METHOD AND APPARATUS FOR DERIVATION OF MV/MVP CANDIDATE FOR INTER/SKIP/MERGE MODES
VERFAHREN UND VORRICHTUNG ZUR ABLEITUNG EINES MV/MVP-KANDIDATEN FÜR INTER-, SKIP-, ODER MERGE-MODI
PROCÉDÉ ET APPAREIL D’OBTENTION DE MV/MVP CANDIDAT POUR MODES INTER/SAUT/FUSION

Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Priority: 29.11.2010 US 417798 P
11.01.2011 US 201161431454 P
14.03.2011 US 201161452541 P
18.04.2011 US 201113089233
10.08.2011 US 201113206891

Date of publication of application: 09.10.2013 Bulletin 2013/41

Proprietor: HFI Innovation Inc.
Zhubei City, Hsinchu County 302 (TW)

Inventors:
• LIN, Jian-Liang
Taiwan (CN)
• TSAI, Yu-Pao
Taiwan (CN)
• CHEN, Yi-Wen
Taiwan (CN)
• HUANG, Yu-Wen
Taiwan (CN)
• LEI, Shaw-Min
Taiwan (CN)

Representative: Hoefer & Partner Patentanwälte mbB
Pliggersheimer Straße 20
81543 München (DE)

References cited:
WO-A2-2009/115901 CN-A- 1 578 469


• J-L LIN ET AL: "Improved Advanced Motion Vector Prediction", 95. MPEG MEETING; 24-1-2011 - 28-1-2011; DAEGU; (MOTION PICTURE EXPERT GROUP OR ISO/IEC JTC1/SC29/WG11), no. m18877, 23 January 2011 (2011-01-23), XP030054746,


• MCCANN (ZETACAST / SAMSUNG) K ET AL: "Video coding technology proposal by Samsung (and BBC)", 1. JCT-VC MEETING; 15-4-2010 - 23-4-2010; DRESDEN; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-TSG.16); URL: HTTP://WFTP3.ITU.INT/AV-ARCH/JCTVC-SITE/., no. JCTVC-A124, 1 June 2010 (2010-06-01), XP030007573,

TECHNICAL FIELD

The present invention relates to video coding. In particular, the present invention relates to a method of deriving a motion vector.

BACKGROUND

In video coding systems, spatial and temporal redundancy is exploited using spatial and temporal prediction to reduce the information to be transmitted. The spatial and temporal prediction utilizes decoded pixels from the same picture and reference pictures respectively to form prediction for current pixels to be coded. In a conventional coding system, side information associated with spatial and temporal prediction may have to be transmitted, which will take up some bandwidth of the compressed video data. The transmission of motion vectors for temporal prediction may require a noticeable portion of the compressed video data, particularly in low-bitrate applications. To further reduce the bitrate associated with motion vectors, a technique called Motion Vector Prediction (MVP) has been used in the field of video coding in recent years. The MVP technique exploits the statistic redundancy among neighboring motion vectors spatially and temporally. In the rest of this document, MVP may sometimes denote "motion vector prediction" and sometimes denote "motion vector predictor" according to contexts.

SUMMARY

A method and an apparatus according to the invention are defined in the independent claims. The method according to the invention is a method of deriving a motion vector predictor (MVP) for a motion vector (MV) of a current block of a current picture in Inter mode, wherein the MV is associated with the center block of the respective area, i.e., the co-located block, in the reference picture may not have the same block size (prediction unit (PU) size) as the current block. When the respective area uses smaller block sizes than the current block, one of the blocks in the co-located block is selected as a co-located reference block. In HM-2.0, the temporal predictor is associated with the center block of the respective area while the previous version of HM uses the above-left reference block of the co-located block. If the MV for the co-located reference block does not exist, the MVP is not available. It is desirable to develop an MVP derivation scheme that can improve the availability of the temporal MVP. The improved MVP derivation scheme may result in smaller motion vector residues and, consequently, better coding efficiency. Furthermore, it is desirable that the MVP derivation scheme will allow the MVP candidate to be derived at the decoder based on decoded information so that no additional side information has to be transmitted.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 illustrates neighboring block configuration for deriving spatial/temporal motion vector prediction candidate set for Inter and Skip modes according to High-Efficiency Video Coding test model version 2.0 (HM-2.0). Fig. 2 illustrates an example of temporal predictor by mapping the center of the block to a co-located block instead of the origin of the block. Fig. 3 illustrates neighboring block configuration for
In video coding systems, the spatial and temporal redundancy is exploited using spatial and temporal prediction to reduce the bitrate to be transmitted or stored. The spatial prediction utilizes decoded pixels from the same picture to form prediction for current pixels to be coded. The spatial prediction is often operated on a block by block basis, such as the 16×16 or 4×4 block for luminance signal in H.264/AVC Intra coding. In video sequences, neighboring pictures often bear great similarities, and simply using picture differences can effectively reduce the transmitted information associated with static background areas. Nevertheless, moving objects in the video sequence may result in substantial residues and will require higher bitrate to code the residues. Consequently, Motion Compensated Prediction (MCP) is often used to exploit temporal correlation in video sequences.

