Claims

1. A ~~Video~~ video decoder (410) configured to:

decode a video (450) from a data stream (420) using motion compensation prediction to predict current pictures from reference pictures

based on ~~first~~ motion vector~~s~~ differences (423) transmitted in the data stream (450) at ~~a first resolution being~~ half-sample resolution, ~~and second motion vectors (424) transmitted in the data stream (450) at a second resolution being different from the first resolution,~~

~~between~~ with first reference pictures (421) of equal picture resolution as respective current pictures for which they are used in prediction and second reference pictures (422) of different picture resolution than respective current pictures for which they are used in prediction, and

using interpolation filters (431, 432) to obtain sub-sample values within ~~a~~ reference sample array~~s~~ formed from respective reference pictures,

select ~~the~~ an interpolation filter to obtain half-sample values within ~~the~~ a reference sample array, the reference sample array formed from a reference picture by using ~~for~~ a ~~predetermined first~~ motion vector, the interpolation filter selected from a first interpolation filter version (431) and a second interpolation filter version (432), wherein the first interpolation filter version (431) is a 6 tap filter with coefficients 3,9,20,20,9,3 and the second interpolation filter version (432) is an 8 tap filter with coefficients -1,4,-11,40,40,-11,4,-1, ~~has a higher edge preserving property than the first interpolation filter version (431), depending on~~by

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in horizontal dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in horizontal dimension~~whether a current picture, to which the predetermined first motion vector belongs, is equal in picture resolution to the reference sample array, to which the predetermined first motion vector relates, in horizontal dimension~~, and/or

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in vertical dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in vertical dimension~~whether the current picture, is equal in picture resolution to the reference sample array in vertical dimension, and/or~~

~~a constraint information (425) being transmitted in the data stream~~.

2. A ~~Video~~ video decoder according to claim 1, further configured to:

obtain full-sample values within the reference sample array without using the interpolation filter.

3. A ~~Video~~ video decoder according to claim 1 or 2, further configured to:

obtain non-half-sample sub-sample values within the reference sample array by using further interpolation filter versions having a higher edge preserving property than the first interpolation filter version.

4. A ~~Video~~ video decoder according to any one of claims 1 to 3, further configured to:

perform the selection separately for horizontal interpolation and vertical interpolation.

5. A ~~Video~~ video decoder according to any one of claims 1 to 4,

wherein the second interpolation filter version is selected for horizontal interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal dimension,

wherein the second interpolation filter version is selected for vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in vertical dimension, and

wherein the second interpolation filter version is selected for horizontal and vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal and vertical dimension.

6. The ~~Video~~ video decoder according to any one of claims 1 to 5, ~~further configured to~~

~~select the second interpolation filter version (432) for the second motion vector~~wherein the second interpolation filter version has a higher edge preserving property than the first interpolation filter version.

~~7. Video decoder according to claim 6, further configured to~~

~~map an alphabet of one or more syntax elements in the data stream which indicate a resolution of the predetermined first motion vector onto a first set of vector resolutions not comprising half-sample resolution, if one of a set of one or more of the following conditions is met, and onto a second set of vector resolutions comprising half-sample resolution if none of the set of one or more of the following conditions is met:~~

~~a constraint information indicating that the filter version having the lower edge preserving property is disabled, e.g. in a picture or slice header, such that the filter version having the lower edge preserving property is disabled for the current picture,~~

~~the current picture to which the predetermined first motion vector belongs is unequal in at least one dimension of picture resolution to the reference sample array to which the predetermined first motion vector relates, or~~

~~a constraint information indicating that resampling of the reference sample array is enabled, e.g. on the sequence level in a sequence parameter set, SPS, such that the filter version having the higher edge preserving property are used when reference sample array resampling is enabled.~~

~~8~~7. A ~~Video~~ video decoder according to any one of claims 1 to ~~7~~6, wherein the data stream comprises information indicating whether temporal consecutive pictures have same or different horizontal and/or vertical picture resolution dimensions.

