CLAIMS

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

obtaining a bitstream that includes an encoded representation of the video data that is encoded using a codec;

determining a plurality of available Matrix Intra Prediction (MIP) parameter sets (MPS's) for a picture of the video data, wherein:

the plurality of available MPS's is a union of (i) a subset of all default MPS's and (ii) a set of one or more additional MPS's that are signaled in the bitstream,

each of the default MPS's is associated with a predefined MIP mode in the codec, and

each of the set of one or more additional MPS's is associated with a new MIP mode in a set of one or more new MIP modes, wherein the new MIP modes are explicit MIP (E-MIP) modes that are derived from matrixes that are not included in the default MPS's;

using a MIP mode associated with an MPS in the plurality of available MPS's to generate a prediction block for a current block of the picture; and

reconstructing the current block based on the prediction block for the current block and residual data for the current block.

2. The method of claim 1, wherein:

the plurality of available MPS's includes at least one MPS for each category in a plurality of categories, and

each category in the plurality of categories corresponds to a different set of block sizes.

3. The method of claim 1, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a syntax element in the bitstream indicates whether the MIP mode is specified with respect to an already-specified MIP mode or whether the MIP mode is specified independently, and

the method further comprises, based on the syntax element indicating that the MIP mode

is specified with respect to the already-specified mode, deriving parameters of the MIP mode using parameters of one or more MIP modes.

4. The method of claim 1, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a predicted sample location array (PSLA) of the MIP mode is a set of sample locations in the current block that correspond to locations where the MIP mode directly generates predicted values,

the MPS associated with the MIP mode includes a list of explicit sample predictor parameter subsets (ESPPS's) for the MIP mode,

the list of ESPPS's for the MIP mode is signaled in the bitstream,

each of the ESPPS's corresponds to a sample location in the PSLA of the MIP mode, and

using the MIP mode to generate the prediction block for the current block comprises:

for each sample location in the PSLA of the MIP mode, predicting a sample for the sample location using parameters contained in the ESPPS corresponding to the sample location; and

interpolating remaining samples of the prediction block based on the predicted samples for the sample locations of the PSLA of the MIP mode.

5. The method of claim 4, wherein the ESPPS's for the MIP mode are signaled in the bitstream dependent on another ESPPS.

6. The method of claim 5, wherein the other ESPPS is one of another E-MIP mode or a particular predefined MIP mode in the codec.

7. The method of claim 1, further comprising determining, based on a syntax element signaled in a sequence parameter set (SPS) of the bitstream, that a particular default MPS of the default MPS's is available to be used for prediction by pictures of the video data that refer to the SPS.

8. The method of claim 1, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a syntax element in the bitstream indicates whether the MIP mode is specified with respect to an already-specified MIP mode or whether the MIP mode is specified independently, and

the method further comprises, based on the syntax element indicating that the E-MIP mode is specified independently, deriving parameters of the MIP mode without using any parameter of any other MIP mode.

9. The method of claim 1, wherein:

a MIP mode index is signaled in the bitstream and signaling of the MIP mode index is dependent on a number of MIP modes in a MIP mode list, and

the MIP mode index indicates the MIP mode.

10. The method of claim 1, wherein:

a reference sample location array (RSLA) for the MIP mode is signaled in the bitstream, the RSLA for the MIP mode indicating a set of reference sample locations in a neighborhood of the current block that are used in the MIP mode, and

using the MIP mode to generate the prediction block comprises:

for each sample location in a predicted sample location array (PSLA) of the MIP mode, determining a prediction value by multiplying a reference sample at a reference sample location indicated by the RSLA for the MIP mode by a matrix coefficient of a matrix specified in the MPS associated with the MIP mode and adding an offset value specified in the MPS associated with the MIP mode.