Motion compensated prediction can be used in a forward prediction fashion, where a current picture block is predicted using a decoded picture or pictures that are prior to the current picture in the display order. In addition to forward prediction, backward prediction can also be used to improve the performance of motion compensated prediction. The backward prediction utilizes a decoded picture or pictures after the current picture in the display order. Since the first version of H.264/AVC was finalized in 2003, forward prediction and backward prediction have been extended to list 0 prediction and list 1 prediction, respectively, where both list 0 and list 1 can contain multiple reference pictures prior to or/and later than the current picture in the display order. The following describes the default reference picture list configuration. For list 0, reference pictures prior to the current picture have lower reference picture indices than those later than the current picture. For list 1, reference pictures later than the current picture have lower reference picture indices than those prior to the current picture. For both list 0 and list 1, after applying the previous rules, the temporal distance is considered as follows: a reference picture closer to the current picture has a lower reference picture index. To illustrate the list 0 and list 1 reference picture configuration, the following example is provided where the current picture is picture 5 and pictures 0, 2, 4, 6, and 8 are reference pictures, where the numbers denote the display order. The list 0 reference pictures with ascending reference picture indices and starting with index equal to zero are 4, 2, 0, 6, and 8. The list 1 reference pictures with ascending reference picture indices and starting with index equal to zero are 6, 8, 4, 2, and 0. The first reference picture having index 0 is called co-located picture, and in this example with picture 5 as the current picture, picture 6 is the list 1 co-located picture, and picture 4 is the list 0 co-located picture. When a block in a list 0 or list 1 co-located picture has the same block location as the current block in the current picture, it is called a list 0 or list 1 co-located block, or called a co-located block in list 0 or list 1. The unit used for motion estimation mode in earlier video standards such as MPEG-1, MPEG-2 and MPEG-4 is primarily based on macroblock. For H.264/AVC, the 16×16 macroblock can be segmented into 16×16, 16×8, 8×16 and 8×8 blocks for motion estimation. Furthermore, the 8×8 block can be segmented into 8×8, 8×4, 4×8 and 4×4 blocks for motion estimation. For the High-Efficiency Video Coding (HEVC) standard under development, the unit for motion estimation/compensation mode is called Prediction Unit (PU), where the PU is hierarchically partitioned from a maximum block size. The MCP type is selected for each slice in the H.264/AVC standard. A slice that the motion compensated prediction is restricted to the list 0 prediction is called a P-slice. For a B-slice, the motion compensated prediction also includes the list 1 prediction in addition to the list 0 prediction.
used in the field of video coding in recent years. In this disclosure, MVP may also refer to Motion Vector Predictor and the abbreviation is used when there is no ambiguity. The MVP technique exploits the statistic redundancy among neighboring motion vectors spatially and temporally. When MVP is used, a predictor for the current motion vector is chosen and the motion vector residue, i.e., the difference between the motion vector and the predictor, is transmitted. The motion vector residue is usually termed motion vector difference (MVD) as well. The MVP scheme can be applied in a closed-loop arrangement where the predictor is derived at the decoder based on decoded information and no additional side information has to be transmitted. Alternatively, side information can be transmitted explicitly in the bitstream to inform the decoder regarding the motion vector predictor selected.

