and the encoded video data are not multiplexed. In this situation, the encoded data is transmitted to video decoder 3206 and audio decoder 3208 without through the demultiplexing unit 3204.

[0226] Via the demultiplexing processing, video elementary stream (ES), audio ES, and optionally subtitle are generated. The video decoder 3206, which includes the video decoder 30 as explained in the above mentioned embodiments, decodes the video ES by the decoding method as shown in the above-mentioned embodiments to generate video frame, and feeds this data to the synchronous unit 3212. The audio decoder 3208, decodes the audio ES to generate audio frame, and feeds this data to the synchronous unit 3212. Alternatively, the video frame may store in a buffer (not shown in FIG. ~~¥~~18) before feeding it to the synchronous unit 3212. Similarly, the audio frame may store in a buffer (not shown in FIG. ~~¥~~18) before feeding it to the synchronous unit 3212.

[0227] The synchronous unit 3212 synchronizes the video frame and the audio frame, and supplies the video/audio to a video/audio display 3214. For example, the synchronous unit 3212 synchronizes the presentation of the video and audio information. Information may code in the syntax using time stamps concerning the presentation of coded audio and visual data and time stamps concerning the delivery of the data stream itself.

[0228] If subtitle is included in the stream, the subtitle decoder 3210 decodes the subtitle, and synchronizes it with the video frame and the audio frame, and supplies the video/audio/subtitle to a video/audio/subtitle display 3216.

[0229] The present invention is not limited to the above-mentioned system, and either the picture encoding device or the picture decoding device in the above-mentioned embodiments can be incorporated into other system, for example, a car system.

[0230] In accordance with the present disclosure, the methods and processes described may be implemented in hardware, software, firmware, or any combination thereof. When implemented in software, the methods or processes may be performed by instructions or program code that are stored in a computer-readable medium and executed by a hardware processing unit.

[0231] Since the proposed method store the avaialble information for each sample in each component, it can provide the availabel information more accurately in intra prediction process.

WHAT IS CLAIMED IS:

1. An apparatus for image intra prediction, comprising:

a memory storage comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

obtain an intra prediction mode of a current block;

derive availability of a reference sample of a component of the current block, wherein the component comprises a Cb component, or a Cr component;

substitute unavailable reference samples by using available reference samples;

derive a prediction of the current block based on the intra prediction mode and the substituted reference samples; and

reconstruct the current block based on the prediction.

2. The apparatus of claim 1, wherein the one or more processors execute the instructions to:

derive the availability of the reference sample by checking availability of Cb samples within a neighboring Cb block, wherein the neighboring Cb block includes the reference sample; or

derive the availability of the reference sample by checking availability of Cr samples within a neighboring Cr block, wherein the neighboring Cr block includes the reference sample.

3. The apparatus of claim 1 or 2, wherein all Cb samples in the reconstructed block are marked as available; or all Cr samples in the reconstructed block are marked as available.

4. The apparatus of claim 1, wherein the one or more processors execute the instructions to:

derive the prediction of the current block by mapping the substituted reference samples to the current block based on the intra prediction mode;

reconstruct the current block by adding a residual to the prediction of the current block; and

mark all samples in the reconstructed block as available after reconstructing the current block.

5. The apparatus of claim 4, wherein a block area comprises a number of units each having a unit area, all samples in the unit area are marked as available.

6. The apparatus of claim 5, wherein:

when the current unit is a Cb unit, all Cb samples at positions covered by the unit area are marked as available; or

when the current unit is a Cr unit, all Cr samples at positions covered by the unit area are marked as available.

7. The apparatus of any one of claims 1-6, wherein availability of reference samples is saved for each component.

8. An apparatus for image intra prediction, comprising:

a memory storage comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

obtain an intra prediction mode of a current block;

derive availability of a reference sample of a component of the current block, wherein the component comprises a Chroma component;

substitute unavailable reference samples by using available reference samples;

derive a Chroma prediction of the current block based on the intra prediction mode and the substituted reference samples; and

reconstruct the current block based on the prediction.

9. The apparatus of claim 8, wherein a Cb component and a Cr component form the chroma component, and the Cb component and the Cr component share a same availability information.

10. The apparatus of claim 9, all Chroma samples in the reconstructed block are marked as available.

11. A method for image intra prediction performed by an encoder or a decoder, comprising:

obtaining an intra prediction mode of a current block;

deriving availability of a reference sample of a component of the current block, wherein the component comprises a Cb component, or a Cr component;

substituting unavailable reference samples by using available reference samples;

deriving a prediction of the current block based on the intra prediction mode and the substituted reference samples; and

reconstructing the current block based on the prediction.