~~9. Video decoder according to any one of claims 1 to 8,~~

~~wherein the current picture is equal in picture resolution to the reference sample array in horizontal and vertical dimension.~~

~~10~~8. A ~~Video~~ video decoder according to any one of claims 1 to ~~7~~9,

wherein the reference sample array is a region, subpicture, or picture.

~~11. Video decoder according to any one of claims 1 to 10, further configured to~~

~~derive the constraint information from the data stream in one of per sequences of pictures, picture-wise, or slice-wise.~~

~~12~~9. A ~~Video~~ video encoder (510) configured to:

encode a video (550) into a data stream (520) using motion compensation prediction to predict current pictures from reference pictures,

indicate by transmitting in the data stream (520) ~~first~~ motion vector~~s~~ differences (523) at ~~a first resolution being~~ half-sample resolution, ~~and second motion vectors (524) at a second resolution being different from the first resolution,~~

with ~~between~~ first reference pictures (521) of equal picture resolution as respective current pictures for which they are used in prediction and second reference pictures (522) of different picture resolution than respective current pictures for which they are used in prediction, and

using interpolation filters (531, 532) to obtain sub-sample values within ~~a~~ reference sample array~~s~~ formed from respective reference pictures,

select ~~the~~ an interpolation filter to obtain half-sample values within ~~the~~ a reference sample array, the reference sample array formed from a reference picture by using ~~for~~ a ~~predetermined first~~ motion vector, the interpolation filter selected from a first interpolation filter version (531) and a second interpolation filter version (532), wherein the first interpolation filter version (531) is a 6 tap filter with coefficients 3,9,20,20,9,3 and the

second interpolation filter version (532) is an 8 tap filter with coefficients -1,4,-11,40,40,-11,4,-1, ~~has a higher edge preserving property than the first interpolation filter version (531), depending on~~by

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in horizontal dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in horizontal dimension~~whether a current picture, to which the predetermined first motion vector belongs, is equal in picture resolution to the reference sample array, to which the predetermined first motion vector relates, in horizontal dimension~~, and/or

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in vertical dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in vertical dimension~~whether the current picture, is equal in picture resolution to the reference sample array in vertical dimension, and/or~~

~~a constraint information (525) to be transmitted in the data stream~~.

~~13~~10. A ~~Video~~ video encoder according to claim ~~12~~9, further configured to:

obtain full-sample values within the reference sample array without using the interpolation filter.

~~14~~11. A ~~Video~~ video encoder according to claim ~~12~~ 9 or ~~13~~10, further configured to:

obtain non half-sample sub-sample values within the reference sample array by using further interpolation filter versions having a higher edge preserving property than the first interpolation filter version.

~~15~~12. A ~~Video~~ video encoder according to any one of claims ~~12~~ 9 to ~~14~~11, further configured to:

perform the selection separately for horizontal interpolation and vertical interpolation.

~~16~~13. A ~~Video~~ video encoder according to any one of claims ~~12~~ 9 to ~~15~~12,

wherein the second interpolation filter version is selected for horizontal interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal dimension,

wherein the second interpolation filter version is selected for vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in vertical dimension, and

wherein the second interpolation filter version is selected for horizontal and vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal and vertical dimension.

~~17~~14. A ~~Video~~ video encoder according to any one of claims ~~12~~ 9 to ~~16~~13, wherein the second interpolation filter version has a higher edge preserving property than the first interpolation filter version~~further configured to~~

~~perform the selection further depending on whether the predetermined first motion vector is of half-sample resolution~~.

~~18. Video encoder according to any one of claims 12 to 17,~~

~~wherein in selecting the resolution of the motion vectors, the encoder is configured to refrain from using half-sample resolution for one or more vectors if the current picture is equal in picture resolution to the reference sample array in horizontal and/or vertical dimension.~~

~~19. Video encoder according claim 17 or 18, further configured to~~

~~map an alphabet of one or more syntax elements in the data stream which indicate a resolution of the predetermined first motion vector onto a first set of vector resolutions not comprising half-sample resolution, if one of a set of one or more of the following conditions is met, and onto a second set of vector resolutions comprising half-sample resolution if none of the set of one or more of the following conditions is met:~~