In the H.264/AVC standard, four different types of inter-prediction are supported for B slices including list 0, list 1, bi-predictive, and DIRECT prediction, where list 0 and list 1 refer to prediction using reference picture group 0 and group 1 respectively. When only references pictures from one reference list (i.e., list 0 or list 1) is used, the prediction is referred to as uni-prediction mode. For the bi-predictive mode, the prediction signal is formed by a weighted average of motion-compensated list 0 and list 1 prediction signals. The DIRECT prediction mode is inferred from previously transmitted syntax elements and can be either list 0 or list 1 prediction or bi-predictive. Therefore, there is no need to transmit information for motion vector in the DIRECT mode. In the case that no quantized error signal is transmitted, the DIRECT macroblock mode is referred to as B SKIP mode and the block can be efficiently coded. Again, a good MVP scheme may result in more zero motion vector residues or smaller prediction errors. Consequently, a good MVP scheme may increase the number of DIRECT-coded blocks and improve the coding efficiency.

In HEVC being developed, some improvements of motion vector prediction over the H.264/AVC are being considered. For Inter and Skip modes in HEVC test model version 2.0 (HM-2.0), multiple spatial MVPs are joined with a temporal MVP for selecting a final MVP for the current block. For Merge mode in HM-2.0, multiple spatial MVPs are also joined with a temporal MVP for selecting a final MVP for the current block. In Merge and Skip modes, the final MVPs are the final MVs because their MVDs are zero by definition. In HM-2.0, the Inter and Skip modes utilize an Advanced Motion Vector Prediction (AMVP) algorithm to select one final motion vector predictor (MVP) within a candidate set of MVPs. The AMVP is proposed by McCann et al., entitled "Samsung's Response to the Call for Proposals on Video Compression Technology", Document JCTVC-A124, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG1, 1st Meeting; Dresden, Germany, 15-23 April, 2010. The index of the selected MVP is transmitted. In the Skip mode of HM-2.0, the reference index will always be set to 0. In the Inter mode, the reference index is explicitly transmitted to the decoder.

In existing HEVC, the temporal MVP is derived based on motion vectors from a respective area of a reference picture by mapping the current block from the current picture to the reference picture. The respective area, i.e., the co-located block, in the reference picture may not have the same block size (i.e., prediction unit (PU) size) as the current block. When the respective area uses smaller block sizes than the current block, one of the blocks in the co-located block is selected as a co-located reference block. In HM-2.0, the temporal predictor is associated with the center block of the respective area. The center block has the coordinates of its lower right corner mapped to the center of the current block. However, a block at the upper-left corner of the respective area has been associated with the temporal prediction of AMVP in previous version of HM. Fig. 1 illustrates the candidate set of MVPs used in HM-2.0, which includes two spatial MVPs and one temporal MVP:

1. Left predictor (the first MV available from E, A_{m-1},...A_{0}),
2. Top predictor (the first available MV from C, \textit{B_{n-1}},...B_{0}, D), and
3. Temporal predictor T_{ct} (a temporal MV, found by mapping the center of the block to its co-located block).

One MVP index is signaled to indicate which MVP from the candidate set is used. For the left predictor, the MVP is selected as the first available MV from the bottom block to top block which has the same reference picture index as the given reference picture index (it is set to 0 for Skip mode in HM-2.0 and is explicitly transmitted to the decoder for the Inter mode) and the same reference list as the given reference list. For the top predictor, it is selected as the first available MV which is not identical to the left predictor from the right block to the left block in HM-2.0, which has the same reference picture index as the given reference picture index and the same reference picture list as the given reference list. The temporal predictor is determined by mapping the center of the block to a co-located picture, instead of the origin of the block (i.e., the upper left block of the respective area). The location of the center for 3 types of partitioning of a 32x32 CU, i.e., 2Nx2N 210, 2NxN 220 and NxN 230, is shown in Fig. 2. The centers and origins of the blocks are indicated by reference numbers 214, 212, 224, 222, 234, and 232 respectively.