11. A method of encoding video data using a codec, the method comprising:

determining a plurality of available Matrix Intra Prediction (MIP) parameter sets (MPS's) for a picture of the video data, wherein:

the plurality of available MPS's is a union of (i) a subset of all default MPS's and (ii) a set of one or more additional MPS's that are signaled in the bitstream,

each of the default MPS's is associated with a predefined MIP mode in the

codec, and

each of the set of one or more additional MPS's is associated with a new MIP mode in a set of one or more new MIP modes, wherein the new MIP modes are explicit MIP (E-MIP) modes that are derived from matrixes that are not included in the default MPS's;

signaling the set of one or more additional MPS's in a bitstream that comprises an encoded representation of the video data;

using a MIP mode associated with an MPS in the plurality of available MPS's to generate a prediction block for a current block of the picture; and

generating residual data for the current block based on the prediction block for the current block and samples of the current block.

12. The method of claim 11, wherein:

the plurality of available MPS's includes at least one MPS for each category in a plurality of categories, and

each category in the plurality of categories correspond to a different set of block sizes.

13. The method of claim 11, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode, and

the method further comprises:

deriving parameters of the MIP mode using parameters of one or more MIP modes; and

signaling a syntax element in the bitstream indicates that the MIP mode is specified with respect to an already-specified MIP mode.

14. The method of claim 11, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a predicted sample location array (PSLA) of the MIP mode is a set of sample locations in the current block that correspond to locations where the MIP mode directly generates predicted values,

the MPS associated with the MIP mode includes a list of explicit sample predictor

parameter subsets (ESPPS's) for the MIP mode,

the method further comprises signaling the list of ESPPS's for the MIP mode in the bitstream,

each of the ESPPS's corresponds to a sample location in the PSLA of the MIP mode, and

using the MIP mode to generate the prediction block for the current block comprises:

for each sample location in the PSLA of the MIP mode, predicting a sample for the sample location using parameters contained in the ESPPS corresponding to the sample location; and

interpolating remaining samples of the prediction block based on the predicted samples for the sample locations of the PSLA of the MIP mode.

15. The method of claim 14, wherein the method further comprises signaling the ESPPS's for the MIP mode in the bitstream dependent on another ESPPS.

16. The method of claim 15, wherein the other ESPPS is one of another E-MIP mode or a particular predefined MIP mode in the codec.

17. The method of claim 11, further comprising including, in a sequence parameter set (SPS) of the bitstream, a syntax element that indicates whether a particular default MPS of the default MPS's is available to be used for prediction by pictures of the video data that refer to the SPS.

18. The method of claim 11, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

the method further comprises:

deriving parameters of the MIP mode without using any parameter of any other MIP mode; and

signaling a syntax element in the bitstream that indicates that the MIP mode is specified with independently.

19. The method of claim 11, wherein the method further comprises signaling a MIP mode index that indicates the MIP mode, wherein signaling of the MIP mode index is dependent on a

number of MIP modes in a MIP mode list.

20. The method of claim 11, wherein:

the method further comprises signaling a reference sample location array (RSLA) for the MIP mode in the bitstream, the RSLA for the MIP mode indicating a set of reference sample locations in a neighborhood of the current block that are used in the MIP mode, and

using the MIP mode to generate the prediction block comprises:

for each sample location in a predicted sample location array (PSLA) of the MIP mode, determining a prediction value by multiplying a reference sample at a reference sample location indicated by the RSLA for the MIP mode by a matrix coefficient of a matrix specified in the MPS associated with the MIP mode and adding an offset value specified in the MPS associated with the MIP mode.