~~a constraint information indicating that the filter version having the lower edge preserving property is disabled, e.g. in a picture or slice header, such that the filter version having the lower edge preserving property is disabled for the current picture,~~

~~the current picture to which the predetermined first motion vector belongs is unequal in at least one dimension of picture resolution to the reference sample array to which the predetermined first motion vector relates, or~~

~~a constraint information indicating that resampling of the reference sample array is enabled, e.g. on the sequence level in a sequence parameter set, SPS, that the filter version having the higher edge preserving property are used when reference sample array resampling is enabled.~~

~~20~~15. A ~~Video~~ video encoder according to any one of claims ~~12~~ 9 to ~~19~~14, wherein the data stream comprises information indicating whether temporal consecutive pictures have the same or different horizontal and/or vertical picture resolution dimensions.

~~21. Video encoder according to any one of claims 12 to 20,~~

~~wherein the current picture is equal in picture resolution to the reference sample array in horizontal and vertical dimension.~~

~~22~~16. A ~~Video~~ video encoder according to any one of claims ~~12~~ 9 to ~~21~~15,

wherein the reference sample array is a region, subpicture, or picture.

~~23. Video encoder according to any one of claims 12 to 22, further configured to~~

~~encode the constraint information into the data stream in one of per sequences of pictures, picture-wise, or slice-wise.~~

~~24~~17. A ~~Method~~ method for decoding a video, the method comprising:

decoding a video from a data stream using motion compensation prediction to predict current pictures from reference pictures

based on ~~first~~ motion vector~~s~~ differences transmitted in the data stream at ~~a first resolution being~~ half-sample resolution~~, and second motion vectors transmitted in the data stream at a second resolution being different from the first resolution~~,

~~between~~ with first reference pictures of equal picture resolution as respective current pictures for which they are used in prediction and second reference pictures of different picture resolution than respective current pictures for which they are used in prediction, and

using interpolation filters to obtain sub-sample values within ~~a~~ reference sample array~~s~~ formed from respective reference pictures,

selecting ~~the~~ an interpolation filter to obtain half-sample values within ~~the~~ a reference sample array, the reference sample array formed from a reference picture by using ~~for a predetermined first~~ motion vector, the interpolation filter selected from a first interpolation filter version and a second interpolation filter version, wherein the first interpolation filter version is a 6 tap filter with coefficients 3,9,20,20,9,3 and the second interpolation filter version is an 8 tap filter with coefficients -1,4,-11,40,40,-11,4,-1, ~~has a higher edge preserving property than the first interpolation filter version, depending on~~by

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in horizontal dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in horizontal dimension~~whether a current picture, to which the predetermined first motion vector belongs, is equal in picture resolution to the reference sample array, to which the predetermined first motion vector relates, in horizontal dimension~~, and/or

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in vertical dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in vertical dimension.~~whether the current picture, is equal in picture resolution to the reference sample array in vertical dimension, and/or~~

~~a constraint information being transmitted in the data stream.~~

~~25~~18. The ~~Method~~ method for decoding a video according to claim ~~24~~17, further comprising:

obtaining full-sample values within the reference sample array ~~for the predetermined first motion vector~~ without using the interpolation filter.

~~26~~19. The ~~Method~~ method for decoding a video according to claim ~~24~~ 17 or ~~25~~18, further comprising:

obtaining non half-sample sub-sample values by using further interpolation filters having a higher edge preserving property than the first interpolation filter version.

~~27~~20. The ~~Method~~ method for decoding a video according to any one of claims ~~24~~ 17 to ~~26~~19, further comprising:

performing the selection separately for horizontal interpolation and vertical interpolation.

~~28~~21. The ~~Method~~ method for decoding a video according to any one of claims ~~24~~ 17 to ~~27~~20,

wherein the second interpolation filter is selected for horizontal interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~ picture in horizontal dimension,

wherein the second interpolation filter is selected for vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in vertical dimension, and

wherein the second interpolation filter is selected for horizontal and vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal and vertical dimension.

~~29~~22. The ~~Method~~ method for decoding a video according to any one of claims ~~24~~ 17 to ~~28~~21, wherein the second interpolation filter version has a higher edge preserving property than the first interpolation filter version~~further comprising~~

~~performing the selection further depending on whether the predetermined first motion vector is of half-sample resolution~~.

