CLAIMS

1. A method, comprising:

at an enhancement layer (EL) video decoder:

determining a predicted residual for a block of an EL frame based, at least in part, on a residual obtained from at least one of a lower EL or a base layer (BL) frame.

2. The method of claim 1, further comprising accessing the residual in memory.

3. The method of claim 1, wherein determining the predicted residual comprises determining the predicted residual in response to an indicator included in a bitstream received at the EL video decoder.

4. The method of claim 3, wherein, in a first state, the indicator specifies that the EL video decoder is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the EL video decoder is to not to perform inter-layer residual prediction.

5. The method of claim 4, wherein the indicator has been placed in one of the first state or the second state based on a rate-distortion cost.

6. The method of claim 1, wherein the residual corresponds to one or more co-located blocks of the lower EL or of the BL.

7. The method of claim 1, further comprising applying at least one of an upsample filter or a refining filter to the residual prior to determining the predicted residual, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and

wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

8. At least one machine-readable medium comprising a plurality of instructions that in response to being executed on a computing device, cause the computing device to determine a predicted residual for a block of an enhancement layer (EL) frame based, at least in part, on a residual obtained from at least one of a lower EL or a base layer (BL) frame.

9. The at least one machine-readable medium of claim 8, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to access the residual in memory.

10. The at least one machine-readable medium of claim 8, wherein determining the predicted residual comprises determining the predicted residual in response to an indicator included in a bitstream received at the computing device, wherein, in a first state, the indicator specifies that the computing device is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the computing device is to not to perform inter-layer residual prediction.

11. The at least one machine-readable medium of claim 8, wherein the indicator has been placed in one of the first state or the second state based on a rate-distortion cost.

12. The at least one machine-readable medium of claim 8, wherein the residual corresponds to one or more co-located blocks of the lower EL or of the BL.

13. The at least one machine-readable medium of claim 8, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to apply at least one of an upsample filter or a refining filter to the residual prior to determining the predicted residual, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

14. An apparatus, comprising:

memory to store video content including at least one residual; and

circuitry to access the memory, and to determine a predicted residual of a block of an enhancement layer (EL) frame based, at least in part, on the at least one residual, wherein the at least one residual comprises at least one residual obtained from at least one of a lower EL frame or a base layer (BL) frame.

15. The apparatus of claim 14, wherein determining a predicted residual comprises determining a predicted residual based on an indicator stored in the memory, wherein, in a first state, the indicator specifies that the circuitry is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the circuitry is to not to perform inter-layer residual prediction.

16. The apparatus of claim 15, wherein the indicator has been placed in one of the first state or the second state in response to a rate-distortion cost.

17. The apparatus of claim 14, wherein the at least one residual corresponds to one or more co-located blocks of the lower EL frame or the BL frame.

18. The apparatus of claim 14, wherein the circuitry is to apply at least one of an upsample filter or a refining filter to the at least one residual prior to determining the predicted residual, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

19. A method, comprising:

at an ELvideo encoder:

determining a predicted residual for a block of an EL frame based, at least in part, on a residual obtained from at least one of a lower EL or a base layer (BL) frame.

20. The method of claim 19, further comprising accessing the residual in memory.

21. The method of claim 19, further comprising:

entropy encoding the EL frame after determining the predicted residual; and

generating a bitstream that includes the entropy encoded EL frame.

22. The method of claim 21, further comprising:

generating an indicator, wherein, in a first state, the indicator specifies that inter-layer residual prediction is to be performed for the block, and wherein, in a second state, the indicator specifies that inter-layer residual prediction is not to be performed for the block; and

including the indicator in the bitstream.

23. The method of claim 22, further comprising:

placing the indicator in one of the first state or the second state based on a rate-distortion cost.

24. The method of claim 19, wherein the residual corresponds to one or more co-located blocks of the lower level EL frame or the BL frame.

25. The method of claim 19, further comprising applying at least one of an upsample filter or a refining filter to the residual prior to determining the predicted residual, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

26. At least one machine-readable medium comprising a plurality of instructions that in response to being executed on a computing device, cause the computing device to determine a predicted residual for a block of an enhancement layer (EL) frame based, at least in part, on a residual obtained from at least one of a lower EL or a base layer (BL) frame.

27. The at least one machine-readable medium of claim 26, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to access the residual in memory.

28. The at least one machine-readable medium of claim 26, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to:

entropy encode the EL frame after determining the predicted residual; and

generate a bitstream that includes the entropy encoded EL frame.

29. The at least one machine-readable medium of claim 28, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to:

generate an indicator, wherein, in a first state, the indicator specifies that inter-layer residual prediction is to be performed for the block, and wherein, in a second state, the indicator specifies that inter-layer residual prediction is not to be performed for the block; and

include the indicator in the bitstream.

30. The at least one machine-readable medium of claim 29, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to place the indicator in one of the first state or the second state based on a rate-distortion cost.

31. The at least one machine-readable medium of claim 26, wherein the residual corresponds to one or more co-located blocks of the lower level EL frame or the BL frame.

32. The at least one machine-readable medium of claim 26, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to apply at least one of an upsample filter or a refining filter to the residual prior to determining the predicted residual, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

CLAIMS

1. A method, comprising:

at a scalable video decoder:

determining a residual from at least one of a lower enhancement laver (EL) frame or a base layer (BL) frame;

applying an upsample filter and a refining filter to the residual to generate an upsampled and filtered residual; and

determining a predicted residual for a block of an EL frame based on adding the upsampled and filtered residual to a second residual of the block of the EL frame.

2. The method of claim 1, further comprising accessing the residual in memory.

3. The method of claim 1, wherein determining the predicted residual comprises determining the predicted residual in response to an indicator included in a bitstream received at the scalable video decoder.