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

a memory to store the video data; and

one or more processors implemented in circuitry, the one or more processors configured to:

obtain a bitstream that includes an encoded representation of the video data that is encoded using a codec;

determine a plurality of available Matrix Intra Prediction (MIP) parameter sets (MPS's) for a picture of the video data, wherein:

the plurality of available MPS's is a union of (i) a subset of all default MPS's and (ii) a set of one or more additional MPS's that are signaled in the bitstream,

each of the default MPS's is associated with a predefined MIP mode in the codec, and

each of the set of one or more additional MPS's is associated with a new MIP mode in a set of one or more new MIP modes, wherein the new MIP modes are explicit MIP (E-MIP) modes that are derived from matrixes that are not included in the default MPS's;

use a MIP mode associated with an MPS in the plurality of available MPS's to

generate a prediction block for a current block of the picture; and

reconstruct the current block based on the prediction block for the current block and residual data for the current block.

22. The device of claim 21, wherein:

the plurality of available MPS's includes at least one MPS for each category in a plurality of categories, and

each category in the plurality of categories correspond to a different set of block sizes.

23. The device of claim 21, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a syntax element in the bitstream indicates whether the MIP mode is specified with respect to an already-specified MIP mode or whether the MIP mode is specified independently, and

the one or more processors are further configured to derive, based on the syntax element indicating that the MIP mode is specified with respect to the already-specified mode, parameters of the MIP mode using parameters of one or more MIP modes.

24. The device of claim 21, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a predicted sample location array (PSLA) of the MIP mode is a set of sample locations in the current block that correspond to locations where the MIP mode directly generates predicted values,

the MPS associated with the MIP mode includes a list of explicit sample predictor parameter subsets (ESPPS's) for the MIP mode,

the list of ESPPS's for the MIP mode is signaled in the bitstream,

each of the ESPPS's corresponds to a sample location in the PSLA of the MIP mode, and

the one or more processors are configured such that, as part of using the MIP mode to generate the prediction block for the current block, the one or more processors:

for each sample location in the PSLA of the MIP mode, predict a sample for the sample location using parameters contained in the ESPPS corresponding to the sample

location; and

interpolate remaining samples of the prediction block based on the predicted samples for the sample locations of the PSLA of the MIP mode.

25. The device of claim 24, wherein the ESPPS's for the MIP mode are signaled in the bitstream dependent on another ESPPS.

26. The device of claim 25, wherein the other ESPPS is one of another E-MIP mode or a particular predefined MIP mode in the codec.

27. The device of claim 21, wherein the one or more processors are further configured to determine, based on a syntax element signaled in a sequence parameter set (SPS) of the bitstream, that a particular default MPS of the default MPS's is available to be used for prediction by pictures of the video data that refer to the SPS.

28. The device of claim 21, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a syntax element in the bitstream indicates whether the MIP mode is specified with respect to an already-specified MIP mode or whether the MIP mode is specified independently, and

the one or more processors are further configured to derive, based on the syntax element indicating that the MIP mode is specified independently, parameters of the MIP mode without using any parameter of any other MIP mode.

29. The device of claim 21, wherein:

a MIP mode index is signaled in the bitstream and signaling of the MIP mode index is dependent on a number of MIP modes in a MIP mode list, and

the MIP mode index indicates the MIP mode.

30. The device of claim 21, wherein:

a reference sample location array (RSLA) for the MIP mode is signaled in the bitstream,

the RSLA for the MIP mode indicating a set of reference sample locations in a neighborhood of the current block that are used in the MIP mode, and

the one or more processors are configured such that, as part of using the MIP mode to generate the prediction block, the one or more processors:

for each sample location in a predicted sample location array (PSLA) of the MIP mode, determine a prediction value by multiplying a reference sample at a reference sample location indicated by the RSLA for the MIP mode by a matrix coefficient of a matrix specified in the MPS associated with the MIP mode and adding an offset value specified in the MPS associated with the MIP mode.

31. The device of claim 21, further comprising a display configured to display decoded video data.

32. The device of claim 21, wherein the device comprises one or more of a camera, a computer, a mobile device, a broadcast receiver device, or a set-top box.