12. The method of claim 11, wherein:

deriving the availability of the reference sample by checking availability of Cb samples within a neighboring Cb block, wherein the neighboring Cb block includes the reference sample; or

derive the availability of the reference sample by checking availability of Cr samples within a neighboring Cr block, wherein the neighboring Cr block includes the reference sample.

13. The method of claim 11 or 12, wherein all Cb samples in the reconstructed block are marked as available; or all Cr samples in the reconstructed block are marked as available.

14. The method of claim 11, wherein the method further comprising:

deriving the prediction of the current block by mapping the substituted reference samples to the current block based on the intra prediction mode;

reconstructing the current block by adding a residual to the prediction of the current block; and

marking all samples in the reconstructed block as available after reconstructing the current block.

15. The method of claim 11, wherein a block area comprises a number of units each having a unit area, all samples in the unit area are marked as available.

16. The method of claim 11, wherein:

when the current unit is a Cb unit, all Cb samples at positions covered by the unit area are marked as available; or

when the current unit is a Cr unit, all Cr samples at positions covered by the unit area are marked as available.

17. The method of claim 11, wherein samples at a right boundary and a bottom boundary of the reconstructed block are marked as available.

18. The method of claim 11, wherein only right boundary samples and bottom boundary samples are marked as available in unit N*1 or 1*N.

19. The method of claim 11, wherein only right boundary samples and bottom boundary samples are marked as available in unit N*N.

20. The method of any one of claims 11-19, wherein availability of reference samples is saved for each component.

21. The method of claim 11, wherein the availability reference samples are determined by obtaining positions or indices of units to which the reference samples belong; when a unit is determined as available, then a reference sample associated with that unit is determined as available.

22. A method for image intra prediction performed by an encoder or a decoder, comprising:

obtaining an intra prediction mode of a current block;

deriving availability of a reference sample of a component of the current block, wherein the component comprises a Chroma component;

substituting unavailable reference samples by using available reference samples;

deriving a Chroma prediction of the current block based on the intra prediction mode and the substituted reference samples; and

reconstructing the current block based on the prediction.

23. The method of claim 22, wherein a Cb component and a Cr component form the chroma component, and the Cb component and the Cr component share a same availability information.

24. The method of claim 22 or 23, wherein all Chroma samples in the reconstructed block are marked as available.

25. The method of claim 22, wherein, after reconstruction a unit in the current block, all samples in a unit area of the unit are marked as available.

~~26. The method of claim 22, wherein, after reconstructing the current block, samples at a right boundary and a bottom boundary of the current block are marked as available.~~

~~27. The method of claim 22, wherein, after reconstructing the current block, only right boundary samples and bottom boundary samples are marked as available in unit N*1 or 1*N.~~

~~28. The method of claim 22, wherein, after reconstructing the current block, only right boundary samples and bottom boundary samples are marked as available in unit N*N.~~

~~29. The method of any one of claims 22-28, wherein the deriving availability of the reference sample comprising:~~

~~obtaining the position or index of the unit which the sample belong to, if the unit is available, then the reference sample is available.~~

~~30. A computer program product comprising a program code for performing the method according to any one of claims 11 to 29.~~

1. An apparatus for image intra prediction, comprising:

a memory comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

obtain an intra prediction mode of a current block;

derive availability of a reference sample of a component of the current block by checking availability of chroma samples, wherein the component is a Cb component, or a Cr component;

substitute unavailable reference samples by using available reference samples;

derive a prediction of the current block by mapping the substitute reference samples to the current block based on the intra prediction mode;

reconstruct the current block by adding a residual to the prediction of the current block to obtain a reconstructed block; and

mark all samples in the reconstructed block as available after reconstructing the current block.

2. The apparatus of claim 1, wherein the one or more processors execute the instructions to:

derive the availability of the reference sample by checking availability of Cb samples within a neighboring Cb block, wherein the neighboring Cb block includes the reference sample; or

derive the availability of the reference sample by checking availability of Cr samples within a neighboring Cr block, wherein the neighboring Cr block includes the reference sample.

3. The apparatus of claim 1 or 2, wherein all Cb samples in the reconstructed block are marked as available; or all Cr samples in the reconstructed block are marked as available.

4. The apparatus of claim 1, wherein a block area comprises a number of units each having a unit area, all samples in the unit area are marked as available.