In HM-2.0, if a block is encoded as a Merge mode, one MVP index is signaled to indicate which MVP from the candidate set is used for this block to be merged. Fig. 3 illustrates the neighboring block configuration for deriving the MVP for Merge mode. The candidate set includes four spatial MVPs and one temporal MVP:
1. Left predictor \((A_0)\),
2. Top predictor \((B_0)\),
3. Temporal predictor \(T_{ctr}\) (a temporal motion vector, found by mapping the center of the block to a co-located picture),
4. Right-Top predictor \((C)\), and
5. Left-Bottom predictor \((E)\).

**[0016]** For the spatial MVs in Merge mode, the reference picture index will be set to the same as the reference picture index from the selected block. For example, if block \(C\) is selected according to the MVP index, the MV and the reference picture index from the block \(C\) are used for merge, i.e. the MV and reference picture index from block \(C\) are used for current PU. If the block has two MVs, the two MVs and their reference picture indices are used for bi-prediction. In particular, each CU can be merged as a whole (i.e., \(2Nx2N\) merge) or partially merged. If partition type \(N\times2N\) or \(2N\timesN\) is selected for Inter predicted CU, the first partition (i.e., PU) of this CU is forced to Merge mode in HM-2.0. That is, the first PU of an \(N\times2N\) or \(2N\timesN\) CU will not have its own motion vector; instead, it has to share one of its neighboring blocks’ motion vectors. At the meantime, the second \(N\times2N\) or \(2N\timesN\) PU can be in either Merge mode or Inter mode. The MVs for the first \(N\times2N\) PU are shown in Fig. 4, where the spatial MVs and reference blocks are indicated by reference number 410 and the temporal MVP is indicated by reference number 420. The MVs for partial merge of the first \(2N\timesN\) PU are shown in Fig. 5, where the spatial MVs are indicated by reference number 510 and the temporal MVP is indicated by reference number 520.

**[0017]** As mentioned before, AMVP is an effective means for reducing the information associated with transmission of an underlying motion vector. The efficiency of AMVP depends on the availability of MVs and the quality of the MVs (i.e., accuracy of the MVP). When an MVP is not available, the underlying MV has to be transmitted without prediction or with a prediction value 0 or other default value. It is desirable to improve the MVP availability and quality. Accordingly, extended temporal search scheme according to various embodiments of the present invention is disclosed. According to one embodiment of the present invention, the temporal MVs for a motion vector (MV) of a current block of a current picture is derived based on one or more co-located reference blocks of the co-located block, wherein said one or more co-located reference blocks comprise a block from the bottom-right neighboring block of the co-located block. For example, above-left reference block 610 of bottom-right neighboring block 620 of co-located block 630 of the reference picture can be used as a co-located reference block in the Inter or Skip mode as shown in Fig. 6, which is not depicting an embodiment of the invention.

**[0018]** While the HM-2.0 and its previous version only use one co-located reference block, an embodiment according to the present invention allows using more than one co-located reference blocks. Fig. 8 illustrates an example of using more than one co-located reference blocks where the co-located reference blocks include above-left reference block 610, center reference block 810 of the co-located block, leftmost reference block 820 of right neighboring block 830 of co-located block 630, and top reference block 840 of a below neighboring block 850 of co-located block 630 in the Inter or Skip mode. A leftmost reference block of the right neighboring block refers to a reference block that is at the most left side of the right neighboring block in this disclosure. In other words, the leftmost reference block of the right neighboring block is a block in the right neighboring block that is adjacent to the co-located block. Leftmost reference block 820 shown in Fig. 8 is the top reference block of the leftmost reference blocks. A top reference block of the below neighboring block refers to a reference block that is at the top side of the below neighboring block in this disclosure. In other words, the top reference block of the below neighboring block is a block in the below neighboring block that is adjacent to the co-located block. Top reference block 840 shown in Fig. 8 is the leftmost reference block of the top reference blocks. While center reference block 810 inside co-located block 630 is used as a co-located reference block, other co-located reference blocks inside co-located block 630 may also be used. A co-located reference block inside the co-located block is referred to as an inside reference block. Fig. 9 illustrates another example of using more than one co-located reference blocks where the co-located reference blocks include the above-left reference block 610, above-left reference block 910 of the co-located block, leftmost reference block 820 of right neighboring block 830 of the co-located block, and top reference block 840 of a below neighboring block 850 of the co-located block in the Inter or Skip mode. In order to differentiate the two above-left reference blocks 610 and 910 when needed, above-left reference block 610 of bottom-right neighboring block 620 of co-located block 630 is referred to as the first above-left reference block while above-left reference block 910 of co-located block 630 is referred to as the above-left reference block. While the co-located reference blocks shown in Fig. 8 and Fig. 9 are used to derive temporal MVP in the Inter or Skip mode, the co-located reference blocks shown in Fig. 8 and Fig. 9 may also be used to derive temporal MVP in the Merge mode.