~~30. Method for decoding a video according to claim 29, further comprising~~

~~mapping an alphabet of one or more syntax elements in the data stream which indicate a resolution of the predetermined first motion vector, e.g. adaptive motion vector resolution amvr_flag and adaptive motion vector resolution precision amvr_precision_idx,~~

~~onto a first set of vector resolutions not comprising half-sample resolution, if one of the following conditions is met, and onto a second set of vector resolutions comprising half-sample resolution if none of the following conditions is met:~~

~~a constraint information indicating that the filter version having the lower edge preserving property is disabled, e.g. in a picture or slice header, i.e. ph_disable_hpel_smoothing_filter or sh_disable_hpel_smoothing_filter is equal to 1, such that the filter version having the lower edge preserving property is disabled for the current picture,~~

~~the current picture to which the predetermined first motion vector belongs is unequal in at least one dimension of picture resolution to the reference sample array to which the predetermined first motion vector relates, or~~

~~a constraint information indicating that resampling of the reference sample array is enabled, e.g. on the sequence level in a sequence parameter set, SPS, i.e. sps_ref_picture_resample_enable_flag is equal to 1, such that the filter version having the higher edge preserving property are used when reference sample array resampling is enabled.~~

~~31~~23. The ~~Method~~ method for decoding a video according to any one of claims ~~24~~ 17 to ~~30~~22,

wherein the data stream comprises information indicating whether temporal consecutive pictures have same or different horizontal and/or vertical picture resolution dimensions.

~~32. Method for decoding a video according to any one of claims 24 to 31,~~

~~wherein the current picture is equal in picture resolution to the reference sample array in horizontal and vertical dimension.~~

~~33~~24. ~~The Method~~ method for decoding a video according to any one of claims ~~24~~ 17 to ~~32~~23,

wherein the reference sample array is a region, subpicture, or picture.

~~34. Method for decoding a video according to any one of claims 24 to 33, further comprising~~

~~deriving the constraint information from the data stream in one of per sequences of pictures, picture-wise, or slice-wise.~~

~~35~~25. ~~A Method~~ method for encoding a video comprising:

encoding a video into a data stream using motion compensation prediction to predict current pictures from reference pictures,

indicating by transmitting in the data stream ~~first~~ motion vector~~s~~ differences at ~~a first resolution being~~ half-sample resolution, ~~and second motion vectors at a second resolution being different from the first resolution,~~

~~between~~ with first reference pictures of equal picture resolution as respective current pictures for which they are used in prediction and second reference pictures of different picture resolution than respective current pictures for which they are used in prediction, and

using interpolation filters to obtain sub-sample values within ~~a~~ reference sample array~~s~~ formed from respective reference pictures,

selecting ~~the~~ an interpolation filter to obtain half-sample values within ~~the~~ a reference sample array, the reference sample array formed from a reference picture by using for a ~~predetermined first~~ motion vector, the interpolation filter selected from a first interpolation filter version and a second interpolation filter version, wherein the first interpolation filter version is a 6 tap filter with coefficients 3,9,20,20,9,3 and the second interpolation filter version is an 8 tap filter with coefficients -1,4,-11,40,40,-11,4,-1, ~~has a higher edge preserving property than the first interpolation filter version, depending on~~by

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in horizontal dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in horizontal dimension~~whether a current picture, to which the predetermined first motion vector belongs, is equal in picture resolution to the reference sample array, to which the predetermined first motion vector relates, in horizontal dimension~~, and/or

selecting the first interpolation filter version when the reference picture is equal in picture resolution to the current picture in vertical dimension and selecting the second interpolation filter version when the reference picture is unequal in picture resolution to the current picture in vertical dimension~~whether the current picture, is equal in picture resolution to the reference sample array in vertical dimension, and/or~~

~~a constraint information to be transmitted in the data stream~~.

~~36~~26. The ~~Method~~ method for encoding a video according to claim ~~35~~25, further comprising:

obtaining full-sample values within the reference sample array ~~for the predetermined first motion vector~~ without using the interpolation filter.

