CLAIMS

What is claimed is:

1. A method for performing filtering processing on an image block, characterized by, wherein the image block is an affine motion image block that is one of a plurality of image blocks of an image and the affine motion image block is divided into two or more affine motion subunits, wherein each affine motion subunit comprises a plurality of pixels and the method comprises:

determining at least one filtering boundary among the two or more affine motion subunits based on a preset rule;

for any one of the at least one filtering boundary, obtaining pixel values of a first affine motion subunit and pixel values of a second affine motion subunit, wherein the first affine motion subunit and the second affine motion subunit are adjacent to the filtering boundary and in the two or more affine motion subunits; and

performing, based on the pixel values of the first affine motion subunit and the pixel values of the second affine motion subunit, filtering processing on pixels adjacent to the filtering boundary;

wherein the first and second affine motion subunits are affine motion subunits using an affine motion model, and wherein the affine motion image block is an image block on which motion compensation prediction is performed based on the affine motion model.

2. The method according to claim 1, wherein the determining at least one filtering boundary among the two or more affine motion subunits based on a preset rule comprises:

for an affine motion subunit comprised in the affine motion image block, determining each boundary of the affine motion subunit as a filtering boundary or determining a boundary of the affine motion subunit as a filtering boundary.

3. The method according to claim 1 or 2, wherein the obtaining the pixel values of a first affine motion subunit comprises:

obtaining first predicted pixel values of the first affine motion subunit based on a motion vector of the first affine motion subunit;

obtaining motion vectors of M subunits in an upper subunit, a lower subunit, a left subunit, and a right subunit that are adjacent to the first affine motion subunit, wherein M is any integer and 1=<M <=4;

obtaining M second predicted pixel values of the first affine motion subunit based on the motion vectors of the M subunits; and

obtaining the pixel values of the first affine motion subunit based on the first predicted pixel values of the first affine motion subunit and the M second predicted pixel values.

4. The method according to claim 3, wherein M=4, the obtaining motion vectors of M subunits in an upper subunit, a lower subunit, a left subunit, and a right subunit that are adjacent to the first affine motion subunit comprises:

if the first affine motion subunit is a subunit adjacent to a lower boundary or a right boundary of the affine motion image block, deriving, based on a affine motion model, the motion vector of each of the upper subunit, the lower subunit, the left subunit, and the right subunit that are adjacent to the first affine motion subunit.

5. The method according to claim 3, wherein M=4, the obtaining motion vectors of M subunits in an upper subunit, a lower subunit, a left subunit, and a right subunit that are adjacent to the first affine motion subunit comprises:

if the first affine motion subunit is a subunit adjacent to an upper boundary of the affine motion image block, deriving, based on a preset affine motion model, motion vectors of three subunits: the lower subunit, the left subunit, and the right subunit that are adjacent to the first affine motion subunit; and

if a motion vector of the upper subunit adjacent to the first affine motion subunit is available, obtaining the motion vector of the upper subunit; or

if a motion vector of the upper subunit adjacent to the first affine motion subunit is unavailable, deriving the motion vector of the upper subunit based on the affine motion model.

6. The method according to claim 3, wherein M=4, the obtaining motion vectors of M subunits in an upper subunit, a lower subunit, a left subunit, and a right subunit that are adjacent to the first affine motion subunit comprises:

if the first affine motion subunit is a subunit adjacent to a left boundary of the affine motion image block, deriving, based on a preset affine motion model, motion vectors of three subunits: the lower subunit, the upper subunit, and the right subunit that are adjacent to the first affine motion subunit; and

if a motion vector of the left subunit adjacent to the first affine motion subunit is available, obtaining the motion vector of the left subunit; or

if a motion vector of the left subunit adjacent to the first affine motion subunit is

unavailable, deriving the motion vector of the left subunit based on the affine motion model.