**[0019]** In another embodiment according to the present invention, when two or more co-located reference blocks are used, the MVP derivation will start MVP search based on first above-left reference block 610 of bottom-right neighboring block 620 of co-located block 630. If no MVP can be found, the MVP derivation will continue MVP search based on other co-located reference blocks. If the MVP still cannot be found, the MVP
In another embodiment according to the present invention, when the MVP found by the MVP derivation is the same as a previously found MVP, the MVP derivation will continue to find an MVP different from the previously found MVP. If the MVP still cannot be found, the MVP can be set to zero or a default value. The previously found MVP is the MVP found during the search over spatial MVP candidates, where the MVP search is first performed based on the spatial neighboring blocks above the current block and to the left of the current block before the MVP search is performed based on the co-located block.

In this disclosure, exemplary configurations of co-located reference blocks have been provided to illustrate embodiments according to the present invention. While separate exemplary configurations have been provided for the Inter/Skip mode and Merge mode, the exemplary configuration for the Inter/Skip mode is applicable to Merge mode, and vice versa. Furthermore, separate exemplary search schemes have been provided for the Inter/Skip mode and Merge mode. However, the search scheme for the Inter/Skip mode is applicable to Merge mode, and vice versa. Furthermore, while several configurations of co-located reference blocks are illustrated as examples, a skilled person in the field may practice the present invention using other configurations with departing from the spirit of the present invention.

Embodiment of MVP derivation according to the present invention as described above may be implemented in various hardware, software codes, or a combination of both. For example, an embodiment of the present invention can be a circuit integrated into a video compression chip or program codes integrated into video compression software to perform the processing described herein. An embodiment of the present invention may also be program codes to be executed on a Digital Signal Processor (DSP) to perform the processing described herein. The invention may also involve a number of functions to be performed by a computer processor, a digital signal processor, a microprocessor, or field programmable gate array (FPGA). These processors can be configured to perform particular tasks according to the invention, by executing machine-readable software code or firmware code that defines the particular methods embodied by the invention. The software code or firmware codes may be developed in different programming languages and different format or style. The software code may also be compiled for different target platform. However, different code formats, styles and languages of software codes and other means of configuring code to perform the tasks in accordance with the invention will not depart from the scope of the invention.

**Claims**

1. A method of deriving a motion vector predictor, MVP, for a motion vector, MV, of a current block of a current picture in Inter mode, wherein the MV is associated with the current block and a corresponding block of a target reference picture in a given reference list, the method comprising:

   - determining at least two co-located reference blocks of a co-located block (630) in the target reference picture, wherein the co-located block (630), that is the respective area of the current block in the reference picture, is a block in the target reference picture that has the same block location as the current block in the current picture;
   - receiving at least two reference MVs, motion vectors, associated with said at least two co-located reference blocks, respectively;
   - determining the MVP for the current block based on a spatial/temporal MVP candidate set of MVPs, the candidate set including said at least two reference MVs as temporal MVPs; and
   - providing the MVP for the current block, wherein said at least two co-located reference blocks in the target reference picture at least comprise a bottom-right neighboring block (610) of the co-located block (630) and an inside reference block (810, 910) of the co-located block (630), wherein a MVP search based on the bottom-right neighboring block (610) and the inside reference block (810, 910) is performed according to a search order, and
   - one reference MV associated with the bottom-right neighboring block (610) is used as the MVP if the bottom-right neighboring block is selected for the current block according to the search order.

2. The method of Claim 1, wherein said one reference MV associated with the bottom-right neighboring block is a motion vector associated with an above-left reference block of the bottom-right neighboring block of the co-located block.

