digital video. It is further appreciated that newer standards, such as HEVC, should allow for backward compatibility with existing standards.

[0005] As used herein, the term "coding standard" denotes compression (coding) and decompression (decoding) algorithms that may be both standard-based, open-source, or proprietary, such as the MPEG standards, Windows Media Video (WMV), flash video, VP8, and the like.

[0006] The approaches described in this section are approaches that could be pursued, but not necessarily approaches that have been previously conceived or pursued. Therefore, unless otherwise indicated, it should not be assumed that any of the approaches described in this section qualify as prior art merely by virtue of their inclusion in this section. Similarly, issues identified with respect to one or more approaches should not assume to have been recognized in any prior art on the basis of this section, unless otherwise indicated.

SUMMARY

[0006a] According to a first aspect of the present invention, there is provided a method for decoding a video stream by a decoder, the method comprising:

accessing a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receiving a picture cropping flag in the video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

accessing the offset cropping parameters;

cropping one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generating, by a reference processing unit, a reference picture according to the cropped reference picture; and

generating, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

[0006b] According to a second aspect of the present invention, there is provided a decoder for decoding a video stream, comprising:

one or more processors configured to:

access a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receive a picture cropping flag in the video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

access the offset cropping parameters;

crop one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generate, by a reference processing unit, a reference picture according to the cropped reference picture; and

generate, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

[0006c] According to a third aspect of the present invention, there is provided a computer-readable medium coupled to one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

accessing a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receiving a picture cropping flag in a video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

accessing the offset cropping parameters;

cropping one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generating, by a reference processing unit, a reference picture according to the cropped reference picture; and

generating, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] An embodiment of the present invention is illustrated by way of example, and not in way by limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0008] FIG. 1 depicts an example implementation of a coding system supporting coding-standard scalability according to an embodiment of this invention;

[0009] FIG. 2A and FIG. 2B depict example implementations of a coding system supporting AVC/H.264 and HEVC codec scalability according to an embodiment of this invention;

[0010] FIG. 3 depicts an example of layered coding with a cropping window according to an embodiment of this invention;

[0011] FIG. 4 depicts an example of inter-layer processing for interlaced pictures according to an embodiment of this invention;

[0012] FIG. 5A and FIG. 5B depict examples of inter-layer processing supporting coding-standard scalability according to an embodiment of this invention;

[0013] FIG. 6 depicts an example of RPU processing for signal encoding model scalability according to an embodiment of this invention;

[0014] FIG. 7 depicts an example encoding process according to an embodiment of this invention;

[0015] FIG. 8 depicts an example decoding process according to an embodiment of this invention; and

CLAIMS:

1. A method for decoding a video stream by a decoder, the method comprising:

accessing a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receiving a picture cropping flag in the video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

accessing the offset cropping parameters;

cropping one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generating, by a reference processing unit, a reference picture according to the cropped reference picture; and

generating, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

2. The method of claim 1,

wherein the base layer picture is in a first spatial resolution, and

wherein generating the reference picture comprises scaling the cropped reference picture from the first spatial resolution to a second spatial resolution such that the reference picture for the enhancement layer is in the second spatial resolution.

3. The method of claim 1, wherein the offset cropping parameters are updated on a frame-by-frame basis in the video stream.

4. The method of claim 1, further comprising detecting that the picture cropping flag is set to a predetermined value.

5. The method of claim 4, wherein the predetermined value is 1.

6. The method of claim 1, wherein the offset cropping parameters comprise a left offset, a right offset, a top offset, and a bottom offset.

7. A decoder for decoding a video stream, comprising:

one or more processors configured to:

access a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receive a picture cropping flag in the video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

access the offset cropping parameters;

crop one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generate, by a reference processing unit, a reference picture according to the cropped reference picture; and

generate, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

8. The decoder of claim 7,

wherein the base layer picture is in a first spatial resolution, and

wherein generating the reference picture comprises scaling the cropped reference picture from the first spatial resolution to a second spatial resolution such that the reference picture for the enhancement layer is in the second spatial resolution.

9. The decoder of claim 7, wherein the offset cropping parameters are updated on a frame-by-frame basis in the video stream.

10. The decoder of claim 7, further comprising detecting that the picture cropping flag is set to a predetermined value.

11. The decoder of claim 10, wherein the predetermined value is 1.

12. The decoder of claim 7, wherein the offset cropping parameters comprise a left offset, a right offset, a top offset, and a bottom offset.

13. A computer-readable medium coupled to one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

accessing a base layer picture, wherein the base layer picture is generated by a base layer decoding unit compliant with a first coding standard;

receiving a picture cropping flag in a video stream indicating that offset cropping parameters are present;

in response to receiving the picture cropping flag indicating that the offset cropping parameters are present:

accessing the offset cropping parameters;

cropping one or more regions of the base layer picture according to the accessed offset cropping parameters to generate a cropped reference picture; and

generating, by a reference processing unit, a reference picture according to the cropped reference picture; and

generating, by an enhancement layer decoding unit compliant with a second coding standard different from the first coding standard, an enhancement layer picture based at least in part on the reference picture.

14. The computer-readable medium of claim 13,

wherein the base layer picture is in a first spatial resolution, and

wherein generating the reference picture comprises scaling the cropped reference picture from the first spatial resolution to a second spatial resolution such that the reference picture for the enhancement layer is in the second spatial resolution.

15. The computer-readable medium of claim 13, wherein the offset cropping parameters are updated on a frame-by-frame basis in the video stream.

16. The computer-readable medium of claim 13, further comprising detecting that the picture cropping flag is set to a predetermined value.

17. The computer-readable medium of claim 16, wherein the predetermined value is 1.

18. The computer-readable medium of claim 13, wherein the offset cropping parameters comprise a left offset, a right offset, a top offset, and a bottom offset.