CLAIMS

1. A method of decoding video data, the method comprising:

determining that a current block of video data is encoded in a matrix intra prediction mode;

deriving, based on a set of left edge neighboring samples of the current block and a set of top edge neighboring samples of the current block, a set of downsampled left edge samples and a set of downsampled top edge samples, wherein the set of downsampled left edge samples includes fewer samples than the set of left edge neighboring samples and the set of downsampled top edge samples includes fewer samples than the set of top edge neighboring samples;

applying an affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate a first set of prediction samples;

interpolating a second set of prediction samples based on the first set of prediction samples, a subset of the set of left edge neighboring samples, and a subset of the set of top edge neighboring samples, wherein the subset of the set of left edge neighboring samples includes different samples than the set of downsampled left edge samples and the subset of the set of top edge neighboring samples includes different samples than the set of downsampled top edge samples;

generating a final prediction block, wherein the final prediction block comprises the first set of prediction samples and the second set of prediction samples;

and

decoding the current block of video data based on the final prediction block.

2. The method of claim 1, wherein:

each sample of the set of downsampled left edge samples comprises an average of two or more samples of the set of left edge neighboring samples; and

each sample of the set of downsampled top edge samples comprises an average of two or more samples of the set of top edge neighboring samples.

3. The method of claim 1, wherein applying the affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate the first set of prediction samples comprises multiplying the set of downsampled left edge samples and the set of downsampled top edge samples by a matrix.

4. The method of claim 1, wherein the set of top edge neighboring samples has N total samples and the set of downsampled top edge samples has a total of N/2 samples, wherein N is an integer representing a number of columns included in the current block.

5. The method of claim 1, wherein the set of left edge neighboring samples has N total samples and the set of downsampled left edge samples has a total of N/2 samples, wherein N is an integer representing a number of rows included in the current block.

6. The method of claim 1, wherein:

the current block is an NxM block of samples, N is an integer value representing a number of columns in the current block and a number of samples in the set of top edge neighboring samples, and M is an integer value representing a number of rows in the current block and a number of samples in the set of left edge neighboring samples; and

the set of downsampled left edge samples has M/2 samples, the set of downsampled top edge samples has N/2 samples, the set of left edge neighboring samples has M samples, and set of top edge neighboring samples has N samples.

7. The method of claim 6, wherein interpolating the second set of prediction samples comprises applying one or more filters in a vertical direction to the first set of prediction samples and the set of downsampled top edge samples.

8. The method of claim 7, wherein applying the one or more filters in the vertical direction includes using samples of the set of top edge neighboring samples to perform linear interpolation in the vertical direction.

9. The method of claim 7, wherein applying the one or more filters in the vertical direction comprises applying position dependent weights to at least some of the N samples of the set of top edge neighboring samples.

10. The method of claim 1, wherein decoding the current block of video data based on the final prediction block comprises:

determining residual values for the current block of video data;

adding the residual values to the filtered prediction block to determine a reconstructed block for the current block of video data; and

applying one or more filters to the reconstructed block to generate a decoded block of video data.

11. The method of claim 1, wherein the method is performed as part of a video encoding process.

12. A device for decoding video data, the device comprising:

a memory configured to store video data; and

one or more processors implemented in circuitry and configured to:

determine that a current block of video data is encoded in a matrix intra prediction mode;

derive, based on a set of left edge neighboring samples of the current block and a set of top edge neighboring samples of the current block, a set of downsampled left edge samples and a set of downsampled top edge samples, wherein the set of downsampled left edge samples includes fewer samples than the set of left edge neighboring samples and the set of downsampled top edge samples includes fewer samples than the set of top edge neighboring samples;

apply an affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate a first set of prediction samples;

interpolate a second set of prediction samples based on the first set of prediction samples, a subset of the set of left edge neighboring samples, and a subset of the set of top edge neighboring samples, wherein the subset of the set of left edge neighboring samples includes different samples than the set of downsampled left edge samples and the subset of the set of top edge neighboring samples includes different samples than the set of downsampled top edge samples;

generate a final prediction block, wherein the final prediction block comprises the first set of prediction samples and the second set of prediction samples;

and

decode the current block of video data based on the final prediction block.

13. The device of claim 12, wherein:

each sample of the set of downsampled left edge samples comprises an average of two or more samples of the set of left edge neighboring samples; and

each sample of the set of downsampled top edge samples comprises an average of two or more samples of the set of top edge neighboring samples.

14. The device of claim 12, wherein to apply the affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate the first set of prediction, the one or more processors are further configured to multiply the set of downsampled left edge samples and the set of downsampled top edge samples by a matrix.