3. The method of Claim 1, wherein the inside reference block (810, 910) is a center reference block (810) of the co-located block (630).

4. The method of Claim 3, wherein said at least two co-located reference blocks further comprise a leftmost reference block (820) of a right neighboring block of the co-located block (630), a top reference block (840) of a bottom neighboring block of the co-located block (630).
5. The method of Claim 1, wherein the inside reference block is an above-left reference block of the co-located block (630), and wherein said at least two co-located reference blocks further comprise a leftmost reference block of a right neighboring block (820) of the co-located block (630) or a top reference block of a bottom neighboring block (840) of the co-located block (630).

6. An apparatus for deriving a motion vector predictor, MVP, for a motion vector, MV, of a current block of a current picture in Inter mode, wherein the MV is associated with the current block and a corresponding block of a target reference picture in a given reference list, the apparatus comprising:

   - means for determining at least two co-located reference block of a co-located block (610) in the target reference picture, wherein the co-located block (610), that is the respective area of the current block in the reference picture, is a block in the target reference picture that has the same block location as the current block in the current picture;
   - means for receiving at least two reference MVs associated with said at least two or more co-located reference blocks, respectively;
   - means for determining the MVP for the current block based on a spatial/temporal MVP candidate set of MVPs, the candidate set including said at least two reference MVs as temporal MVPs; and
   - means for providing the MVP for the current block; wherein said at least two co-located reference blocks in the target reference picture at least comprise a bottom-right neighboring block of the co-located block (610) and an inside reference block of the co-located block (610), wherein a MVP search based on the bottom-right neighboring block and the inside reference block is performed according to a search order, and one reference MV associated with the bottom-right neighboring block is used as the MVP if the bottom-right neighboring block is selected for the current block according to the search order.

7. The apparatus of Claim 6, wherein said one reference MV associated with the bottom-right neighboring block is a motion vector associated with an above-left reference block of the bottom-right neighboring block of the co-located block (630).

8. The apparatus of Claim 6, wherein the inside reference block is a center reference block of the co-located block (630).

9. The apparatus of Claim 8, wherein said at least two co-located reference blocks further comprise a leftmost reference block of a right neighboring block (820) of the co-located block (630), a top reference block of a bottom neighboring block (840) of the co-located block (630).
2. Verfahren gemäß Anspruch 1, wobei der eine Referenz-MV, der mit dem unteren rechten Nachbarblock verknüpft ist, ein Bewegungsvektor ist, der mit einem oberen linken Referenzblock des unteren rechten Nachbarblocks des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks verknüpft ist.

3. Verfahren gemäß Anspruch 1, wobei der innenseitige Referenzblock (810, 910) ein mittlerer Referenzblock (810) des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) ist.

4. Verfahren gemäß Anspruch 3, wobei die mindestens zwei räumlich gleich und zeitlich unterschiedlich angeordneten Referenzblöcke weiter einen am weitesten links gelegenen Referenzblock (820) eines rechten Nachbarblocks des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630), einen oberen Referenzblock (840) eines unteren Nachbarblocks des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) aufweisen.

5. Verfahren gemäß Anspruch 1, wobei der innenseitige Referenzblock ein oberer linker Referenzblock des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) ist, und wobei die mindestens zwei räumlich gleich und zeitlich unterschiedlich angeordneten Referenzblöcke weiter einen am weitesten links gelegenen Referenzblock eines rechten Nachbarblocks (820) des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) oder einen oberen Referenzblock (840) eines unteren Nachbarblocks des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) aufweisen.

