

CLAIMS

1. A method of chroma motion vector derivation used in an affine based inter prediction of a current image block comprises a luma block and a co-located chroma block, the method comprising
 - 5 determining chroma scaling factors in horizontal and vertical directions based on chroma format information, wherein the chroma format information indicates a chroma format of a current picture which the current image block belongs to, wherein the chroma format comprises one of a YUV 4:2:2 format, a YUV 4:2:0 format or a YUV 4:4:4 format;
 - determining a set (S) of luma subblocks of the luma block based on values of the chroma scaling factors; and
 - 10 determining a chroma motion vector for a chroma subblock of the chroma block based on motion vectors of one or more luma subblocks in the set (S) of luma subblocks; wherein when both SubWidthC and SubHeightC are equal to 1, the set of luma subblocks (S) comprises a luma subblock indexed by
 - 15 $S_0 = (xSbIdx, ySbIdx);$ when at least one of SubWidthC and SubHeightC is not equal to 1, the set of luma subblocks (S) comprises: a first luma subblock indexed by
$$S_0 = ((xSbIdx \gg (SubWidthC - 1)) \ll (SubWidthC - 1)),$$
$$(ySbIdx \gg (SubHeightC - 1)) \ll (SubHeightC - 1)),$$
 and a second luma subblock
 - 20 indexed by
$$S_1 = ((xSbIdx \gg (SubWidthC - 1)) \ll (SubWidthC - 1)) + (SubWidthC - 1),$$
$$(ySbIdx \gg (SubHeightC - 1)) \ll (SubHeightC - 1)) + (SubHeightC - 1)$$
 wherein SubWidthC and SubHeightC represent the chroma scaling factors in horizontal and vertical directions, respectively;
 - 25 xSbIdx and ySbIdx represent a subblock index in the horizontal direction and a subblock index in the vertical direction, respectively, for a luma subblock in the set(S); “<<” represents a left arithmetic shift; “>>” represents a right arithmetic shift; xSbIdx = 0..numSbX - 1 and ySbIdx = 0..numSbY - 1;
 - 30 numSbX indicates the number of the luma subblocks in the luma block along the horizontal direction; and numSbY indicates the number of the luma subblocks in the luma block along the vertical direction;

wherein when there are more than one luma subblocks in the set (S), the determining a chroma motion vector for the chroma subblock based on the motion vector of one or more luma subblock in the set (S) of luma subblocks, comprises:

averaging motion vectors of the luma subblocks in the set S to generate an averaged luma

5 motion vector, mvAvgLX; and

deriving the motion vector for the chroma subblock, mvCLX[xSbIdxL][ySbIdxL] based on the averaged luma motion vector, mvAvgLX;

wherein the determining chroma scaling factors in horizontal and vertical directions based on chroma format information, comprises:

10 determining the chroma scaling factors in the horizontal and vertical directions based on a mapping between the chroma format information and a pair of chroma scaling factors in the horizontal and vertical directions.

2. The method of claim 1, wherein each of the one or more luma subblocks in the set(S) is
15 represented by a subblock index in a horizontal direction and a subblock index in a vertical direction.

3. The method of claim 1, wherein the number of the chroma subblocks in the chroma block
20 along the horizontal direction and the vertical direction are the same with the number of the luma subblocks in the luma block along the horizontal and vertical directions, respectively.

4. The method of any one of claims 1 to 3,

25 wherein when the chroma format is 4:4:4, the set (S) comprise one luma subblock co-located with the chroma subblock;

wherein when the chroma format is 4: 2: 2, the set (S) comprise two luma subblocks horizontally adjacent to each other;

30 wherein when the chroma format is 4: 2: 0, the set (S) comprise two luma subblocks which are diagonal.

5. The method of any one of claims 1 to 4, wherein averaging motion vectors of the luma subblocks in the set S comprise one or more of:

averaging horizontal component of the motion vectors of the luma subblocks in the set S; or,
averaging vertical component of the motion vectors of the luma subblocks in the set S.

