~~WHAT IS CLAIMED IS:~~

~~1. A decoder, the decoder comprising circuitry configured to:~~

~~receive a coded video bitstream, the coded video stream including a coded reference picture and a coded current picture having a first size;~~

~~decode the reference picture;~~

~~identify from the bitstream a sub-region of the reference picture, the sub-region having a second size, wherein the second size is different from the first size;~~

~~rescale the sub-region to a third size, wherein the third size is equal to the first size, to form a rescaled reference picture; and~~

~~decode the current picture using the rescaled reference picture.~~

~~2. The decoder of claim 1 wherein the sub-region is characterized by a top offset, a bottom offset, a right offset, and a left offset.~~

~~3. The decoder of claim 1, wherein identifying the sub-region further comprises receiving, in the bitstream, an indication that the sub-region is present.~~

~~4. A decoder, the decoder comprising circuitry configured to:~~

~~receive a coded video bitstream including a coded first reference picture and a coded current picture;~~

~~decode the reference picture;~~

~~identify from the bit stream a first sub-region of the reference picture;~~

~~transform the first sub-region to form a second reference picture; and~~

~~decode the current picture using the second reference picture.~~

~~5. The decoder of claim 4 wherein the current picture has a first size, the first sub-region has a second size that is different from the first size, and the decoder is configured to transform sub-region by scaling the first sub-region to a third size equal to the first size.~~

~~6. The decoder of claim 4 wherein the decoder is configured to transform the first sub-region by translating the first sub-region.~~

~~7. The decoder of claim 4 wherein the decoder is configured to transform the first sub-region by applying an affine transformation.~~

~~8. The decoder of claim 1, further configured to store the first reference picture in a buffer.~~

~~9. The decoder of claim 8, wherein the buffer further comprises a long-term reference buffer.~~

~~10. The decoder of claim 8, wherein the buffer further comprises a reference picture buffer.~~

~~11. The decoder of claim 1, wherein the decoder is further configured to locate a second sub-region in the first reference picture.~~

~~12. The decoder of claim 11, further configured to decode a second frame using the first reference region and the second independent reference region~~

~~13. The decoder of claim 12, further configured to store the second independent reference region in a buffer.~~

~~14. The decoder of claim 1, wherein the current picture is a first picture, and the decoder is further configured to decode a second picture using first sub-region and a second sub-region.~~

~~15. A method of video coding using reference regions, the method comprising:~~

~~receiving, by a decoder, a coded video bitstream, the coded video bitstream including a coded reference picture and a coded current picture having a first size;~~

~~decoding, by the decoder, the reference picture;~~

~~identifying, by the decoder and from the bitstream, a sub-region of the reference picture, the sub-region having a second size, wherein the second size is different from the first size;~~

~~rescaling, by the decoder, the sub-region to a third size, wherein the third size is equal to the first size, to form a rescaled reference picture; and~~

~~decoding, by the decoder, the current picture using the rescaled reference picture.~~

~~16. The method of claim 15 wherein the sub-region is characterized by a height offset, a height, a length offset and a length.~~

~~17. The method of claim 15, wherein identifying the sub-region further comprises receiving, in the bitstream, an indication that the sub-region is present.~~

~~18. The method of claim 15 further comprising storing the reference frame in a buffer.~~

~~19. The method of claim 18, wherein the buffer further comprises a long-term reference buffer.~~

~~20. The method of claim 18, wherein the buffer further comprises a reference picture buffer.~~

~~21. A decoder, the decoder comprising circuitry configured to:~~

~~receive a bitstream;~~

~~identify a first frame;~~

~~locate a first independent reference region within the first frame;~~

~~extract the first independent reference region from the first frame; and~~

~~decode a second frame using the first independent reference region as a reference for the second frame.~~

~~22. The decoder of claim 21, wherein the decoder is further configured to locate the first independent reference region by identifying, in the bitstream, a geometric characterization of an independent reference region within the first frame.~~

~~23. The decoder of claim 22, wherein the first independent reference region is rectangular, and the geometric characterization further comprises a quadruple of numbers characterizing vertices of the first independent reference region~~

~~24. The decoder of claim 21, wherein identifying the first independent reference region further comprises receiving, in the bitstream, an indication that the first independent reference region is present.~~

~~25. The decoder of claim 21, wherein the first independent reference region has a size, and the decoder is configured decode the second frame by decoding the second frame having the same size as the first independent reference region.~~

~~26. The decoder of claim 21, wherein the decoder is configured decode the second frame by transforming the first independent reference region.~~

~~27. The decoder of claim 26, wherein transforming the first independent reference region further comprises scaling the first independent reference region.~~

~~28. The decoder of claim 26, wherein transforming the first independent reference region further comprises flipping the first independent reference region.~~

~~29. The decoder of claim 26, wherein transforming the first independent reference region further comprises moving the first independent reference region relative to a location in a video picture.~~

~~30. The decoder of claim 26, wherein transforming the first independent reference region further comprises rotating the first independent reference region relative to a location in a video picture.~~

~~31. The decoder of claim 21, further configured to store first frame in a buffer.~~

~~32. The decoder of claim 31, wherein the buffer further comprises a long-term reference buffer.~~

~~33. The decoder of claim 31, wherein the buffer further comprises a reference picture buffer.~~