6. Vorrichtung für ein Herleiten eines Bewegungsvektor-Prädiktors, MVP, für einen Bewegungsvektor, MV, eines aktuellen Blocks eines aktuellen Bilds in einem Inter-Modus, wobei der MV mit dem aktuellen Block und einem korrespondierenden Block eines Zielreferenzbilds in einer gegebenen Referenzliste verknüpft ist, wobei die Vorrichtung aufweist:

   eine Einrichtung zum Bestimmen mindestens zweier räumlich gleich und zeitlich unterschiedlich angeordneter Referenzblöcke eines räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (610) in dem Zielreferenzbild, wobei der räumlich gleich und zeitlich unterschiedlich angeordnete Block (610), welcher der jeweilige Bereich des aktuellen Blocks in dem Referenzbild ist, ein Block in dem Zielreferenzbild ist, welcher die gleiche Blockposition aufweist wie der aktuelle Block in dem aktuellen Bild;
   eine Einrichtung zum Empfangen mindestens zweier Referenz-MVs, die jeweils mit den mindestens zwei oder mehreren räumlich gleich und zeitlich unterschiedlich angeordneten Referenzblöcken verknüpft sind;
   eine Einrichtung zum Bestimmen des MVPs für den aktuellen Block basierend auf einer räumlichen/zeitlichen MVP-Kandidatengruppe von MVPs, wobei die Kandidatengruppe die mindestens zwei Referenz-MVs als zeitliche MVPs umfasst; und
   eine Einrichtung zum Bereitstellen des MVPs für den aktuellen Block; wobei die mindestens zwei räumlich gleich und zeitlich unterschiedlich angeordneten Referenzblöcke in dem Zielreferenzbild zumindest einen unteren rechten Nachbarblock des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (610) und einen innenseitigen Referenzblock des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (610) aufweisen, wobei eine MVP-Suche basierend auf dem unteren rechten Nachbarblock und dem innenseitigen Referenzblock gemäß einer Suchreihenfolge durchgeführt wird, und ein Referenz-MV, der mit dem unteren rechten Nachbarblock verknüpft ist, als der MVP verwendet wird, wenn der untere rechte Nachbarblock für den aktuellen Block gemäß der Suchreihenfolge ausgewählt wird.

7. Vorrichtung gemäß Anspruch 6, wobei der eine Referenz-MV, der mit dem unteren rechten Nachbarblock verknüpft ist, ein Bewegungsvektor ist, der mit einem oberen linken Referenzblock des unteren rechten Nachbarblocks des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) verknüpft ist.

8. Vorrichtung gemäß Anspruch 6, wobei der innenseitige Referenzblock ein mittlerer Referenzblock des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) ist.

9. Vorrichtung gemäß Anspruch 8, wobei die mindestens zwei räumlich gleich und zeitlich unterschiedlich angeordneten Referenzblöcke weiter einen am weitesten links gelegenen Referenzblock eines rechten Nachbarblocks (820) des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630), einen oberen Referenzblock eines unteren Nachbarblocks (840) des räumlich gleich und zeitlich unterschiedlich angeordneten Blocks (630) aufweisen.

Revendications

1. Procédé de dérivation d’un prédicteur de vecteur de mouvement, MVP, pour un vecteur de mouvement, MV, d’un bloc actuel d’une image actuelle en mode Inter, dans lequel le MV est associé au bloc actuel
et à un bloc correspondant d’une image de référence cible dans une liste de référence donnée, le procédé comprenant le fait :

5 de déterminer au moins deux blocs de référence co-localisés d’un bloc co-localisé (630) dans l’image de référence cible, où le bloc co-localisé (630), qui est la zone respective du bloc actuel dans l’image de référence, est un bloc dans l’image de référence cible qui a le même emplacement de bloc que le bloc actuel dans l’image actuelle ;

10 de recevoir au moins deux vecteurs de mouvement, MV, de référence, associés auxdits au moins deux blocs de référence co-localisés, respectivement ;

15 de déterminer le MVP pour le bloc actuel sur la base d’un ensemble de candidats de MVP spatiaux/temps des MVP, l’ensemble de candidats comportant lesdits au moins deux MV de référence en tant que MVP temps ; et de fournir le MVP pour le bloc actuel, où lesdits au moins deux blocs de référence co-localisés dans l’image de référence cible comprennent au moins un bloc voisin inférieur droit (610) du bloc co-localisé (630) et un bloc de référence interne (810, 910) du bloc co-localisé (630), où une recherche de MVP sur la base du bloc voisin inférieur droit (610) et du bloc de référence interne (810, 910) est effectuée selon un ordre de recherche, et un MV de référence associé au bloc voisin inférieur droit (610) est utilisé comme étant le MVP si le bloc voisin inférieur droit est sélectionné pour le bloc actuel selon l’ordre de recherche.

