

CLAIMS

What is claimed is:

1. An image prediction method, comprising:

5 obtaining a first reference unit of an image unit, wherein respective predicted images are obtained for the image unit and the first reference unit by using a same affine model;

obtaining motion information of basic motion compensation units at two or more preset positions in the first reference unit; and

0 obtaining motion information of a basic motion compensation unit of the image unit according to the motion information of the basic motion compensation units at the two or more preset positions in the first reference unit.

2. The method according to claim 1, wherein the obtaining a first reference unit of an image unit comprises:

5 checking, in preset order, whether a predicted image is obtained for a prediction unit adjacent to the image unit by using the affine model; and

if yes, stopping the checking and using the prediction unit as the first reference unit.

3. The method according to claim 1, wherein the preset position is a unit corner-point position in the first reference unit.

0 4. The method according to any one of claims 1 to 3, wherein the obtaining motion information of basic motion compensation units at two or more preset positions in the first reference unit comprises:

obtaining motion information of basic motion compensation units at three preset positions in the first reference unit; and

25 correspondingly, the obtaining motion information of a basic motion compensation unit of the image unit according to the motion information comprises:

obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the three preset positions in the first reference unit.

30 5. The method according to claim 4, wherein the obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the three preset positions in the first reference unit comprises:

assigning a same prediction direction to the basic motion compensation unit of the image unit and the basic motion compensation units at the three preset positions in the first reference unit;

assigning a same reference frame index to the basic motion compensation unit of the image unit and the basic motion compensation units at the three preset positions in the first reference unit;

and

obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the three preset positions in the first reference unit.

6. The method according to claim 5, wherein the obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the three preset positions in the first reference unit is implemented in the following manner:

$$vx = ax - by - e$$

$$vy = cx - dy - f$$

$$a = \frac{(x_1 - x_2)(y_1 - y_2)(vx_1 - vx_3) - (x_1 - x_2)(y_1 - y_3)(vx_1 - vx_2)}{(x_1 - x_2)(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)^2(y_1 - y_3)}$$

$$b = \frac{(x_1 - x_2)(vx_1 - vx_3) - (x_1 - x_3)(vx_1 - vx_2)}{(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)}$$

$$c = \frac{(x_1 - x_2)(y_1 - y_2)(vy_1 - vy_3) - (x_1 - x_2)(y_1 - y_3)(vy_1 - vy_2)}{(x_1 - x_2)(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)^2(y_1 - y_3)}$$

$$d = \frac{(x_1 - x_2)(vy_1 - vy_3) - (x_1 - x_3)(vy_1 - vy_2)}{(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)}$$

$$e = ax_1 - by_1 - vx_1$$

$$f = cx_1 - dy_1 - vy_1$$

wherein x and y are respectively horizontal and vertical coordinates of the basic motion compensation unit of the image unit, vx and vy are corresponding horizontal and vertical motion vectors, x_1 , x_2 , and x_3 and y_1 , y_2 , and y_3 are respectively horizontal and vertical coordinates of the basic motion compensation units at the three preset positions in the first reference unit, and vx_1 , vx_2 , and vx_3 and vy_1 , vy_2 , and vy_3 are corresponding horizontal and vertical motion vectors.

7. The method according to any one of claims 1 to 3, wherein the obtaining motion information of basic motion compensation units at two or more preset positions in the first reference unit comprises:

obtaining motion information of basic motion compensation units at two preset positions in the

first reference unit; and

correspondingly, the obtaining motion information of a basic motion compensation unit of the image unit according to the motion information comprises:

obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the two preset positions in the first reference unit.

8. The method according to claim 7, wherein the obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the two preset positions in the first reference unit comprises:

assigning a same prediction direction to the basic motion compensation unit of the image unit and the basic motion compensation units at the two preset positions in the first reference unit;

assigning a same reference frame index to the basic motion compensation unit of the image unit and the basic motion compensation units at the two preset positions in the first reference unit; and

obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the two preset positions in the first reference unit.