15. The device of claim 12, wherein the set of top edge neighboring samples has N total samples and the set of downsampled top edge samples has a total of N/2 samples, wherein N is an integer representing a number of columns included in the current block.

16. The device of claim 12, wherein the set of left edge neighboring samples has N total samples and the set of downsampled left edge samples has a total of N/2 samples, wherein N is an integer representing a number of rows included in the current block.

17. The device of claim 12, wherein:

the current block is an NxM block of samples, N is an integer value representing a number of columns in the current block and a number of samples in the set of top edge neighboring samples, and M is an integer value representing a number of rows in the current block and a number of samples in the set of left edge neighboring samples;

the set of downsampled left edge samples has M/2 samples, the set of downsampled top edge samples has N/2 samples, the set of left edge neighboring samples has M samples, and set of top edge neighboring samples has N samples.

18. The device of claim 17, wherein to interpolate the second set of prediction samples, the one or more processors are further configured to apply one or more filters in a vertical direction to the first set of prediction samples and the set of top edge neighboring samples.

19. The device of claim 18, wherein to apply the one or more filters in the vertical direction, the one or more processors are further configured to use samples of the set of top edge neighboring samples to perform linear interpolation in the vertical direction.

20. The device of claim 18, wherein to apply the one or more filters in the vertical direction, the one or more processors are further configured to apply position dependent weights to at least some of the N samples of the set of top edge neighboring samples.

21. The device of claim 12, wherein to decode the current block of video data based on the final prediction block, the one or more processors are further configured to:

determine residual values for the current block of video data;

add the residual values to the filtered prediction block to determine a reconstructed block for the current block of video data; and

apply one or more filters to the reconstructed block to generate a decoded block of video data.

22. The device of claim 12, wherein the device comprises a wireless communication device, further comprising a receiver configured to receive encoded video data.

23. The device of claim 22, wherein the wireless communication device comprises a telephone handset and wherein the receiver is configured to demodulate, according to a wireless communication standard, a signal comprising the encoded video data.

24. The device of claim 12, wherein the device comprises a wireless communication device,

further comprising a transmitter configured to transmit encoded video data.

25. The device of claim 24, wherein the wireless communication device comprises a telephone handset and wherein the transmitter is configured to modulate, according to a wireless communication standard, a signal comprising the encoded video data.

26. A non-transitory computer-readable storage medium storing instructions that when executed by one or more processors cause the one or more processor to:

determine that a current block of video data is encoded in a matrix intra prediction mode;

derive, based on a set of left edge neighboring samples of the current block and a set of top edge neighboring samples of the current block, a set of downsampled left edge samples and a set of downsampled top edge samples, wherein the set of downsampled left edge samples includes fewer samples than the set of left edge neighboring samples and the set of downsampled top edge samples includes fewer samples than the set of top edge neighboring samples;

apply an affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate a first set of prediction samples;

interpolate a second set of prediction samples based on the first set of prediction samples, a subset of the set of left edge neighboring samples, and a subset of the set of top edge neighboring samples, wherein the subset of the set of left edge neighboring samples includes different samples than the set of downsampled left edge samples and the subset of the set of top edge neighboring samples includes different samples than the set of downsampled top edge samples;

generate a final prediction block, wherein the final prediction block comprises the first set of prediction samples and the second set of prediction samples;

and

decode the current block of video data based on the final prediction block.

27. The non-transitory computer-readable storage medium of claim 26, wherein:

each sample of the set of downsampled left edge samples comprises an average of two or more samples of the set of left edge neighboring samples; and

each sample of the set of downsampled top edge samples comprises an average of two or more samples of the set of top edge neighboring samples.

28. The non-transitory computer-readable storage medium of claim 26, wherein to apply the affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate the first set of prediction samples, the instructions cause the one or more processors to multiply the set of downsampled left edge samples and the set of downsampled top edge samples by a matrix.

29. The non-transitory computer-readable storage medium of claim 26, wherein the set of top edge neighboring samples has N total samples and the set of downsampled top edge samples has a total of N/2 samples, wherein N is an integer representing a number of columns included in the current block.

30. The non-transitory computer-readable storage medium of claim 26, wherein the set of left edge neighboring samples has N total samples and the set of downsampled left edge samples has a total of N/2 samples, wherein N is an integer representing a number of rows included in the current block.

31. The non-transitory computer-readable storage medium of claim 26, wherein:

the current block is an NxM block of samples, N is an integer value representing a number of columns in the current block and a number of samples in the set of top edge neighboring samples, and M is an integer value representing a number of rows in the current block and a number of samples in the set of left edge neighboring samples;

the set of downsampled left edge samples has M/2 samples, the set of downsampled top edge samples has N/2 samples, the set of left edge neighboring samples has M samples, and set of top edge neighboring samples has N samples.