33. A device for encoding video data using a codec, the device comprising:

a memory to store the video data; and

one or more processors implemented in circuitry, the one or more processors configured to:

determine a plurality of available Matrix Intra Prediction (MIP) parameter sets (MPS's) for a picture of the video data, wherein:

the plurality of available MPS's is a union of (i) a subset of all default MPS's and (ii) a set of one or more additional MPS's that are signaled in the bitstream,

each of the default MPS's is associated with a predefined MIP mode in the codec, and

each of the set of one or more additional MPS's is associated with a new MIP mode in a set of one or more new MIP modes, wherein the new MIP modes are explicit MIP (E-MIP) modes that are derived from matrixes that are not included in the default MPS's;

signaling the set of one or more additional MPS's in a bitstream that comprises an

encoded representation of the video data;

use a MIP mode associated with an MPS in the plurality of available MPS's to generate a prediction block for a current block of the picture; and

generate residual data for the current block based on the prediction block for the current block and samples of the current block.

34. The device of claim 33, wherein:

the plurality of available MPS's includes at least one MPS for each category in a plurality of categories, and

each category in the plurality of categories correspond to a different set of block sizes.

35. The device of claim 33, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode, and

the one or more processors are further configured to:

derive parameters of the MIP mode using parameters of one or more MIP modes; and

signal a syntax element in the bitstream indicates that the MIP mode is specified with respect to an already-specified MIP mode.

36. The device of claim 33, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

a predicted sample location array (PSLA) of the MIP mode is a set of sample locations in the current block that correspond to locations where the MIP mode directly generates predicted values,

the MPS associated with the MIP mode includes a list of explicit sample predictor parameter subsets (ESPPS's) for the MIP mode,

the one or more processors are further configured to signal the list of ESPPS's for the MIP mode in the bitstream,

each of the ESPPS's corresponds to a sample location in the PSLA of the MIP mode, and

the one or more processors are configured such that, as part of using the MIP mode to generate the prediction block for the current block, the one or more processors:

for each sample location in the PSLA of the MIP mode, predict a sample for the sample location using parameters contained in the ESPPS corresponding to the sample location; and

interpolate remaining samples of the prediction block based on the predicted samples for the sample locations of the PSLA of the MIP mode.

37. The device of claim 36, wherein the one or more processors are further configured to signal the ESPPS's for the MIP mode in the bitstream dependent on another ESPPS.

38. The device of claim 37, wherein the other ESPPS is one of another E-MIP mode or a particular predefined MIP mode in the codec.

39. The device of claim 33, wherein the one or more processors are further configured to include, in a sequence parameter set (SPS) of the bitstream, a syntax element that indicates whether a particular default MPS of the default MPS's is available to be used for prediction by pictures of the video data that refer to the SPS.

40. The device of claim 33, wherein:

the MIP mode is in the set of new MIP modes and is an explicit MIP (E-MIP) mode,

the one or more processors are further configured to:

derive parameters of the MIP mode without using any parameter of any other MIP mode; and

signal a syntax element in the bitstream that indicates that the MIP mode is specified with independently.

41. The device of claim 33, wherein the one or more processors are further configured to signal a MIP mode index that indicates the MIP mode, wherein signaling of the MIP mode index is dependent on a number of MIP modes in a MIP mode list.

42. The device of claim 33, wherein:

the one or more processors are further configured to signal a reference sample location

array (RSLA) for the MIP mode in the bitstream, the RSLA for the MIP mode indicating a set of one or more reference sample locations in a neighborhood of the current block that are used in the MIP mode, and

the one or more processors are configured such that, as part of using the MIP mode to generate the prediction block, the one or more processors:

for each sample location in a predicted sample location array (PSLA) of the MIP mode, determine a prediction value by multiplying a reference sample at a reference sample location indicated by the RSLA for the MIP mode by a matrix coefficient of a matrix specified in the MPS associated with the MIP mode and adding an offset value specified in the MPS associated with the MIP mode.

43. The device of claim 33, wherein the device comprises one or more of a camera, a computer, a mobile device, a broadcast receiver device, or a set-top box.