9. The method according to claim 8, wherein the obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the two preset positions in the first reference unit is implemented in the following manner:

$$vx = a_2x - a_3y - a_0$$

$$vy = a_2y + a_3x - a_1$$

$$a_0 = a_2x_2 - a_3y_2 - vx_2$$

$$a_1 = a_2y_2 + a_3x_2 - vy_2$$

$$a_2 = \frac{[(x_2 - x_1)^2 + (y_2 - y_1)^2](vx_2 - vx_1) + (x_2 - x_1)(y_2 - y_1)(vy_2 - vy_1) - (vx_2 - vx_1)(y_2 - y_1)^2}{(x_2 - x_1)[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

$$a_3 = \frac{(x_2 - x_1)(vy_2 - vy_1) - (y_2 - y_1)(vx_2 - vx_1)}{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

wherein x and y are respectively horizontal and vertical coordinates of the basic motion compensation unit of the image unit, vx and vy are corresponding horizontal and vertical motion vectors, x_1 and x_2 and y_1 and y_2 are respectively horizontal and vertical coordinates of the

basic motion compensation units at the two preset positions in the first reference unit, and vx_1 and vx_2 and vy_1 and vy_2 are corresponding horizontal and vertical motion vectors.

10. The method according to claim 1, further comprising: obtaining position information of the basic motion compensation units at the two or more preset positions in the first reference unit;

5 wherein the obtaining motion information of a basic motion compensation unit of the image unit according to the motion information of the basic motion compensation units at the two or more preset positions in the first reference unit, comprises:

0 obtaining motion information of two or more preset positions in the image unit according to the position information and motion information of the basic motion compensation units at the two or more preset positions in the first reference unit;

obtaining motion information of a basic motion compensation unit of the image unit according to the motion information of the two or more preset positions in the image unit and position information of the two or more preset positions in the image unit.

11. An image prediction device, comprising:

5 a first obtaining module, configured to obtain a first reference unit of an image unit, wherein respective predicted images are obtained for the image unit and the first reference unit by using a same affine model;

a second obtaining module, configured to obtain motion information of basic motion compensation units at two or more preset positions in the first reference unit; and

0 a third obtaining module, configured to obtain motion information of a basic motion compensation unit of the image unit according to position information and the motion information of the basic motion compensation units at the two or more preset positions in the first reference unit.

12. The device according to claim 11, wherein the first obtaining module is configured to:

25 check, in preset order, whether a predicted image is obtained for a prediction unit adjacent to the image unit by using the affine model; and

if yes, stop the checking and use the prediction unit as the first reference unit.

13. The device according to claim 11, wherein the preset position is a unit corner-point position in the first reference unit.

30 14. The device according to any one of claims 11 to 13, wherein the third obtaining module is configured to:

obtain motion information of basic motion compensation units at three preset positions in the first reference unit; and

correspondingly, the obtaining motion information of a basic motion compensation unit of the

image unit according to the motion information comprises:

obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the three preset positions in the first reference unit.

15. The device according to claim 14, wherein the third obtaining module is further configured to:

assign a same prediction direction to the basic motion compensation unit of the image unit and the basic motion compensation units at the three preset positions in the first reference unit;

assign a same reference frame index to the basic motion compensation unit of the image unit and the basic motion compensation units at the three preset positions in the first reference unit; and

obtain the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the three preset positions in the first reference unit.