~~37~~27. The ~~Method~~ method for encoding a video according to claim ~~35~~ 25 or ~~36~~26, further comprising:

obtaining non half-sample sub-sample values by using further interpolation filters having a higher edge preserving property than the first interpolation filter version.

~~38~~28. The ~~Method~~ method for encoding a video according to any one of claims ~~35~~ 25 to ~~37~~27, further comprising:

performing the selection separately for horizontal interpolation and vertical interpolation.

~~39~~29. The ~~Method~~ method for encoding a video according to any one of claims ~~35~~ 25 to ~~38~~28,

wherein the second interpolation filter is selected for horizontal interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal dimension,

wherein the second interpolation filter is selected for vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in vertical dimension, and

wherein the second interpolation filter is selected for horizontal and vertical interpolation if the current picture is not equal in picture resolution to the reference ~~sample array~~picture in horizontal and vertical dimension.

~~40~~30. The ~~Method~~ method for encoding a video according to any one of claims ~~35~~ 25 to ~~39~~29, ~~further comprising~~wherein the second interpolation filter version has a higher edge preserving property than the first interpolation filter version.

~~performing the selection further depending on whether the predetermined first motion vector is of half-sample resolution.~~

~~41. Method for encoding a video according to any one of claims 35 to 40,~~

~~wherein in selecting the resolution of the motion vectors, the method comprises refraining from using half-sample resolution for one or more vectors if the current picture is equal in picture resolution to the reference sample array in horizontal and/or vertical dimension.~~

~~42. Method for encoding a video according claim 40 or 41, further comprising~~

~~mapping an alphabet of one or more syntax elements in the data stream which indicate a resolution of the predetermined first motion vector, e.g. adaptive motion vector resolution amvr_flag and adaptive motion vector resolution precision amvr_precision_idx,~~

~~onto a first set of vector resolutions not comprising half-sample resolution, if one of the following conditions is met, and onto a second set of vector resolutions comprising half-sample resolution if none of the following conditions is met:~~

~~a constraint information indicating that the filter version having the lower edge preserving property is disabled, e.g. in a picture or slice header, i.e. ph_disable_hpel_smoothing_filter or sh_disable_hpel_smoothing_filter is equal to 1, such that the filter version having the lower edge preserving property is disabled for the current picture,~~

~~the current picture to which the predetermined first motion vector belongs is unequal in at least one dimension of picture resolution to the reference sample array to which the predetermined first motion vector relates, or~~

~~a constraint information indicating that resampling of the reference sample array is enabled, e.g. on the sequence level in a sequence parameter set, SPS, i.e. sps_ref_picture_resample_enable_flag is equal to 1, such that the filter version having the higher edge preserving property are used when reference sample array resampling is enabled.~~

~~43~~31. The ~~Method~~ method for encoding a video according to any one of claims ~~35~~ 25 to ~~43~~30,

wherein the data stream comprises information indicating whether temporal consecutive pictures have the same or different horizontal and/or vertical picture resolution dimensions.

~~44. Method for encoding a video according to any one of claims 35 to 43,~~

~~wherein the current picture is equal in picture resolution to the reference sample array in horizontal and vertical dimension.~~

~~45~~32. The ~~Method~~ method for encoding a video according to any one of claims ~~35~~ 25 to ~~44~~31,

wherein the reference sample array is a region, subpicture, or picture.

~~46. Method for encoding a video according to any one of claims 35 to 45, further comprising~~

~~encoding the constraint information into the data stream in one of per sequences of pictures, picture-wise, or slice-wise.~~

~~47~~33. A ~~Computer~~ computer program product including a program for a processing device, comprising software code portions for performing the steps of any one of claims ~~24~~ 17 to ~~46~~32, when the program is run on the processing device.

~~48~~34. The ~~Computer~~ computer program product according to claim ~~47~~33, wherein the computer program product comprises a computer-readable medium on which the software code portions are stored, wherein the program is directly loadable into an internal memory of the processing device.

~~49~~35. A ~~Data~~ data stream, produced by the method for encoding a video according to any one of claims ~~35~~ 25 to ~~46~~32.