~~34. The decoder of claim 21, wherein the decoder is further configured to locate a second reference region in the first frame.~~

~~35. The decoder of claim 34, further configured to decode the second frame using the first reference region and the second independent reference region~~

~~36. The decoder of claim 35, further configured to store the second independent reference region in a buffer.~~

~~37. The decoder of claim 21, further configured to decode second frame using the first reference region and a second reference region.~~

~~38. A method of video coding using reference regions, the method comprising:~~
~~receiving a bitstream;~~
~~identifying a first frame;~~
~~locating a first independent reference region within the first frame;~~
~~extracting the first independent reference region from the first frame; and~~
~~decoding a second frame using the first independent reference region as a reference for the second frame.~~

~~39. The method of claim 38, wherein locating the first independent reference region further comprises identifying, in the bitstream, a geometric characterization of an independent reference region within the first frame.~~

~~40. The method of claim 39, wherein the first independent reference region is rectangular, and the geometric characterization further comprises a quadruple of numbers characterizing vertices of the first independent reference region.~~

~~41. The method of claim 38, wherein identifying the first independent reference region further comprises receiving, in the bitstream, an indication that the first independent reference region is present.~~

~~42. The method of claim 38, wherein the first independent reference region has a size, and decoding the second frame further comprises decoding the second frame having the same size as the first independent reference region.~~

~~43. The method of claim 38, further comprising decoding the second frame by transforming the first independent reference region.~~

~~44. The method of claim 43, wherein transforming the first independent reference region further comprises scaling the first independent reference region.~~

~~45. The method of claim 43, wherein transforming the first independent reference region further comprises flipping the first independent reference region.~~

~~46. The method of claim 43, wherein transforming the first independent reference region further comprises moving the first independent reference region relative to a location in a video picture.~~

~~47. The method of claim 43, wherein transforming the first independent reference region further comprises rotating the first independent reference region relative to a location in a video picture.~~

~~48. The method of claim 38 further comprising storing the first frame in a buffer.~~

~~49. The method of claim 48, wherein the buffer further comprises a long-term reference buffer.~~

~~50. The method of claim 48, wherein the buffer further comprises a reference picture buffer.~~

~~51. The method of claim 48, wherein the decoder is further configured to locate a second reference region in the first frame.~~

~~52. The method of claim 31 further comprising decoding the second frame using the first reference region and the second independent reference region.~~

~~53. The method of claim 35 further comprising storing the second independent reference region in a buffer.~~

~~54. The method of claim 38 further comprising decoding second frame using the first reference region and a second reference region.~~

Claims

1. A decoder, the decoder comprising circuitry configured to: receive a bitstream, including a sequence parameter set and a first coded picture;

detect in the sequence parameter set associated with the first coded picture, that a coded sub-picture is present in the first coded picture and a location of the coded sub- picture in the first coded picture;

extract from the first coded picture, and decode, the coded sub-picture to form a reference picture;

determine a predictor from the reference picture using a scaling constant, the scaling constant being determined from information in the bitstream; and

use the predictor to decode a subsequent picture in the bitstream.

2. A decoder, the decoder comprising circuitry configured to:

receive a bitstream including a sequence parameter set and a first coded picture;

detect in the sequence parameter set associated with the first coded picture, the location of a first coded sub-picture in the first coded picture and the location of a second coded sub-picture in the first coded picture;

extract and decode the first coded sub-picture to form a first reference picture;

extract and decode the second coded sub-picture to form a second reference picture;

determine a first predictor in the first reference picture using a first scaling constant determined from information in the bitstream; and

determine a second predictor in the second reference picture using a second scaling constant determined from information in the bitstream.

3. A method of video decoding, the method comprising:

receiving, by a decoder, a bitstream, including a sequence parameter set and a first coded picture;

detecting, by the decoder, in the sequence parameter set associated with the first coded picture, that a coded sub-picture region is present in the first coded picture and a location of the coded sub-picture region in the first coded picture;

extracting, by the decoder, the coded sub-picture region from the first coded picture

to form a decoded independent picture that is used as a reference picture;

determining, by the decoder, a predictor from the reference picture using a scaling constant, the scaling constant being determined from information in the bitstream; and

using, by the decoder, the predictor to decode a subsequent picture in the bitstream.

4. The decoder of claim 1, wherein the information in the bitstream used to obtain the scaling constant includes an index.

5. The decoder of claim 1, wherein the predictor is formed using an interpolation filter.

6. The decoder of claim 1, wherein the subsequent picture is a subsequent independent sub-picture.

7. The decoder of claim 2, wherein the predictor is determined using a motion vector candidate list.

8. The decoder of claim 2, wherein the first predictor is used to decode a first subsequent picture.

9. The decoder of claim 8, wherein the second predictor is used to decode a second subsequent picture.

10. The decoder of claim 9, wherein the first and second subsequent pictures are sub-pictures extracted from the same picture.

11. A decoder, the decoder comprising circuitry configured to:

receive a bitstream including a sequence parameter set and a first coded picture;

detect in the sequence parameter set associated with the first coded picture, that a coded sub-picture is present in the first coded picture and a location of the coded sub- picture in the first coded picture;

extract from the first coded picture, and decode, the coded sub-picture to form a reference picture;

determine a predictor in the reference picture using a scaling constant obtained from information in the bitstream, the information including an index; and

use the predictor to decode a subsequent picture.