

CLAIMS

What is claimed is:

1. A picture prediction method, comprising:

obtaining initial motion information of a current picture block;

5 determining, from positions of N forward reference blocks and N backward reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block, wherein positions of N forward reference blocks and N backward reference blocks are based on the initial motion information, the N forward reference blocks comprising an
10 initial forward reference block and (N-1) candidate forward reference blocks, the N backward reference blocks comprising an initial backward reference block and (N-1) candidate backward reference blocks, and wherein the N forward reference blocks are located in a forward reference picture, the N backward reference blocks are located in a backward reference picture, and N is an integer greater than 1;

15 wherein for positions of n-th candidate forward and n-th candidate backward reference blocks of the N forward and N backward reference blocks, a first position offset and a second position offset are in a mirror relationship, the first position offset represents an offset of the position of the n-th candidate forward reference block relative to a position of the initial forward reference block, and the second position offset
20 represents an offset of the position of the n-th candidate backward reference block relative to a position of the initial backward reference block; wherein n is an integer and $1 \leq n \leq N-1$; and

obtaining a predicted value of a pixel value of the current picture block based on a pixel value of the target forward reference block and a pixel value of the target
25 backward reference block;

wherein the positions of the N forward reference blocks comprise a position of one initial forward reference block and positions of (N-1) candidate forward reference blocks, and an offset of a position of each candidate forward reference block relative to the position of the initial forward reference block is an integer pixel distance; and

the positions of the N backward reference blocks comprise a position of one initial backward reference block and positions of (N-1) candidate backward reference blocks, and an offset of a position of each candidate backward reference block relative to the position of the initial backward reference block is an integer pixel distance.

5 2. The method according to claim 1, wherein that a first position offset and a second position offset are in a mirror relationship comprises:

 a direction of the first position offset is opposite to a direction of the second position offset, and an amplitude value of the first position offset is the same as an amplitude value of the second position offset.

10 3. The method according to claim 1 or 2, further comprising:

 obtaining updated motion information of the current picture block, wherein the updated motion information comprises an updated forward motion vector and an updated backward motion vector, the updated forward motion vector points to the position of the target forward reference block, and the updated backward motion vector
15 points to the position of the target backward reference block.

 4. The method according to any one of claims 1 to 3, wherein the initial motion information comprises a first motion vector and a first reference picture index in a forward prediction direction, and a second motion vector and a second reference picture index in a backward prediction direction; and

20 the determining positions of N forward reference blocks and positions of N backward reference blocks based on the initial motion information comprises:

 determining, based on the first motion vector and the position of the current picture block, the position of the initial forward reference block of the current picture block in the forward reference picture corresponding to the first reference picture index, using
25 the position of the initial forward reference block as a first search start point, and determining the positions of the (N-1) candidate forward reference blocks in the forward reference picture, wherein the positions of the N forward reference blocks comprise the position of the initial forward reference block and the positions of the (N-1) candidate forward reference blocks; and

30 determining, based on the second motion vector and the position of the current

picture block, the position of the initial backward reference block of the current picture block in the backward reference picture corresponding to the second reference picture index, using the position of the initial backward reference block as a second search start point, and determining the positions of the (N-1) candidate backward reference blocks in the backward reference picture, wherein the positions of the N backward reference blocks comprise the position of the initial backward reference block and the positions of the (N-1) candidate backward reference blocks.

5 The method according to any one of claims 1 to 4, wherein the determining, from positions of N pairs of reference blocks based on a matching cost criterion, that positions of a pair of reference blocks are a position of a target forward reference block of the current picture block and a position of a target backward reference block of the current picture block comprises:

10 determining, from the positions of the N pairs of reference blocks, that positions of a pair of reference blocks with a minimum matching error are the position of the target forward reference block of the current picture block and the position of the target backward reference block of the current picture block; or

15 determining, from the positions of the N pairs of reference blocks, that positions of a pair of reference blocks with a matching error less than or equal to a matching error threshold are the position of the target forward reference block of the current picture block and the position of the target backward reference block of the current picture block, wherein N is less than or equal to N.

20 The method according to any one of claims 1 to 5, wherein the method is used to code the current picture block; and the obtaining initial motion information of a current picture block comprises: obtaining the initial motion information from a candidate motion information list of the current picture block; or

25 the method is used to decode the current picture block; and before the obtaining initial motion information of a current picture block, the method further comprises: obtaining indication information from a bitstream of the current picture block, wherein the indication information is used to indicate the initial motion information of the current picture block.