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6. The method of any one of claims 1 to 5, wherein the averaging motion vectors of the luma subblocks in the set S to generate an averaged luma motion vector comprises:

$$mvAvgLX = \sum_i mvLX[S_i^x][S_i^y]$$

when $mvAvgLX[0]$ is greater or equal to 0, $mvAvgLX[0] = (mvAvgLX[0] +$

10 $(N \gg 1) - 1) \gg \log_2(N)$, otherwise,

$$mvAvgLX[0] = -((-mvAvgLX[0] + (N \gg 1) - 1) \gg \log_2(N));$$

when $mvAvgLX[1]$ is greater or equal to 0, $mvAvgLX[1] = (mvAvgLX[1] +$

$(N \gg 1) - 1) \gg \log_2(N)$, otherwise,

$$mvAvgLX[1] = -((-mvAvgLX[1] + (N \gg 1) - 1) \gg \log_2(N)),$$

15 wherein:

$mvAvgLX$ is a resulting motion vector of the averaging;

$mvAvgLX[0]$ is a horizontal component of the resulting motion vector $mvAvgLX$, and

$mvAvgLX[1]$ is a vertical component of the resulting motion vector $mvAvgLX$;

S_i^x and S_i^y are horizontal and vertical indices of subblock S_i in the set of luma

20 subblocks (S) in motion vector array,

$mvLX[S_i^x][S_i^y]$ is a motion vector of a luma subblock with indices S_i^x and S_i^y , N is a number of elements in the set (S) of luma subblocks, $\log_2(N)$ represents the logarithm of N to the base 2 and is the power to which the number 2 is raised to obtain the value N , and “ $\gg$ ” represents a right arithmetic shift.

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7. The method of any of claims 1 to 5, wherein the averaging of motion vectors of the luma subblocks in the set S comprises:

$$mvAvgLX = mvLX[(xSbIdx \gg (SubWidthC - 1) \ll (SubWidthC - 1))]$$

$$[(ySbIdx \gg (SubHeightC - 1) \ll (SubHeightC - 1))] +$$

30 $mvLX[(xSbIdx \gg (SubWidthC - 1) \ll (SubWidthC - 1)) + (SubWidthC - 1)]$

$$[(ySbIdx \gg (SubHeightC - 1) \ll (SubHeightC - 1)) + (SubHeightC - 1)]$$

if $mvAvgLX[0] \geq 0$ then

$$mvAvgLX[0] = (mvAvgLX[0] + 1 - (mvAvgLX[0] \geq 0)) \gg 1$$

if mvAvgLX[1] >= 0 then

mvAvgLX[1] =(mvAvgLX[1] + 1 -(mvAvgLX[1] >= 0)) >> 1

wherein mvAvgLX[0] is a horizontal component of the averaged motion vector mvAvgLX, mvAvgLX[1] is a vertical component of the averaged motion vector mvAvgLX; wherein
5 SubWidthC and SubHeightC represent the chroma scaling factors in horizontal and vertical directions respectively; xSbIdx and ySbIdx represent a subblock index in horizontal direction and a subblock index in the vertical direction, respectively, for a luma subblock in the set(S), “<<” is a left arithmetic shift and “>>” is a right arithmetic shift.

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8. The method of any one of claims 1 to 7, further comprising
generating a prediction of the chroma subblock based on the determined chroma motion
vector.

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9. The method of any of claims 1 to 8 implemented by an encoding device.

10. The method of any of claims 1 to 8 implemented by a decoding device.

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11. An encoder (20) comprising processing circuitry for carrying out the method according to any one of claims 1 to 9.

12. A decoder (30) comprising processing circuitry for carrying out the method according to any one of claims 1 to 8 and 10.

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13. A computer program product comprising program instructions for performing the method according to any one of claims 1 to 10.

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