Claims

1. An apparatus for intra prediction decoding an image, the apparatus comprising

an intra prediction unit that extracts intra prediction mode information that indicates an intra prediction mode applied to a current block of the image from a bitstream and performs intra prediction on the current block according to the intra prediction mode indicated by the extracted intra prediction mode information,

wherein in the intra prediction mode, a pixel of a neighboring block predicts a pixel of the current block, the pixel of the neighboring block determined from among pixels of the neighboring block previously reconstructed before the pixel of the current block using an extended line having a predetermined gradient about the pixel of the current block.

2. The apparatus of claim 1, wherein the gradient is $\tan^{-1}(dy/dx)$, dx and dy are integers, and a value of at least one of dx and dy is a power of 2.

3. The apparatus of claim 2, wherein in the intra prediction mode, N pixels, N is an integer, located on an upper side of the at least one block and close to the extended line having the gradient are determined as the pixels of the neighboring block, and a value of dy is a power of 2.

4. The apparatus of claim 2, wherein in the intra prediction mode, N pixels, N is an integer, located on a left side of the at least one block and close to the extended line having the gradient are determined as the pixels of the neighboring block, and a value of dx is a power of 2.

5 The apparatus of claim 2, wherein in the intra prediction mode, available pixels from among N pixels, N is an integer, located on an upper side of the at least one block and N pixels located on a left side of the at least one block close to the extended line having the gradient are determined as the pixels of the neighboring block, and values of dx and dy are powers of 2.

6. The apparatus of claim 1, wherein the gradient is $\tan^{-1}(dy/dx)$ (dx and dy are integers) and an absolute values of dx and dy are set such that a distance between prediction directions close to a horizontal direction or a vertical direction is narrow and a distance between prediction modes close to a diagonal direction is wide.

7. The apparatus of claim 6, wherein the gradient is $\tan^{-1}(dy/dx)$ (dx and dy are integers) and dy has a fixed value that is a power of 2, a distance between extended lines decreases as an absolute value of dx is closer to 0 such that the distance between the extended lines decreases as a direction of a determined extended line determined according to values of dx and dy is closer to a vertical direction, and the distance between the extended lines increases as the absolute value of dx is farther from 0 such that the distance between the extended lines increases as the direction of the determined extended line is closer to a horizontal direction.

8. The apparatus of claim 6, wherein the gradient is $\tan^{-1}(dy/dx)$ (dx and dy are integers) and dx has a fixed value that is a power of 2, a distance between extended lines decreases as an absolute value of dy is closer to 0 such that the distance between the extended lines decreases as a direction of a determined extended line determined according to values of dx and dy is closer to a horizontal direction, and the distance between the extended lines increases as the absolute value of dy is farther from 0 such that the distance between the extended lines increases as the direction of the determined extended line is closer to the vertical direction.

9. The apparatus of claim 1, wherein the gradient is $\tan^{-1}(dy/dx)$ (dx and dy are integers) and a pixel located at an ith place (i is an integer) based on an upper border of the at least one block and a jth place (j is an integer) based on a left border of the at least one block is (j,i),

an up neighboring pixel and a left neighboring pixel close to the extended line about the pixel (j, i) are respectively (j+i*dx/dy,0) and (0,i+j*dy/dx).

10. The apparatus of claim 9, wherein in the intra prediction mode, available values of c*(dx/dy), c is a constant, are stored, and locations of the upper neighboring pixel and the left neighboring pixel are determined using the stored values.

11. The apparatus of claim 1, wherein the gradient is $\tan^{-1}(dy/dx)$ (dx and dy are integers) and (dx, dy) has an at least one value selected from among the group consisting of (-32, 32), (-26, 32), (-21, 32), (-17, 32), (-13, 32), (-9, 32), (-5, 32), (-2, 32), (0.32), (2, 32), (5, 32), (9, 32), (21, 32), (26, 32), (32, 32), (32, -26), (32, -21), (32, -17), (32, -13), (32, -9), (32, -5), (32, -2), (32, 0), (32, 2), (32, 13), (32, 17), (32, 21), (32, 26) and (32, 32).

Claims

1. A method of decoding an image, the method comprising:

extracting an intra prediction mode of a current block from a bitstream, the intra prediction mode indicating a particular direction among a plurality of directions, wherein the particular direction is indicated by using one of a dx number in a horizontal direction and a fixed number in a vertical direction, or a dy number in the vertical direction and a fixed number in the horizontal direction, wherein dx and dy are integers;

determining a number of neighboring pixels located on a left side of the current block or an upper side of the current block;

determining a location of one or more neighboring pixels among the neighboring pixels located on the left side of the current block or the upper side of the current block using a bitwise shift operation based on a position of a current pixel (j, i) and one of the dx or dy numbers indicating the particular direction, where j and i are integers; and

performing intra prediction on the current block using the number of neighboring pixels and the location of the one or more neighboring pixels,

wherein the performing of the intra prediction comprises calculating a value of the current pixel using the number of neighboring pixels, and the location of the one or more neighboring pixels;

wherein:

the location of the one or more neighboring pixels located on the upper side of the current block is determined based on i*dx>>m, where i is a position of the current pixel in the vertical direction, dx is the dx number in the horizontal direction, m is related to the fixed number in the vertical direction, and >> is the bitwise shift operation, and

the location of the one or more neighboring pixels located on the left side of the current block is determined based on j*dy>>n, where j is a position of the current pixel in the horizontal direction, dy is the dy number in the vertical direction, and n is related to the fixed number in the horizontal direction,

wherein the bitwise shift operation operates on a binary representation of i*dx and j*dy.

2. The method of claim 1, wherein the particular direction is indicated by an angle of $\tan^{-1}(dy/dx)$.