32. The non-transitory computer-readable storage medium of claim 31, wherein to interpolate the second set of prediction samples, the instructions cause the one or more processors to apply one or more filters in a vertical direction to the first set of prediction samples and the set of top edge neighboring samples.

33. The non-transitory computer-readable storage medium of claim 32, wherein to apply the one or more filters in the vertical direction, the instructions cause the one or more processors to use samples of the set of top edge neighboring samples to perform linear interpolation in the vertical direction.

34. The non-transitory computer-readable storage medium of claim 32, wherein to apply the one or more filters in the vertical direction, the instructions cause the one or more processors to apply position dependent weights to at least some of the N samples of the set of top edge neighboring samples.

35. The non-transitory computer-readable storage medium of claim 26, wherein to decode the current block of video data based on the final prediction block, the instructions cause the one or more processors to:

determine residual values for the current block of video data;

add the residual values to the filtered prediction block to determine a reconstructed block for the current block of video data; and

apply one or more filters to the reconstructed block to generate a decoded block of video data.

36. An apparatus for decoding video data, the apparatus comprising:

means for determining that a current block of video data is encoded in a matrix intra prediction mode;

means for deriving, based on a set of left edge neighboring samples of the current block and a set of top edge neighboring samples of the current block, a set of downsampled left edge samples and a set of downsampled top edge samples, wherein the set of downsampled left edge samples includes fewer samples than the set of left edge neighboring samples and the set of downsampled top edge samples includes fewer samples than the set of top edge neighboring samples;

means for applying an affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate a first set of prediction samples;

means for interpolating a second set of prediction samples based on the first set of prediction samples, the set of left edge neighboring samples, and the set of top edge neighboring samples, wherein the subset of the set of left edge neighboring samples includes different samples than the set of downsampled left edge samples and the subset of the set of top edge neighboring samples includes different samples than the set of downsampled top edge samples;

means for generating a final prediction block, wherein the final prediction block comprises the first set of prediction samples and the second set of prediction samples;

and

means for decoding the current block of video data based on the final prediction block.

37. The apparatus of claim 36, wherein:

the means for deriving the set of downsampled left edge samples comprises means for downsampling the set of left edge neighboring samples, wherein each sample of the set of downsampled left edge samples comprises an average of two or more samples of the set of left edge neighboring samples; and

the means for deriving the set of downsampled top edge samples comprises means for downsampling the set of top edge neighboring samples, wherein each sample of the set of downsampled top edge samples comprises an average of two or more samples of the set of top edge neighboring samples.

38. The apparatus of claim 36, wherein the means for applying the affine model to the set of downsampled left edge samples and the set of downsampled top edge samples to generate the first set of prediction samples comprises means for multiplying the set of downsampled left edge samples and the set of downsampled top edge samples by a matrix.

39. The apparatus of claim 36, wherein the set of top edge neighboring samples has N total samples and the set of downsampled top edge samples has a total of N/2 samples, wherein N is an integer representing a number of columns included in the current block.

40. The apparatus of claim 36, wherein the set of left edge neighboring samples has N total samples and the set of downsampled left edge samples has a total of N/2 samples, wherein N is an integer representing a number of rows included in the current block.

41. The apparatus of claim 36, wherein:

the current block is an NxM block of samples, N is an integer value representing a number of columns in the current block and a number of samples in the set of top edge neighboring samples, and M is an integer value representing a number of rows in the current block and a number of samples in the set of left edge neighboring samples; and

the set of downsampled left edge samples has M/2 samples, the set of downsampled top edge samples has N/2 samples, the set of left edge neighboring samples has M samples, and set of top edge neighboring samples has N samples.

42. The apparatus of claim 41, wherein the means for interpolating the second set of prediction samples comprises means for applying one or more filters in a vertical direction to the first set of prediction samples and the set of top edge neighboring samples.

43. The apparatus of claim 42, wherein the means for applying the one or more filters in the vertical direction includes means for using samples of the set of top edge neighboring samples to perform linear interpolation in the vertical direction.

44. The apparatus of claim 42, wherein the means for applying the one or more filters in the vertical direction comprises means for applying position dependent weights to at least some of the N samples of the set of top edge neighboring samples.

45. The apparatus of claim 36, wherein the means for decoding the current block of video data based on the final prediction block comprises:

means for determining residual values for the current block of video data;

means for adding the residual values to the filtered prediction block to determine a reconstructed block for the current block of video data; and

means for applying one or more filters to the reconstructed block to generate a decoded block of video data.