7. The method according to claim 1 or 2, wherein the obtaining pixel values of a first affine motion subunit adjacent to the filtering boundary comprises:

obtaining first predicted pixel values of the first affine motion subunit (P);

deriving, based on a affine motion model, motion vectors of M sets of coordinates in coordinates (1.1, 1.2, 1.3, 1.4) in subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having a first vertex (1), which correspond to the first vertex (1) of the first affine motion subunit (P), and motion vectors of M sets of coordinates in coordinates (2.1, 2.2, 2.3, 2.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having a second vertex (2), which correspond to the second vertex (2) of the first affine motion subunit (P), wherein the first vertex (1) and the second vertex (2) are any two different vertexes of the first affine motion subunit (P), and M is any integer and 1=<M <=4;

obtaining M motion vector pairs by grouping the motion vectors of the M sets of coordinates in the coordinates (1.1, 1.2, 1.3, 1.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having the first vertex (1), which correspond to the first vertex (1) of the first affine motion subunit (P), and the motion vectors of the M sets of coordinates in the coordinates (2.1, 2.2, 2.3, 2.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having the second vertex (2), which correspond to the second vertex (2) of the first affine motion subunit (P), wherein a first motion vector pair in the M motion vector pairs comprises a motion vector of first coordinates corresponding to the first vertex (1) of the first affine motion subunit (P) and a motion vector of first coordinates corresponding to the second vertex (2) of the first affine motion subunit (P), and the first coordinates are upper coordinates or lower coordinates or left coordinates or right coordinates;

performing calculation on the M motion vector pairs based on the affine motion model, to obtain M motion vectors of the first affine motion subunit (P);

obtaining M second predicted pixel values of the first affine motion subunit (P) based on the M motion vectors of the first affine motion subunit (P); and

obtaining the pixel values of the first affine motion subunit (P) based on the first predicted pixel values of the first affine motion subunit (P) and the M second predicted pixel values.

8. The method according to any one of claims 1 to 7, wherein before the performing, based on the pixel values of the first affine motion subunit and the pixel values of the second affine

motion subunit, filtering processing on pixels adjacent to the filtering boundary, the method further comprises:

determining a boundary strength value of the filtering boundary; and

the performing, based on the pixel values of the first affine motion subunit and the pixel values of the second affine motion subunit, filtering processing on pixels adjacent to the filtering boundary comprises:

performing, based on the boundary strength value of the filtering boundary, initial thresholds β_0 and t_c, and pixel differences between pixel values of a plurality of pixels that are adjacent to the filtering boundary and that are in the first affine motion subunit and the second affine motion subunit, filtering processing on the pixels adjacent to the filtering boundary by using a second preset algorithm.

9. The method according to claim 8, wherein the determining a boundary strength value of the filtering boundary comprises:

when any one of the following conditions (1) to (3) is a true condition, setting the boundary strength value of the filtering boundary to 1; otherwise, setting the boundary strength value of the filtering boundary to 0:

(1) the first affine motion subunit has one motion vector; the second affine motion subunit has one motion vector; and a motion vector difference between horizontal components or vertical components of the motion vector of the first affine motion subunit and the motion vector of the second affine motion subunit is greater than or equal to a motion vector difference threshold T;

(2) the first affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are different; the second affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are different; and a motion vector difference between horizontal components or vertical components of two motion vectors is greater than or equal to a motion vector difference threshold T; and

(3) the first affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are the same; the second affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are the same; and the following two conditions a and b are true conditions:

(a) a difference between horizontal components or vertical components of two motion vectors that indicate a forward reference candidate list list0 is greater than or equal to a motion vector difference threshold T; or a difference between horizontal components or vertical components of two motion vectors that indicate a backward reference candidate list list1 is

greater than or equal to a motion vector difference threshold T; and

(b) a difference between horizontal components or vertical components of a motion vector that indicates a forward reference candidate list list0 and that is of the first affine motion subunit and a motion vector that indicates a backward reference candidate list list1 and that is of the second affine motion subunit is greater than or equal to a motion vector difference threshold T; or a difference between horizontal components or vertical components of a motion vector that indicates a backward reference candidate list list1 and that is of the first affine motion subunit and a motion vector that indicates a forward reference candidate list list0 and that is of the second affine motion subunit is greater than or equal to a motion vector difference threshold T.

10. The method according to claim 9, wherein

the motion vector difference threshold T is four times 1/4 of luminance sampling precision; or

if motion models of the first affine motion subunit and the second affine motion subunit are different, the motion vector difference threshold T is 1/4 of luminance sampling precision, or if motion models of the first affine motion subunit and the second affine motion subunit are the same, the motion vector difference threshold T is four times 1/4 of luminance sampling precision.