16. The device according to claim 15, wherein the obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the three preset positions in the first reference unit is implemented in the following manner:

$$vx = ax - by - e$$

$$vy = cx - dy - f$$

$$a = \frac{(x_1 - x_2)(y_1 - y_2)(vx_1 - vx_3) - (x_1 - x_2)(y_1 - y_3)(vx_1 - vx_2)}{(x_1 - x_2)(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)^2(y_1 - y_3)}$$

$$b = \frac{(x_1 - x_2)(vx_1 - vx_3) - (x_1 - x_3)(vx_1 - vx_2)}{(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)}$$

$$c = \frac{(x_1 - x_2)(y_1 - y_2)(vy_1 - vy_3) - (x_1 - x_2)(y_1 - y_3)(vy_1 - vy_2)}{(x_1 - x_2)(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)^2(y_1 - y_3)}$$

$$d = \frac{(x_1 - x_2)(vy_1 - vy_3) - (x_1 - x_3)(vy_1 - vy_2)}{(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)}$$

$$e = ax_1 - by_1 - vx_1$$

$$f = cx_1 - dy_1 - vy_1$$

wherein x and y are respectively horizontal and vertical coordinates of the basic motion compensation unit of the image unit, vx and vy are corresponding horizontal and vertical motion vectors, x_1 , x_2 , and x_3 and y_1 , y_2 , and y_3 are respectively horizontal and vertical coordinates of the basic motion compensation units at the three preset positions in the first reference unit, and

vx_1 , vx_2 , and vx_3 and vy_1 , vy_2 , and vy_3 are corresponding horizontal and vertical motion vectors.

17. The device according to any one of claims 11 to 13, wherein the third obtaining module is configured to:

5 obtain motion information of basic motion compensation units at two preset positions in the first reference unit; and

correspondingly, the obtaining motion information of a basic motion compensation unit of the image unit according to the motion information comprises:

0 obtaining a prediction direction, a reference frame index, and a motion vector of the basic motion compensation unit of the image unit according to prediction directions, reference frame indexes, and motion vectors of the basic motion compensation units at the two preset positions in the first reference unit.

18. The device according to claim 17, wherein the third obtaining module is further configured to:

5 assign a same prediction direction to the basic motion compensation unit of the image unit and the basic motion compensation units at the two preset positions in the first reference unit;

assign a same reference frame index to the basic motion compensation unit of the image unit and the basic motion compensation units at the two preset positions in the first reference unit; and

0 obtain the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the two preset positions in the first reference unit.

19. The device according to claim 18, wherein the obtaining the motion vector of the basic motion compensation unit of the image unit by means of interpolation according to the motion vectors of the basic motion compensation units at the two preset positions in the first reference unit is implemented in the following manner:

$$vx = a_2x + a_3y + a_0$$

$$vy = a_2y + a_3x + a_1$$

$$a_0 = a_2x_2 - a_3y_2 - vx_2$$

$$a_1 = a_2y_2 + a_3x_2 - vy_2$$

$$a_2 = \frac{[(x_2 - x_1)^2 + (y_2 - y_1)^2](vx_2 - vx_1) + (x_2 - x_1)(y_2 - y_1)(vy_2 - vy_1) - (vx_2 - vx_1)(y_2 - y_1)^2}{(x_2 - x_1)[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

$$a_3 = \frac{(x_2 - x_1)(vy_2 - vy_1) - (y_2 - y_1)(vx_2 - vx_1)}{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

wherein x and y are respectively horizontal and vertical coordinates of the basic motion

compensation unit of the image unit, v_x and v_y are corresponding horizontal and vertical motion vectors, x_1 and x_2 and y_1 and y_2 are respectively horizontal and vertical coordinates of the basic motion compensation units at the two preset positions in the first reference unit, and v_{x1} and v_{x2} and v_{y1} and v_{y2} are corresponding horizontal and vertical motion vectors.

- 5 20. The device according to claim 11, wherein the third obtaining module is configured to:
- obtain motion information of two or more preset positions in the image unit according to position information of the basic motion compensation units at the two or more preset positions in the first reference unit and motion information of the basic motion compensation units at the two or more preset positions in the first reference unit;
- 0 obtain motion information of a basic motion compensation unit of the image unit according to the motion information of the two or more preset positions in the image unit and position information of the two or more preset positions in the image unit.