CLAIMS

1. An apparatus for determination of a motion vector for a block including a processing circuitry configured to:

obtain an initial motion vector and a template for the block;

determine a refinement of the initial motion vector by template matching with said template in a search space, wherein

said search space is located on a position given by the initial motion vector and includes one or more fractional sample positions, wherein each of the fractional sample positions belonging to the search space is obtained by interpolation filtering with a interpolation filter of a predefined tap-size using integer samples only within a window, said window being formed by integer samples accessible for the template matching in said search space.

2. The apparatus according to claim 1, wherein the window is defined as an extension on at least one of: left and right; and top and bottom of the block.

3. The apparatus according to claim 1 or 2, wherein the window is defined around a position pointed by the initial motion vector and identifies a number of samples to be accessed for performing the refinement of the initial motion vector.

4. The apparatus according to any of the preceding claims, wherein the window is defined as N integer sample columns and M integer sample rows relative to the block initial motion vector, at least one of N and M being non-zero integer values.

5. The apparatus according to any of the preceding claims, wherein

the processing circuitry is configured to determine the refinement of the initial motion vector by template matching with said template in a search space which is iteratively extended in a direction given by one of more best matching positions of the search

space in a most recent iteration,

the window is defined by a predefined maximum number of the iterations.

6. The apparatus according to any of the preceding claims, wherein the search space includes a rectangular sub-window of the window such that all integer samples accessed for interpolation filtering of each fractional sample in the sub-window are located within said window for the interpolation filter with the predefined tap-size.

7. The apparatus according to any of claims 1 to 4, wherein the search space includes a rectangular search sub-window of the window, wherein the refinement of the initial motion vector is determined by template matching with said template in the rectangular search sub-window such that the integer samples accessed for interpolation filtering of each fractional sample in the search sub-window are located within said window for the interpolation filter with the predefined tap-size.

8. The apparatus according to claim 7, wherein

the processing circuitry is configured to determine the refinement of the initial motion vector by template matching with said template in a search space which is iteratively extended in a direction given by one of more best matching positions of the search space in a most recent iteration, wherein the iteration is ended when at least one sample within the search space of the most recent iteration is outside the search sub-window.

9. The apparatus according to claim 6, wherein the interpolation filter is a one-dimensional filter using K either horizontal or vertical integer samples when the fractional sample position is located on a respective horizontal or vertical line of integer samples.

10. The apparatus according to claim 9, wherein the search space further includes fractional sample positions located outside the sub-window either:

- adjacent on the top or on the bottom of the sub-window and located on the horizontal line of integer samples or
- adjacent on the left or on the right hand side of the sub-window and located on the vertical line of integer samples.

11. An encoding apparatus for encoding video images split to blocks into a bitstream, the encoding apparatus comprising:

the apparatus for determination of a motion vector for a block according to any of claims 1 to 10;

an encoding circuitry for encoding difference between the block and the predictor given by a block in a position based on the determined motion vector and for generating bitstream including the encoded difference and the initial motion vector.

12. A decoding apparatus for decoding from a bitstream video images split to blocks, the decoding apparatus comprising:

a parsing unit for parsing from the bitstream an initial motion vector and an encoded difference between a block and a predictor given by a block in a position specified by a refined motion vector;

the apparatus for determination of the refined motion vector for the block according to any of claims 1 to 10;

decoding circuitry for reconstructing the block as a sum of the parsed difference and the predictor given by the block in the position specified by the refined motion vector.

13. A method for determination of a motion vector for a block including the steps of:

obtaining an initial motion vector and a template for the block;

determining a refinement of the initial motion vector by template matching with said template in a search space, wherein

said search space is located on a position given by the initial motion vector and includes

one or more fractional sample positions, wherein each of the fractional sample positions belonging to the search space is obtained by interpolation filtering with a interpolation filter of a predefined tap-size using integer samples only within a window, said window being formed by integer samples accessible for the template matching in said search space.

14. The method according to claim 13, wherein the window is defined a as N integer sample columns and M integer sample rows relative to the block initial motion vector, N and M being non-zero integer values.

15. The method according to claim 13 or 14, wherein

the refinement of the initial motion vector is determined by template matching with said template in a search space which is iteratively extended in a direction given by one of more best matching positions of the search space in a most recent iteration,

the window is defined by a predefined maximum number of the iterations.

16. The method according to any of claims 13 to 15, wherein the search space includes a rectangular sub-window of the window such that all integer samples accessed for interpolation filtering of each fractional sample in the sub-window are located within said window for the interpolation filter with the predefined tap-size.

17. The method according to claim 13 or 14, wherein the search space includes a rectangular search sub-window of the window, wherein the refinement of the initial motion vector is determined by template matching with said template in the rectangular search sub-window such that the integer samples accessed for interpolation filtering of each fractional sample in the search sub-window are located within said window for the interpolation filter with the predefined tap-size.

18. The method according to claim 17, wherein

the refinement of the initial motion vector is determined by template matching with said template in a search space which is iteratively extended in a direction given by one of more best matching positions of the search space in a most recent iteration, wherein the iteration is ended when at least one sample within the search space of the most recent iteration is outside the search sub-window.

19. The method according to claim 16, wherein the interpolation filter is a one-dimensional filter using K either horizontal or vertical integer samples when the fractional sample position is located on a respective horizontal or vertical line of integer samples.

20. The method according to claim 19, wherein the search space further includes fractional sample positions located outside the sub-window either:

- adjacent on the top or on the bottom of the sub-window and located on the horizontal line of integer samples or
- adjacent on the left or on the right hand side of the sub-window and located on the vertical line of integer samples.

21. An encoding method for encoding video images split to blocks into a bitstream, the encoding method comprising:

determining a motion vector for a block according to any of claim 13 to 20;

encoding difference between the block and the predictor given by a block in a position based on the determined motion vector and for generating bitstream including the encoded difference and the initial motion vector.

22. A decoding method for decoding from a bitstream video images split to blocks, the decoding method comprising:

parsing from the bitstream an initial motion vector and an encoded difference between a block and a predictor given by a block in a position specified by a refined motion vector;

determining the refined motion vector for the block according to claim 13to 20;

reconstructing the block as a sum of the parsed difference and the predictor given by the block in the position specified by the refined motion vector.

23. Computer readable medium storing instructions which when executed on a processor cause the processor to perform the method according to any of claims 13 to 22.