The present invention relates to MPEG-4 studio profiles, and it employs object-based coding that encodes foreground pictures and background pictures separately after they are separated from the original images. The object-based coding has advantages such as improved coding efficiency. In particular, MPEG-4 includes a scheme called “sprite coding”.

“Sprite” is an extended, panoramic image used for background pictures. This extended image is coded and transmitted in advance. On the receiver side, an image patch is extracted from the extended image and is used as a background picture of the decoded image. All that needs to be coded in the sprite scheme is the extended background image and position parameters used for image extraction at the receiver end. This eliminates the need to encode every frame, thereby making it possible to improve image coding efficiency.

Figure 1 is a block diagram showing the decoder and encoder apparatus of the first embodiment of the present invention. Coder circuit 1 receives, at input A, an extended panoramic image used as background pictures of the video and parameters for extracting background pictures from the extended background image. Furthermore, the coder circuit 1 receives a defocus value at input B, where the defocus value defines the extent to which the extracted background picture is to be blurred. Moreover, coder circuit 1 receives one or more foreground pictures of video. It encodes the extended background image, the parameters, the defocus value, and the foreground pictures to produce digital data D, which is then transmitted to decoder circuit 2.

Decoder circuit 2 decodes D. It outputs a signal representing the decoded background picture at output E, a signal representing the decoded defocus value at output F, and a signal representing the decoded foreground picture at output G. Defocus circuit 3 applies defocusing processing to the signal representing the decoded background picture (at E) where the level of defocusing is dependent on the decoded defocus value (at F). Details of the defocus processing will be described later.

Defocus circuit 3 outputs a signal representing the defocused background picture at output H. Synthesizing circuit 4 synthesizes the signal representing the defocused background picture (at H) with the signal representing the decoded foreground picture (at G).

When the background picture having the lens distortion thereof removed is composed with a foreground picture having the lens distortion, the reconstructed image may not have a natural appearance because of disparity between the presence and absence of the lens distortion.

Figure 2 is a block diagram showing an encoder apparatus embodiment of the present invention. The encoder apparatus includes a lens distortion compensation circuit 21, an extended background image generation circuit 22, a coder circuit 23, a decoder circuit 24, a background picture separation unit 25, and a lens distortion adding unit 26.

The lens distortion compensation circuit 21 processes each frame of a video signal A in accordance with the camera lens distortion signal B so as to compensate for the lens distortion. Figures 3A and 3B are illustrative drawings showing examples of lens distortions. When a square object 31 is taken picture of by use of a lens 32 distorted images 33a and 33b will be produced. A pincushion distortion as exhibited by image 33a is called positive distortion, and a barrel distortion as exhibited by image 33b is called negative distortion.

With respect to the compensated coordinates, luminance and chrominance signal levels are obtained from surrounding pixels by interpolation, thereby producing a video signal C having the lens distortion thereof compensated for.

This makes it possible to produce a composed image of the background picture and the foreground picture having substantially the same amount of lens distortion, thereby making the reconstructed image realistic.