CLAIMS

1. An apparatus comprising:

a memory;

at least one picture region of a color image in a compressed format stored on the memory, wherein the color image comprises a luminance channel and two chroma channels, wherein the compressed format for the at least one picture region includes:

a first quantization parameter value for decompressing the luminance channel of the at least one picture region;

a quantization parameter bias value for determining a second quantization parameter value for decompressing at least one of the two chroma channels of the at least one picture region, wherein the second quantization parameter is determined by adding the quantization parameter bias to the first quantization parameter value.

2. The apparatus of claim 1, wherein the second quantization parameter value is greater than the first quantization parameter value.

3. The apparatus of claim 1, wherein the compressed format is further characterized by a second quantization parameter bias value for determining a third quantization parameter value for decompressing a chroma channel of the at least one picture region, wherein the third quantization parameter is determined by adding the second quantization parameter bias to the first quantization parameter value,

wherein the second quantization parameter bias value is different than the first quantization parameter bias value.

4. The apparatus of claim 1, wherein the at least one picture region comprises a macroblock.

5. The apparatus of claim 1, wherein the quantization parameter bias value is negative.

6. The apparatus of claim 3, wherein the second quantization parameter bias is negative.

7. The apparatus of claim 1, wherein the second quantization parameter is used for both the chroma channels of the at least one picture region.

8. The apparatus of claim 1, wherein the second quantization parameter is restricted to be at least 1 and below a maxim quantization parameter value.

9. The apparatus of claim 3, wherein the third quantization parameter is restricted to be at least 1 and below a maxim quantization parameter value.

WHAT IS CLAIMED IS:

1. A method for compressing image chroma information of a color video image in a video image compression system, including selecting a resolution for a red color component of the color video image that is higher than the resolution for a blue color component of the color video image.

2. A method for compressing image chroma information of a color video image in a video image compression system, including:
   (a) downfiltering a blue color component of the color video image to a processed blue color component having a first resolution along at least one of the horizontal and vertical image axes of the color video image; and
   (b) filtering a red color component of the color video image to a processed red color component having a second resolution higher than the first resolution.

3. The method of claim 2, wherein the second resolution is in the range from 0.5 to 1.0 of the full resolution of the red color component along at least one of the horizontal and vertical image axes of the color video image.

4. The method of claim 2, further including compressing at least the processed blue color and red color components to a compressed output image.

5. The method of claim 4, further including decompressing the compressed output image to obtain uncompressed processed blue and red color components.

6. The method of claim 5, further including upsize filtering the processed blue and red color components to the full resolution of the color video image.

7. The method of claims 1 or 2, wherein the video image compression system is a motion-compensated video image compression system.

8. A method for reducing chroma noise during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, including utilizing a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is less than the first QP value.

9. The method of claim 8, wherein the second QP value is determined by applying a bias value to the first QP value.

10. The method of claim 8, further including compressing the color video image, after application of the first and second QP values, to a compressed output image.

11. The method of claim 10, further including decompressing the compressed output image using the first and second QP values to obtain an uncompressed video image.

12. A method for achieving higher compression during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, including utilizing a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is greater than the first QP value.

13. The method of claim 12, wherein the second QP value is determined by applying a bias value to the first QP value.

14. The method of claim 12, further including compressing the color video image, after application of the first and second QP values, to a compressed output image.

15. The method of claim 14, further including decompressing the compressed output image using the first and second QP values to obtain an uncompressed video image.

16. A method for improving the coding efficiency for a color space representation of a video image originally represented as linear RGB pixel values in a video image compression system, including transforming the linear RGB pixel values of the video image to a logarithmic representation of luminance and chroma channel information.

17. The method of claim 16, wherein transforming includes applying the following equations to obtain a YUV logarithmic representation of the video image:

Ylog = Log (Wr * R + Wg * G + Wb * B)

U chroma channel = Log(R) - Ylog

V chroma channel = Log(B) - Ylog

where Wr, Wg, and Wb are linear weightings for red, green, and blue components of luminance of the video image.

18. The method of claim 17, further including reducing the resolution of the U and V chroma channels of the YUV logarithmic representation.

19. The method of claim 17, further including compressing the YUV logarithmic representation of the video image to a compressed video image.

20. The method of claim 19, further including decompressing the compressed video image to a restored YUV logarithmic representation of the video image.

21. The method of claim 20, further including transforming restored YUV logarithmic representation of the video image to linear RGB pixel values.

22. The method of claim 21, wherein transforming includes applying the following equations to obtain the linear RGB pixel values:

R= anti-log(Y + U)

B= anti-log(Y + V)

G=(anti-log(Y) - Wr * R - Wb * B) / Wg.

23. A method for improving the video characteristics of a color video image in a video compression system, including:

(a) selecting a set of image channels to represent the color video image, including a luminance channel and *n* chroma channels, where *n* is at least three; and

(b) compressing the luminance channel and the *n* additional chroma channels to a compressed video image.