5. The apparatus of claim 4, wherein:

when the current block is a Cb unit, all Cb samples at positions covered by the unit area are marked as available; or

when the current block is a Cr unit, all Cr samples at positions covered by the unit area are marked as available.

6. The apparatus of any one of claims 1-5, wherein availability of reference samples is saved for each component.

7. An apparatus for image intra prediction, comprising:

a memory comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

obtain an intra prediction mode of a current block;

derive availability of a reference sample of a component of the current block by checking availability of chroma samples, wherein the component is a Chroma component;

substitute unavailable reference samples by using available reference samples;

derive a Chroma prediction of the current block by mapping the substitute reference samples to the current block based on the intra prediction mode;

reconstruct the current block by adding a residual to the prediction of the current block to obtain a reconstructed block; and

mark all samples in the reconstructed block as available after reconstructing the current block.

8. The apparatus of claim 7, wherein a Cb component and a Cr component form the chroma component, and the Cb component and the Cr component share a same availability information.

9. The apparatus of claim 8, all Chroma samples in the reconstructed block are marked as available.

10. A method for image intra prediction performed by an encoder or a decoder, comprising:

obtaining an intra prediction mode of a current block;

deriving availability of a reference sample of a component of the current block by checking availability of chroma samples, wherein the component is a Cb component, or a Cr component;

substituting unavailable reference samples by using available reference samples;

deriving a prediction of the current block by mapping the substitute reference samples to the current block based on the intra prediction mode;

reconstructing the current block by adding a residual to the prediction of the current block to obtain a reconstructed block; and

mark all samples in the reconstructed block as available after reconstructing the current block.

11. The method of claim 10, wherein:

deriving the availability of the reference sample by checking availability of Cb samples within a neighboring Cb block, wherein the neighboring Cb block includes the reference sample; or

derive the availability of the reference sample by checking availability of Cr samples within a neighboring Cr block, wherein the neighboring Cr block includes the reference sample.

12. The method of claim 10 or 11, wherein all Cb samples in the reconstructed block are marked as available; or all Cr samples in the reconstructed block are marked as available.

13. The method of claim 10, wherein a block area comprises a number of units each having a unit area, all samples in the unit area are marked as available.

14. The method of claim 13, wherein:

when the current block is a Cb unit, all Cb samples at positions covered by the unit area are marked as available; or

when the current block is a Cr unit, all Cr samples at positions covered by the unit area are marked as available.

15. The method of claim 10, wherein samples at a right boundary and a bottom boundary of the reconstructed block are marked as available.

16. The method of claim 10, wherein only right boundary samples and bottom boundary samples are marked as available in unit N*1 or 1*N.

17. The method of claim 10, wherein only right boundary samples and bottom boundary samples are marked as available in unit N*N.

18. The method of any one of claims 10-17, wherein availability of reference samples is saved for each component.

19. The method of claim 10, wherein the available reference samples are determined by obtaining positions or indices of units to which the reference samples belong; when a unit is determined as available, then a reference sample associated with that unit is determined as available.

20. A method for image intra prediction performed by an encoder or a decoder, comprising:

obtaining an intra prediction mode of a current block;

deriving availability of a reference sample of a component of the current block by checking availability of chroma samples, wherein the component is a Chroma component;

substituting unavailable reference samples by using available reference samples;

deriving a Chroma prediction of the current block by mapping the substitute reference samples to the current block based on the intra prediction mode;

reconstructing the current block by adding a residual to the prediction of the current block to obtain a reconstructed block; and

mark all samples in the reconstructed block as available after reconstructing the current block.

21. The method of claim 20, wherein a Cb component and a Cr component form the chroma component, and the Cb component and the Cr component share a same availability information.

22. The method of claim 20 or 21, wherein all Chroma samples in the reconstructed block are marked as available.

23. The method of claim 20, wherein, after reconstructing a unit in the current block, all samples in a unit area of the unit are marked as available.

24. The method of claim 20, wherein, after reconstructing the current block, samples at a right boundary and a bottom boundary of the current block are marked as available.

25. The method of claim 20, wherein, after reconstructing the current block, only right boundary samples and bottom boundary samples are marked as available in unit N*1 or 1*N.

26. The method of claim 20, wherein, after reconstructing the current block, only right boundary samples and bottom boundary samples are marked as available in unit N*N.

27. The method of any one of claims 20-26, wherein the deriving availability of the reference sample comprising:

obtaining a position or index of an unit which the reference sample belong to, if the unit is available, then the reference sample is available.

28. A computer program comprising a program code for performing the method according to any one of claims 10 to 27.