4. The method of claim 3, wherein, in a first state, the indicator specifies that the scalable video decoder is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the scalable video decoder is not to perform inter-layer residual prediction.

5. The method of claim 4, wherein the indicator has been placed in one of the first state or the second state based on a rate-distortion cost.

6. The method of claim 1, wherein the residual corresponds to one or more co-located blocks of the lower EL frame or of the BL frame.

7. The method of claim 1, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

8. At least one machine-readable medium comprising a plurality of instructions that, in response to being executed on a computing device, cause the computing device to perform saclable video decoding by:

determining a residual from at least one of a lower enhancement layer (EL) frame or a base layer (BL) frame;

applying an upsample filter and a refining filter to the residual to generate an upsampled and filtered residual; and

determining a predicted residual for a block of an EL frame based on adding the upsambled and

filtered residual to a second residual of the block of the EL frame.

9. The at least one machine-readable medium of claim 8, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to access the residual in memory.

10. The at least one machine-readable medium of claim 8, wherein determining the predicted residual comprises determining the predicted residual in response to an indicator included in a bitstream received at the computing device, wherein, in a first state, the indicator specifies that the computing device is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the computing device is not to perform inter-layer residual prediction.

11. The at least one machine-readable medium of claim 10, wherein the indicator has been placed in one of the first state or the second state based on a rate-distortion cost.

12. The at least one machine-readable medium of claim 8, wherein the residual corresponds to one or more co-located blocks of the lower EL frame or of the BL frame.

13. The at least one machine-readable medium of claim 8, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

14. An apparatus, comprising:

memory to store video content including at least one residual; and

circuitry to access the memory to obtain the residual, wherein the residual is from at least one of a lower enhancement layer (EL) frame or a base layer (BL) frame to apblv an upsample filter and a refining filter to the residual to generate an upsampled and filtered residual, and to determine a predicted residual for a block of an EL frame based on and addition of the upsampled and filtered residual to a second residual of the block of the EL frame.

15. The apparatus of claim 14, wherein determining the predicted residual comprises determining the predicted residual based on an indicator stored in the memory, wherein, in a first state, the indicator specifies that the circuitry is to perform inter-layer residual prediction, and wherein, in a second state, the indicator specifies that the circuitry is to not to perform inter-layer residual prediction.

16. The apparatus of claim 15, wherein the indicator has been placed in one of the first state or the second state in response to a rate-distortion cost.

17. The apparatus of claim 14, wherein the at least one residual corresponds to one or more co-located blocks of the lower EL frame or the BL frame.

18. The apparatus of claim 14, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

19. A method, comprising:

at a scalable video encoder:

determining a residual for a block from at least one of a lower enhancement laver (EL) frame or a base layer (BL) frame;

determining a coding mode of the block;

determining whether to perform inter-layer prediction for an EL block of an EL frame co-located with the block responsive to the coding mode of the block; and

when inter-laver prediction is to be performed:

applying an upsample filter and a refining filter to the residual to generate an upsampled and filtered residual; and

determining asecond residual for the EK block of the EL frame based on differencing the upsampled and filtered residual with a predicted residual of the block of the EL frame.

20. The method of claim 19, further comprising accessing the residual in memory.

21. The method of claim 19, further comprising:

entropy encoding the EL frame after determining the second residual; and

generating a bitstream that includes the entropy encoded EL frame.

22. The method of claim 21, further comprising:

generating an indicator, wherein, in a first state, the indicator specifies that inter-layer residual prediction is to be performed for the block, and wherein, in a second state, the indicator specifies that inter-layer residual prediction is not to be performed for the block; and

including the indicator in the bitstream.

23. The method of claim 19, wherein the coding mode of the block comprises intra mode.

24. The method of claim 19, wherein the coding mode of the block comprises inter mode.

25. The method of claim 19, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.

26. At least one machine-readable medium comprising a plurality of instructions that in response to being executed on a computing device, cause the computing device to perform scalable video encoding by:

determining a residual for a block from at least one of a lower enhancement layer (EL) frame or a base layer (BL) frame;

determining a coding mode of the block;

determining whether to perform inter-layer prediction for an EL block of an EL frame co-located with the block responsive to the coding mode of the block; and

when inter-layer prediction is to be performed:

applying an upsample filter and a refining filter to the residual to generate an upsampled and filtered residual; and

determining a second residual for the EL block of the EL frame based on differencing the upsampled and filtered residual with a predicted residual of the block of the EL frame.

27. The at least one machine-readable medium of claim 26, further comprising one or more instructions that, in response to being executed on the computing device, cause the computing device to access the residual in memory.

28. The at least one machine-readable medium of claim 26, further comprising one or more instructions that in response to being executed on the computing device, cause the computing device to:

entropy encode the EL frame after determining the second residual; and

generate a bitstream that includes the entropy encoded EL frame.

29. The at least one machine-readable medium of claim 28, further comprising one or more instructions that, in response to being executed on the computing device, cause the computing device to:

generate an indicator, wherein, in a first state, the indicator specifies that inter-layer residual prediction is to be performed for the block, and wherein, in a second state, the indicator specifies that inter-layer residual prediction is not to be performed for the block; and

include the indicator in the bitstream.

30. The at least one machine-readable medium of claim 26, wherein the coding mode of the block comprises intra mode.

31. The at least one machine-readable medium of claim 26, wherein the coding mode of the block

comprises inter mode.

32. The at least one machine-readable medium of claim 26, wherein the upsample filter comprises one of fixed upsample coefficients or adaptive upsample coefficients, and wherein the refining filter comprises one of fixed refining coefficients or adaptive refining coefficients.