24. The method of claim 23, wherein at least one chroma channel represents non-visible wavelengths.

25. The method of claim 23, wherein the luminance channel is the image channel having the highest dynamic range and resolution.

26. The method of claim 23, further including coding each chroma channel independently from each other channel.

27. The method of claim 23, further including coding each chroma channel differentially with respect to a selected other channel.

28. The method of claim 23, further including reducing the resolution of at least one chroma channel.

29. The method of claim 23, further including applying a quantization parameter (QP) value to at least one chroma channel biased with respect to a QP value applied to the luminance channel.

30. A computer program, stored on a computer-readable medium, for compressing image chroma information of a color video image in a video image compression system, the computer program comprising instructions for causing a computer to permit selection of a resolution for a red color component of the color video image that is higher than the resolution for a blue color component of the color video image.

31. A computer program, stored on a computer-readable medium, for compressing image chroma information of a color video image in a video image compression system, the computer program comprising instructions for causing a computer to:

(a) downfilter a blue color component of the color video image to a processed blue color component having a first resolution along at least one of the horizontal and vertical image axes of the color video image; and

(b) filter a red color component of the color video image to a processed red color component having a second resolution higher than the first resolution.

32. The computer program of claim 31, wherein the second resolution is in the range from 0.5 to 1.0 of the full resolution of the red color component along at least one of the horizontal and vertical image axes of the color video image.

33. The computer program of claim 31, further including instructions for causing the computer to compress at least the processed blue color and red color components to a compressed output image.

34. The computer program of claim 33, further including instructions for causing a decompression computer to decompress the compressed output image to obtain uncompressed processed blue and red color components.

35. The computer program of claim 34, further including instructions for causing the decompression computer to upsize filter the processed blue and red color components to the full resolution of the color video image.

36. The computer program of claims 30 or 31, wherein the video image compression system is a motion-compensated video image compression system.

37. A computer program, stored on a computer-readable medium, for reducing chroma noise during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, the computer program comprising instructions for causing a computer to utilize a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is less than the first QP value.

38. The computer program of claim 37, wherein the second QP value is determined by applying a bias value to the first QP value.

39. The computer program of claim 37, further including instructions for causing the computer to compress the color video image, after application of the first and second QP values, to a compressed output image.

40. The computer program of claim 39, further including instructions for causing a decompression computer to

decompress the compressed output image using the first and second QP values to obtain an uncompressed video image.

41. A computer program, stored on a computer-readable medium, for achieving higher compression during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, the computer program comprising instructions for causing a computer to utilize a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is greater than the first QP value.

42. The computer program of claim 41, wherein the second QP value is determined by applying a bias value to the first QP value.

43. The computer program of claim 41, further including instructions for causing the computer to compress the color video image, after application of the first and second QP values, to a compressed output image.

44. The computer program of claim 14, further including instructions for causing a decompression computer to decompress the compressed output image using the first and second QP values to obtain an uncompressed video image.

45. A computer program, stored on a computer-readable medium, for improving the coding efficiency for a color space representation of a video image originally represented as linear RGB pixel values in a video image compression system, the computer program comprising instructions for causing a computer to transform the linear RGB pixel values of the video image to a logarithmic representation of luminance and chroma channel information.

46. The computer program of claim 45, wherein the instructions for causing the computer to transform include instructions for causing the computer to apply the following equations to obtain a YUV logarithmic representation of the video image:

Ylog = Log (Wr * R + Wg * G + Wb * B)

U chroma channel = Log(R) - Ylog

V chroma channel = Log(B) - Ylog

where Wr, Wg, and Wb are linear weightings for red, green, and blue components of luminance of the video image.

47. The computer program of claim 46, further including instructions for causing the computer to reduce the resolution of the U and V chroma channels of the YUV logarithmic representation.

48. The computer program of claim 46, further including instructions for causing the computer to compress the YUV logarithmic representation of the video image to a compressed video image.

49. The computer program of claim 48, further including instructions for causing a decompression computer to decompress the compressed video image to a restored YUV logarithmic representation of the video image.

50. The computer program of claim 49, further including instructions for causing the decompression computer to transform restored YUV logarithmic representation of the video image to linear RGB pixel values.

51. The computer program of claim 50, wherein the instructions for causing the computer to transform includes instructions for causing the computer to apply the following equations to obtain the linear RGB pixel values:

R= anti-log(Y + U)

B= anti-log(Y + V)

G=(anti-log(Y) - Wr * R - Wb * B) / Wg.

52. A computer program, stored on a computer-readable medium, for improving the video characteristics of a color video image in a video compression system, the computer program comprising instructions for causing a computer to:

(a) select a set of image channels to represent the color video image, including a luminance channel and *n* chroma channels, where *n* is at least three; and

(b) compress the luminance channel and the *n* additional chroma channels to a compressed video image.

53. The computer program of claim 52, wherein at least one chroma channel represents non-visible wavelengths.

54. The computer program of claim 52, wherein the luminance channel is the image channel having the highest dynamic range and resolution.