20

2. Procédé de la revendication 1, dans lequel ledit un MV de référence associé au bloc voisin inférieur droit est un vecteur de mouvement associé à un bloc de référence supérieur gauche du bloc voisin inférieur droit du bloc co-localisé.

25

3. Procédé de la revendication 1, dans lequel le bloc de référence interne (810, 910) est un bloc de référence central (810) du bloc co-localisé (630).

30

4. Procédé de la revendication 3, dans lequel lesdits au moins deux blocs de référence co-localisés comprennent en outre le bloc de référence le plus à gauche (820) d’un bloc voisin droit du bloc co-localisé (630), un bloc de référence supérieur (840) d’un bloc voisin inférieur du bloc co-localisé (630).

35

5. Procédé de la revendication 1, dans lequel le bloc de référence interne est un bloc de référence supérieur gauche du bloc co-localisé (630), et dans lequel lesdits au moins deux blocs de référence co-localisés comprennent en outre le bloc de référence le plus à gauche du bloc voisin droit (820) du bloc co-localisé (630) ou un bloc de référence supérieur d’un bloc voisin inférieur (840) du bloc co-localisé (630).

40

6. Appareil pour dériver un prédicteur de vecteur de mouvement, MVP, pour un vecteur de mouvement, MV, d’un bloc actuel d’une image actuelle en mode Inter, dans lequel le MV est associé au bloc actuel et à un bloc correspondant d’une image de référence cible dans une liste de référence donnée, l’appareil comprenant :

45 des moyens pour déterminer au moins deux blocs de référence co-localisés d’un bloc co-localisé (610) dans l’image de référence cible, où le bloc co-localisé (610), qui est la zone respective du bloc actuel dans l’image de référence, est un bloc dans l’image de référence cible qui a le même emplacement de bloc que le bloc actuel dans l’image actuelle ;

50 des moyens pour recevoir au moins deux MV de référence associés auxdits au moins deux blocs de référence co-localisés ou plus, respectivement ;

55 des moyens pour déterminer le MVP pour le bloc actuel sur la base d’un ensemble de candidats de MVP spatiaux/temps des MVP, l’ensemble de candidats comportant lesdits au moins deux MV de référence en tant que MVP temps ; et des moyens pour fournir le MVP pour le bloc actuel ; où lesdits au moins deux blocs de référence co-localisés dans l’image de référence cible comprennent au moins un bloc voisin inférieur droit du bloc co-localisé (610) et un bloc de référence interne (810, 910) du bloc co-localisé (630), où une recherche de MVP sur la base du bloc voisin inférieur droit et du bloc de référence interne (810, 910) est effectuée selon un ordre de recherche, et un MV de référence associé au bloc voisin inférieur droit est utilisé comme étant le MVP si le bloc voisin inférieur droit est sélectionné pour le bloc actuel selon l’ordre de recherche.

60

7. Appareil de la revendication 6, dans lequel ledit un MV de référence associé au bloc voisin inférieur droit est un vecteur de mouvement associé à un bloc de référence supérieur gauche du bloc voisin inférieur droit du bloc co-localisé (630).

65

8. Appareil de la revendication 6, dans lequel le bloc de référence interne est un bloc de référence central du bloc co-localisé (630).
9. Appareil de la revendication 8, dans lequel lesdits au moins deux blocs de référence co-localisés comprennent en outre le bloc de référence le plus à gauche d’un bloc voisin droit (820) du bloc co-localisé (630), un bloc de référence supérieur d’un bloc voisin inférieur (840) du bloc co-localisé (630).
REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader’s convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

• US 61417798 [0001]
• US 61431454 [0001]
• US 61452541 [0001]
• US 08923311 [0001]
• US 13206891 B [0001]
• WO 2009115901 A2 [0003]

Non-patent literature cited in the description

• Samsung’s Response to the Call for Proposals on Video Compression Technology. The JCT-VC document JCTVC-A124, 23 April 2010 [0003]

• MCCANN et al. Samsung’s Response to the Call for Proposals on Video Compression Technology. JCTVC-A124, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG1, 1st Meeting, 15 April 2010 [0012]