11. An apparatus for performing filtering processing on an image block, characterized by, wherein the image block is an affine motion image block and the affine motion image block is divided into two or more affine motion subunits, wherein each affine motion subunit comprises a plurality of pixels; and the apparatus comprises:

a determining unit, configured to: determine at least one filtering boundary among the two or more affine motion subunits based on a preset rule;

an obtaining unit, configured to: for any one of the at least one filtering boundary, obtain pixel values of a first affine motion subunit and pixel values of a second affine motion subunit, wherein the first affine motion subunit and the second affine motion subunit are adjacent to the filtering boundary and in the two or more affine motion subunits; and

a filtering unit, configured to perform, based on the pixel values of the first affine motion subunit and the pixel values of the second affine motion subunit, filtering processing on pixels adjacent to the filtering boundary; wherein the first and second affine motion subunits are affine subunits using an affine motion model, and wherein the affine motion image block is an image block on which motion compensation prediction is performed based on the affine motion model.

12. The apparatus according to claim 11, wherein the determining unit is specifically configured to:

determine each boundary of an affine motion subunit of the two or more affine motion subunits as a filtering boundary or determine a boundary of the affine motion subunit as a filtering boundary.

13. The filtering apparatus according to claim 11 or 12, wherein the obtaining unit is specifically configured to:

obtain first predicted pixel values of the first affine motion subunit based on a motion vector of the first affine motion subunit;

obtain motion vectors of M subunits in an upper subunit, a lower subunit, a left subunit, and a right subunit that are adjacent to the first affine motion subunit, wherein M is any integer and 1=<M <=4;

obtain M second predicted pixel values of the first affine motion subunit based on the motion vectors of the M subunits; and

obtain the pixel values of the first affine motion subunit based on the first predicted pixel values of the first affine motion subunit and the M second predicted pixel values.

14. The filtering apparatus according to claim 13, wherein the obtaining unit is specifically configured to:

if the first affine motion subunit is a subunit adjacent to a lower boundary or a right boundary of the affine motion image block, derive, based on a affine motion model, a motion vector of each of the upper subunit, the lower subunit, the left subunit, and the right subunit that are adjacent to the first affine motion subunit.

15. The filtering apparatus according to claim 13, wherein M=4, the obtaining unit is specifically configured to:

if the first affine motion subunit is a subunit adjacent to an upper boundary of the affine motion image block, derive, based on a preset affine motion model, motion vectors of three subunits: the lower subunit, the left subunit, and the right subunit that are adjacent to the first affine motion subunit; and

if a motion vector of the upper subunit adjacent to the first affine motion subunit is available, obtain the motion vector of the upper subunit; or

if a motion vector of the upper subunit adjacent to the first affine motion subunit is unavailable, derive the motion vector of the upper subunit based on the affine motion model.

16. The filtering apparatus according to claim 13, wherein M=4, the obtaining unit is specifically configured to:

if the first affine motion subunit is a subunit adjacent to a left boundary of the affine motion image block, derive, based on a preset affine motion model, motion vectors of three subunits: the lower subunit, the upper subunit, and the right subunit that are adjacent to the first affine motion subunit; and

if a motion vector of the left subunit adjacent to the first affine motion subunit is available, obtain the motion vector of the left subunit; or

if a motion vector of the left subunit adjacent to the first affine motion subunit is unavailable, derive the motion vector of the left subunit based on the affine motion model.

17. The filtering apparatus according to claim 11 or 12, wherein the obtaining unit is specifically configured to:

obtain first predicted pixel values of the first affine motion subunit (P);

derive, based on a affine motion model, motion vectors of M sets of coordinates in coordinates (1.1, 1.2, 1.3, 1.4) in subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having a first vertex (1), which correspond to the first vertex (1) of the first affine motion subunit (P), and motion vectors of M sets of coordinates in coordinates (2.1, 2.2, 2.3, 2.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having a second vertex (2), which correspond to the second vertex (2) of the first affine motion subunit (P), wherein the first vertex (1) and the second vertex (2) are any two different vertexes of the first affine motion subunit (P), and M is any integer and 1=<M <=4;