55. The computer program of claim 52, further including instructions for causing a computer to code each chroma channel independently from each other channel.

56. The computer program of claim 52, further including instructions for causing a computer to code each chroma channel differentially with respect to a selected other channel.

57. The computer program of claim 52, further including instructions for causing a computer to reduce the resolution of at least one chroma channel.

58. The computer program of claim 52, further including instructions for causing a computer to apply a quantization parameter (QP) value to at least one chroma channel biased with respect to a QP value applied to the luminance channel.

59. A system for compressing image chroma information of a color video image a video image compression system, including:

(a) means for selecting a resolution for a red color component of the color video image that is higher than the resolution for a blue color component of the color video image; and

(b) means for applying the selected resolution to compress the color video image.

60. A system for compressing image chroma information of a color video image in a video image compression system, including means for:

(a) downfiltering a blue color component of the color video image to a processed blue color component having a first resolution along at least one of the horizontal and vertical image axes of the color video image; and

(b) filtering a red color component of the color video image to a processed red color component having a second resolution higher than the first resolution.

61. The system of claim 60, wherein the second resolution is in the range from 0.5 to 1.0 of the full resolution of the red color component along at least one of the horizontal and vertical image axes of the color video image.

62. The system of claim 60, further including means for compressing at least the processed blue color and red color components to a compressed output image.

63. The system of claim 62, further including means for decompressing the compressed output image to obtain uncompressed processed blue and red color components.

64. The system of claim 63, further including means for upsize filtering the processed blue and red color components to the full resolution of the color video image.

65. The system of claims 59 or 60, wherein the video image compression system is a motion-compensated video image compression system.

66. A system for reducing chroma noise during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, including

(a) means for utilizing a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is less than the first QP value; and

(b) means for applying the selected QP values during compression of the color video image.

67. The system of claim 66, wherein the second QP value is determined by applying a bias value to the first QP value.

68. The system of claim 66, further including means for compressing the color video image, after application of the first and second QP values, to a compressed output image.

69. The system of claim 68, further including means for decompressing the compressed output image using the first and second QP values to obtain an uncompressed video image.

70. A system for achieving higher compression during compression of a color video image in a YUV video image compression system utilizing a quantization parameter (QP) during compression, including:

(a) means for utilizing a first QP value for the Y color channel of a color video image, and a second QP value for at least one of the U and V color channels of the color video image, wherein the second QP value is greater than the first QP value

(b) means for applying the selected QP values during compression of the color video image.

71. The system of claim 70, wherein the second QP value is determined by applying a bias value to the first QP value.

72. The system of claim 70, further including means for compressing the color video image, after application of the first and second QP values, to a compressed output image.

73. The system of claim 72, further including means for decompressing the compressed output image using the first and second QP values to obtain an uncompressed video image.

74. A system for improving the coding efficiency for a color space representation of a video image originally represented as linear RGB pixel values in a video image compression system, including:

(a) means for inputting linear RGB pixel values of a video image; and

(b) means for transforming the linear RGB pixel values of the video image to a logarithmic representation of luminance and chroma channel information.

75. The system of claim 74, wherein transforming includes applying the following equations to obtain a YUV logarithmic representation of the video image:

Ylog = Log (Wr * R + Wg * G + Wb * B)

U chroma channel = Log(R) - Ylog

V chroma channel = Log(B) - Ylog

where Wr, Wg, and Wb are linear weightings for red, green, and blue components of luminance of the video image.

76. The system of claim 75, further including means for reducing the resolution of the U and V chroma channels of the YUV logarithmic representation.

77. The system of claim 75, further including means for compressing the YUV logarithmic representation of the video image to a compressed video image.

78. The system of claim 77, further including means for decompressing the compressed video image to a restored YUV logarithmic representation of the video image.

79. The system of claim 78, further including means for transforming restored YUV logarithmic representation of the video image to linear RGB pixel values.

80. The system of claim 79, wherein transforming includes applying the following equations to obtain the linear RGB pixel values:

R= anti-log(Y + U)

B= anti-log(Y + V)

G=(anti-log(Y) - Wr * R - Wb * B) / Wg.

81. A system for improving the video characteristics of a color video image in a video compression system, including means for:

(a) selecting a set of image channels to represent the color video image, including a luminance channel and *n* chroma channels, where *n* is at least three; and

(b) compressing the luminance channel and the *n* additional chroma channels to a compressed video image.

82. The system of claim 81, wherein at least one chroma channel represents non-visible wavelengths.

83. The system of claim 81, wherein the luminance channel is the image channel having the highest dynamic range and resolution.

84. The system of claim 81, further including means for coding each chroma channel independently from each other channel.

85. The system of claim 81, further including means for coding each chroma channel differentially with respect to a selected other channel.

86. The system of claim 81, further including means for reducing the resolution of at least one chroma channel.

87. The system of claim 81, further including means for applying a quantization parameter (QP) value to at least one chroma channel biased with respect to a QP value applied to the luminance channel.