection box, a second correlation probability between the body to be correlated and a wrist key point in the key points, wherein the key points in the body detection box comprise the wrist key point and an elbow key point belonging to the same arm;

when the second correlation probability is greater than a second threshold, determining a third correlation probability between the hand detection box and the wrist key point based on the wrist key point and elbow key point belonging to the same arm; and

when the third correlation probability is greater than a third threshold, determining a correlation degree between the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability.

2. The method of claim 1, wherein determining the first correlation probability between the body detection box of the body to be correlated and the hand detection box of the hand to be correlated in the image to be detected of which the image content comprises the body to be correlated and the hand to be correlated comprises:

determining a body feature in the body detection box and a hand feature in the hand detection box; and

determining the first correlation probability between the body detection box and the hand detection box based on the body feature and the hand feature.

3. The method of claim 1 or 2, wherein determining, based on the key points in the body detection box, the second correlation probability between the body to be correlated and the wrist key point in the key points comprises:

determining a confidence that the wrist key point is a truth point; and

determining a correlation probability between the body to be correlated and the wrist key point based on the confidence to obtain the second correlation probability.

4. The method of claim 3, wherein determining the correlation probability between the body to be correlated and the wrist key point based on the confidence to obtain the second correlation probability comprises:

determining the confidence as the second correlation probability.

5. The method of any one of claims 1-4, wherein determining the third correlation probability between the hand detection box and the wrist key point based on the wrist key point and elbow key point belonging to the same arm comprises:

determining a positional relationship between the wrist key point and the hand detection box based on the wrist key point and elbow key point belonging to the same arm; and

determining the third correlation probability based on the positional relationship and a confidence corresponding to the wrist key point, the confidence corresponding to the wrist key point comprising the confidence that the wrist key point is a truth point.

6. The method of claim 5, wherein determining the positional relationship between the wrist key point and the hand detection box based on the wrist key point and elbow key point belonging to the same arm comprises:

determining a first connecting line connecting the wrist key point and elbow key point belonging to the same arm;

determining a second connecting line connecting the wrist key point and a preset point in the hand detection box; and

determining an included angle between the first connecting line and the second connecting line by taking the wrist key point as a vertex along a forearm direction of the arm to obtain the positional relationship.

7. The method of claim 6, wherein determining the third correlation probability based on the positional relationship and the confidence corresponding to the wrist key point comprises:

determining, when the included angle is less than a preset angle threshold, a distance from the wrist key point to the preset point in the hand detection box; and

determining the third correlation probability based on the included angle, the distance and the confidence corresponding to the wrist key point.

8. The method of claim 7, wherein determining the third correlation probability based on the included angle, the distance and the confidence corresponding to the wrist key point comprises:

determining a first confidence of the distance based on a first difference between the distance and a preset length threshold;

determining a second confidence of the included angle based on a second difference between the included angle and the preset angle threshold; and

fusing the first confidence, the second confidence and the confidence corresponding to the wrist key point to obtain the third correlation probability.

9. The method of any one of claims 1-8, wherein determining the correlation degree between

the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability comprises:

correcting the first correlation probability based on the second correlation probability and the third correlation probability to obtain a corrected first probability; and

determining the correlation degree between the body to be correlated and the hand to be correlated based on the corrected first probability.

10. The method of claim 9, wherein, when the image content of the image to be detected comprises multiple bodies to be correlated and multiple hands to be correlated, determining the correlation degree between the body to be correlated and the hand to be correlated based on the corrected first probability comprises:

determining a corrected first probability between each body to be correlated and each hand to be correlated to obtain a corrected first probability set;

screening a target corrected first probability with a probability value greater than a preset probability threshold from the corrected first probability set; and

determining, based on the target corrected first probability, the hand to be correlated matched with the body to be correlated corresponding to the target corrected first probability.

11. The method of any one of claims 1-10, wherein determining the second correlation probability between the body to be correlated and the wrist key point in the key points comprises:

when the first correlation probability is greater than the preset probability threshold, determining the second correlation probability between the body to be correlated and the wrist key point in the key points;

determining the third correlation probability between the hand detection box and the wrist key point comprises:

when the second correlation probability is greater than the preset probability threshold, determining the third correlation probability; and

determining the correlation degree between the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability comprises:

when the third correlation probability is greater than the preset probability threshold, determining the correlation degree between the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability.

12. The method of claim 10, further comprising: before determining the correlation degree between the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability,

fusing the first correlation probability, the second correlation probability and the third correlation probability to obtain a fused probability; and

when the fused probability is less than a third preset probability threshold, updating a position of the wrist key point corresponding to the second correlation probability to obtain an updated wrist key point.

13. The method of any one of claims 1-12, further comprising: before determining the first correlation probability between the body detection box of the body to be correlated and the hand detection box of the hand to be correlated,

performing body detection, hand detection, and human key point detection on the image to be detected to determine the body detection box of the body to be correlated, the hand detection box of the hand to be correlated, and the key points of the body to be correlated.

14. A body and hand correlation apparatus, comprising:

a first determination module, configured to determine, in an image to be detected of which an image content comprises a body to be correlated and a hand to be correlated, a first correlation probability between a body detection box of the body to be correlated and a hand detection box of the hand to be correlated;

a second determination module, configured to determine, when the first correlation probability is greater than a first threshold, a second correlation probability between the body to be correlated and a wrist key point in the key points based on key points in the body detection box, wherein the key points in the body detection box comprise the wrist key point and an elbow key point belonging to the same arm;

a third determination module, configured to determine, when the second correlation probability is greater than a second threshold, a third correlation probability between the hand detection box and the wrist key point based on the wrist key point and elbow key point belonging to the same arm; and

a fourth determination module, configured to determine, when the third correlation probability is greater than a third threshold, a correlation degree between the body to be correlated and the hand to be correlated based on the first correlation probability, the second correlation probability and the third correlation probability.

15. The apparatus of claim 14, wherein the first determination module comprises:

a first determination submodule, configured to determine a body feature in the body detection box and a hand feature in the hand detection box; and

a second determination submodule, configured to determine the first correlation probability between the body detection box and the hand detection box based on the body feature and the hand feature.

16. The apparatus of claim 14 or 15, wherein the second determination module comprises:

a third determination submodule, configured to determine a confidence that the wrist key point is a truth point; and

a fourth determination submodule, configured to determine a correlation probability between the body to be correlated and the wrist key point based on the confidence to obtain the second correlation probability.

17. The apparatus of claim 16, wherein the third determination module comprises:

a fifth determination submodule, configured to determine a positional relationship between the wrist key point and the hand detection box based on the wrist key point and elbow key point belonging to the same arm; and

a sixth determination submodule, configured to determine the third correlation probability based on the positional relationship and a confidence corresponding to the wrist key point, the confidence corresponding to the wrist key point comprising the confidence that the wrist key point is a truth point.

18. The apparatus of any one of claims 14-17, wherein the fifth determination submodule comprises:

a first connecting unit, configured to determine a first connecting line connecting the wrist key point and elbow key point belonging to the same arm;

a second connecting unit, configured to determine a second connecting line connecting the wrist key point and a preset point in the hand detection box; and

a first determination unit, configured to determine an included angle between the first connecting line and the second connecting line by taking the wrist key point as a vertex along a forearm direction of the arm to obtain the positional relationship.

19. A computer storage medium, having a computer-executable instruction stored thereon, the

computer-executable instruction being executed to implement the body and hand correlation method of any one of claims 1-13.

20. A computer device, comprising a processor and a memory storing a computer-executable instruction, wherein the processor runs the computer-executable instruction in the memory to implement the body and hand correlation method of any one of claims 1-13.