7. The method according to claim 1, wherein a first position offset is represented by $(\text{delta0x}, \text{delta0y})$ and the second position offset is represented by $(\text{delta1x}, \text{delta1y})$, wherein $\text{delta0x} = -\text{delta1x}$, and $\text{delta0y} = -\text{delta1y}$.

8. The method according to claim 1 or 7, wherein the initial motion information comprises a first motion vector that correspond to a reference picture list 0, RefPicList0 of a current picture having the current picture block, and a second motion vector that correspond to a reference picture list 1, RefPicList1 of the current picture; and

wherein the position of the initial forward reference block and the position of the initial backward reference block are determined by using the first motion vector and second motion vector respectively.

9. The method according to any one of claims 1 or 7, wherein the matching cost criterion is an sum of absolute difference, SAD criterion, the target forward and target backward reference blocks have a minimum SAD value among N SAD values of the N pairs of reference blocks.

10. The method according to any one of claims 1 to 9, wherein the determining, from positions of N forward reference blocks and N backward reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block, comprises:

when an early termination condition is not met, determining, from positions of N forward reference blocks and N backward reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block.

11. The method according to claim 10, wherein when an early termination condition is not met, the determining, from positions of N forward reference blocks and N backward reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block, comprises:

when a difference between a pixel value of the initial forward reference block and a pixel value of the initial backward reference block is greater than a matching error threshold, determining, from positions of N forward reference blocks and N backward

reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block.

12. A picture prediction apparatus, comprising:

5 a first obtaining unit, configured to obtain initial motion information of a current picture block;

a first search unit, configured to: determine, from positions of N forward reference blocks and N backward reference blocks, based on a matching cost criterion, positions of a target forward reference block and a target backward reference block of the current picture block, wherein positions of N forward reference blocks and N backward reference blocks are based on the initial motion information, the N forward reference blocks comprising an initial forward reference block and (N-1) candidate forward reference blocks, the N backward reference blocks comprising an initial backward reference block and (N-1) candidate backward reference blocks, and wherein the N forward reference blocks are located in a forward reference picture, the N backward reference blocks are located in a backward reference picture, and N is an integer greater than 1;

wherein for positions of n-th candidate forward and n-th candidate backward reference blocks of the N forward and N backward reference blocks, a first position offset and a second position offset are in a mirror relationship, the first position offset represents an offset of the position of the n-th candidate forward reference block relative to a position of the initial forward reference block, and the second position offset represents an offset of the position of the n-th candidate backward reference block relative to a position of the initial backward reference block; and n is an integer and $1 \leq n \leq N-1$; and

25 a first prediction unit, configured to obtain a predicted value of a pixel value of the current picture block based on a pixel value of the target forward reference block and a pixel value of the target backward reference block;

wherein the positions of the N forward reference blocks comprise a position of one initial forward reference block and positions of (N-1) candidate forward reference blocks, and an offset of a position of each candidate forward reference block relative to

the position of the initial forward reference block is an integer pixel distance; and

the positions of the N backward reference blocks comprise a position of one initial backward reference block and positions of (N-1) candidate backward reference blocks, and an offset of a position of each candidate backward reference block relative to the position of the initial backward reference block is an integer pixel distance.

13. The apparatus according to claim 12, wherein that a first position offset and a second position offset are in a mirror relationship comprises: a direction of the first position offset is opposite to a direction of the second position offset, and an amplitude value of the first position offset is the same as an amplitude value of the second position offset.

14. The apparatus according to claim 12 or 13, wherein the first prediction unit is further configured to obtain updated motion information of the current picture block, wherein the updated motion information comprises an updated forward motion vector and an updated backward motion vector, the updated forward motion vector points to the position of the target forward reference block, and the updated backward motion vector points to the position of the target backward reference block.