obtain M motion vector pairs by grouping the motion vectors of the M sets of coordinates in the coordinates (1.1, 1.2, 1.3, 1.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having the first vertex (1), which correspond to the first vertex (1) of the first affine motion subunit (P), and the motion vectors of the M sets of coordinates in the coordinates (2.1, 2.2, 2.3, 2.4) in the subunits that are adjacent on the up, down, left and right to the first affine motion subunit (P) having the second vertex (2), which correspond to the second vertex (2) of the first affine motion subunit (P), wherein a first motion vector pair in the M motion vector pairs comprises a motion vector of first coordinates corresponding to the first vertex (1) of the first affine motion subunit (P) and a motion vector of first coordinates corresponding to the second vertex (2) of the first affine motion subunit (P), and

the first coordinates are upper coordinates or lower coordinates or left coordinates or right coordinates;

perform calculation on the M motion vector pairs based on the affine motion model, to obtain M motion vectors of the first affine motion subunit (P);

obtain M second predicted pixel values of the first affine motion subunit (P) based on the M motion vectors of the first affine motion subunit (P); and

obtain the pixel values of the first affine motion subunit (P) based on the first predicted pixel values of the first affine motion subunit (P) and the M second predicted pixel values.

18. The filtering apparatus according to claim 11 or 12, wherein

the determining unit is further configured to: before the filtering unit performs, based on the pixel values of the first affine motion subunit and the pixel values of the second affine motion subunit, filtering processing on the pixels adjacent to the filtering boundary, determine a boundary strength value of the filtering boundary; and

the filtering unit is specifically configured to perform, based on the boundary strength value of the filtering boundary determined by the determining unit, initial thresholds β_0 and t_c, and pixel differences between pixel values of a plurality of pixels that are adjacent to the filtering boundary and that are in the first affine motion subunit and the second affine motion subunit, filtering processing on the pixels adjacent to the filtering boundary by using a second preset algorithm.

19. The filtering apparatus according to claim 18, wherein the determining unit is specifically configured to:

when any one of the following conditions (1) to (3) is a true condition, set the boundary strength value of the filtering boundary to 1; otherwise, set the boundary strength value of the filtering boundary to 0:

the first affine motion subunit has one motion vector; the second affine motion subunit has one motion vector; and a motion vector difference between horizontal components or vertical components of the motion vector of the first affine motion subunit and the motion vector of the second affine motion subunit is greater than or equal to a motion vector difference threshold T;

(2) the first affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are different; the second affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are different; and a motion vector difference between horizontal components or vertical components of two motion vectors is

greater than or equal to a motion vector difference threshold T; and

(3) the first affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are the same; the second affine motion subunit has two motion vectors and reference images indicated by the two motion vectors are the same; and the following two conditions a and b are true conditions:

(a) a difference between horizontal components or vertical components of two motion vectors that indicate a forward reference candidate list list0 is greater than or equal to a motion vector difference threshold T; or a difference between horizontal components or vertical components of two motion vectors that indicate a backward reference candidate list list1 is greater than or equal to a motion vector difference threshold T; and

(b) a difference between horizontal components or vertical components of a motion vector that indicates a forward reference candidate list list0 and that is of the first affine motion subunit and a motion vector that indicates a backward reference candidate list list1 and that is of the second affine motion subunit is greater than or equal to a motion vector difference threshold T; or a difference between horizontal components or vertical components of a motion vector that indicates a backward reference candidate list list1 and that is of the first affine motion subunit and a motion vector that indicates a forward reference candidate list list0 and that is of the second affine motion subunit is greater than or equal to a motion vector difference threshold T.

20. The filtering apparatus according to claim 19, wherein

the motion vector difference threshold T is four times 1/4 of luminance sampling precision; or

if motion models of the first affine motion subunit and the second affine motion subunit are different, the motion vector difference threshold T is 1/4 of luminance sampling precision, or if motion models of the first affine motion subunit and the second affine motion subunit are the same, the motion vector difference threshold T is four times 1/4 of luminance sampling precision.

21. A computer program product comprising program code which when executed on a processor cause the processor to perform the method according to any of claims 1 to 10.