15. The apparatus according to any one of claims 12 to 14, wherein the initial motion information comprises a first motion vector and a first reference picture index in a forward prediction direction, and a second motion vector and a second reference picture index in a backward prediction direction; and

in the aspect of determining positions of N forward reference blocks and positions of N backward reference blocks based on the initial motion information, the first search unit is specifically configured to:

determine, based on the first motion vector and the position of the current picture block, the position of the initial forward reference block of the current picture block in the forward reference picture corresponding to the first reference picture index, use the position of the initial forward reference block as a first search start point, and determine the positions of the (N-1) candidate forward reference blocks in the forward reference picture, wherein the positions of the N forward reference blocks comprise the position of the initial forward reference block and the positions of the (N-1) candidate forward

reference blocks; and

determine, based on the second motion vector and the position of the current picture block, the position of the initial backward reference block of the current picture block in the backward reference picture corresponding to the second reference picture index, use the position of the initial backward reference block as a second search start point, and determine the positions of the (N-1) candidate backward reference blocks in the backward reference picture, wherein the positions of the N backward reference blocks comprise the position of the initial backward reference block and the positions of the (N-1) candidate backward reference blocks.

16. The apparatus according to any one of claims 12 to 15, wherein in the aspect of determining, from positions of N pairs of reference blocks based on a matching cost criterion, that positions of a pair of reference blocks are a position of a target forward reference block of the current picture block and a position of a target backward reference block of the current picture block, the first search unit is specifically configured to:

determine, from the positions of the N pairs of reference blocks, that positions of a pair of reference blocks with a minimum matching error are the position of the target forward reference block of the current picture block and the position of the target backward reference block of the current picture block; or

determine, from the positions of the N pairs of reference blocks, that positions of a pair of reference blocks with a matching error less than or equal to a matching error threshold are the position of the target forward reference block of the current picture block and the position of the target backward reference block of the current picture block, wherein N is less than or equal to N.

17. The apparatus according to claim 12, wherein a first position offset is represented by (Δx_0 , Δy_0) and the second position offset is represented by (Δx_1 , Δy_1), wherein $\Delta x_0 = -\Delta x_1$, and $\Delta y_0 = -\Delta y_1$.

18. The apparatus according to claim 12 or 17, wherein the initial motion information comprises a first motion vector that correspond to a reference picture list 0, RefPicList0 of a current picture having the current picture block, and a second motion

vector that correspond to a reference picture list 1, RefPicList1 of the current picture;
and

wherein the position of the initial forward reference block and the position of the
initial backward reference block are determined by using the first motion vector and
5 second motion vector respectively.

19. The apparatus according to any one of claims 12 or 17, wherein the matching
cost criterion is an sum of absolute difference, SAD criterion, the target forward and
target backward reference blocks have a minimum SAD value among N SAD values of
the N pairs of reference blocks.

10 20. The apparatus according to any one of claims 12 to 19, wherein the first search
unit is specifically configured to:

when an early termination condition is not met, determine, from positions of N
forward reference blocks and N backward reference blocks, based on a matching cost
criterion, positions of a target forward reference block and a target backward reference
15 block of the current picture block.

21. The apparatus according to claim 20, wherein wherein the first search unit is
specifically configured to:

when a difference between a pixel value of the initial forward reference block and
a pixel value of the initial backward reference block is greater than a matching error
20 threshold, determining, from positions of N forward reference blocks and N backward
reference blocks, based on a matching cost criterion, positions of a target forward
reference block and a target backward reference block of the current picture block.

22. A video encoder, wherein the video encoder is configured to code a picture
block, and comprises:

25 an inter prediction module, comprising the picture prediction apparatus according
to any one of claims 12 to 21, wherein the inter prediction module is configured to
obtain a predicted value of a pixel value of the picture block through prediction;

an entropy coding module, configured to code indication information into a
bitstream, wherein the indication information is used to indicate initial motion
30 information of the picture block; and

a reconstruction module, configured to reconstruct the picture block based on the predicted value of the pixel value of the picture block.

23. A video decoder, wherein the video decoder is configured to decode a bitstream to obtain a picture block, and comprises:

5 an entropy decoding module, configured to decode the bitstream to obtain indication information, wherein the indication information is used to indicate initial motion information of a current picture block obtained through decoding;

 an inter prediction module, comprising the picture prediction apparatus according to any one of claims 12 to 21, wherein the inter prediction module is configured to
10 obtain a predicted value of a pixel value of the picture block through prediction; and

 a reconstruction module, configured to reconstruct the picture block based on the predicted value of the pixel value of the picture block.

24. A computer program product carrying program instructions which, when executed by a computer device, causes the computer device to perform the method of
15 any one of claims 1 to 11.