VALIDAÇÃO de RESULTADOS TP1

Parâmetros:
- Downsampling 4:2:2; interpolação linear
- QF = 75

Resultados a obter:
- **Imagens** (encoder e decoder)
- **Matrizes** correspondentes no bloco de coordenadas **[8: 16, 8: 16]**
- **Erros** na imagem recuperada
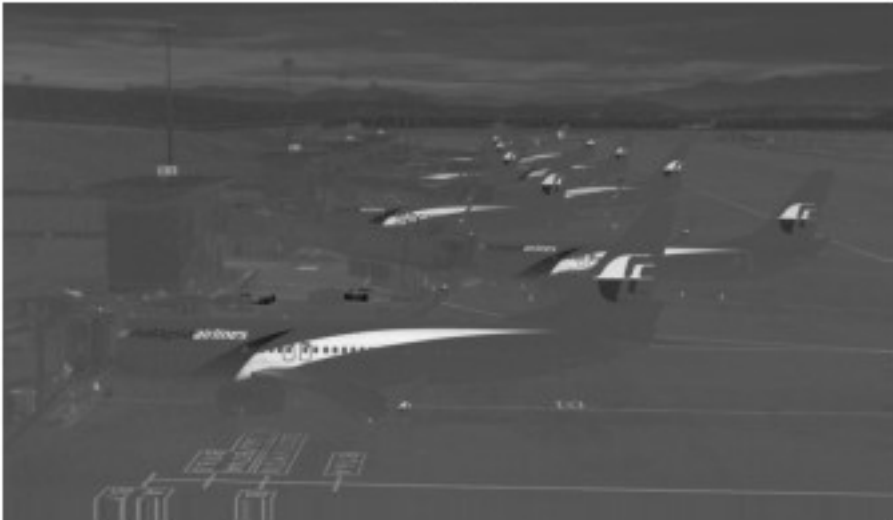

Img Orig

R

G

B

R [8:16, 8:16]

```
[[209 212 210 208 208 210 210 207]
 [209 210 210 208 208 210 210 208]
 [209 211 211 210 210 211 212 210]
 [210 212 212 212 212 215 215 213]
 [212 213 213 215 215 216 216 216]
 [216 214 216 217 217 217 217 217]
 [219 218 218 221 221 218 218 218]
 [223 220 220 223 223 219 219 219]]
```
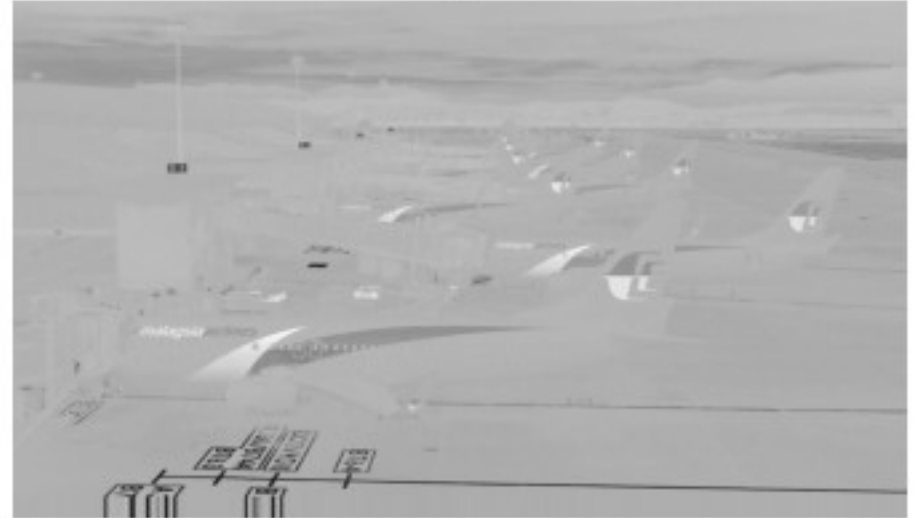
Y

Cb

Cr

Y [8:16, 8:16]

[[222.758 223.068 223.057 223.046 223.046 223.057 223.057 222.046]
 [222.758 223.057 223.057 223.046 223.046 223.057 223.057 223.046]
 [222.758 224.057 224.057 223.758 223.758 224.057 225.057 223.758]
 [224.117 224.829 224.829 224.829 224.829 225.84 225.84 226.057]
 [224.829 225.829 225.829 225.84 225.84 226.84 226.84 226.84]
 [227.313 226.715 227.313 227.025 227.025 228.313 228.313 227.025]
 [228.797 229.085 229.085 229.395 229.036 229.313 229.313 228.025]
 [231.395 231.085 231.085 230.107 230.107 230.085 230.085 228.797]]

Cb[8:16, 8:16]

[[136.037 135.862 135.869 135.875 135.875 135.869 135.869 135.875]
 [136.037 135.869 135.869 135.875 135.875 135.869 135.869 135.875]
 [136.037 135.869 135.869 136.037 136.037 135.869 135.869 136.037]
 [134.706 134.869 134.869 134.869 134.869 134.862 134.862 135.869]
 [134.869 134.869 134.869 134.862 134.862 134.862 134.862 134.862]
 [134.031 134.369 134.031 134.194 134.194 134.031 134.031 134.194]
 [133.194 133.031 133.031 132.856 134.187 134.031 134.031 134.194]
 [132.856 133.031 133.031 133.019 133.019 133.031 133.031 133.194]]

Y downsampling 4:2:2

Cb downsampling 4:2:2

Cr downsampling 4:2:2

Cb [8:16, 8:16]

```
[[136.037 135.862 135.869 135.875 135.875 135.869 135.869 135.875]
 [136.037 135.869 135.869 135.875 135.875 135.869 135.869 135.875]
 [136.037 135.869 135.869 136.037 136.037 135.869 135.869 136.037]
 [134.706 134.869 134.869 134.869 134.869 134.862 134.862 135.869]
 [134.869 134.869 134.869 134.862 134.862 134.862 134.862 134.862]
 [134.031 134.369 134.031 134.194 134.194 134.031 134.031 134.194]
 [133.194 133.031 133.031 132.856 134.187 134.031 134.031 134.194]
 [132.856 133.031 133.031 133.019 133.019 133.031 133.031 133.194]]
```
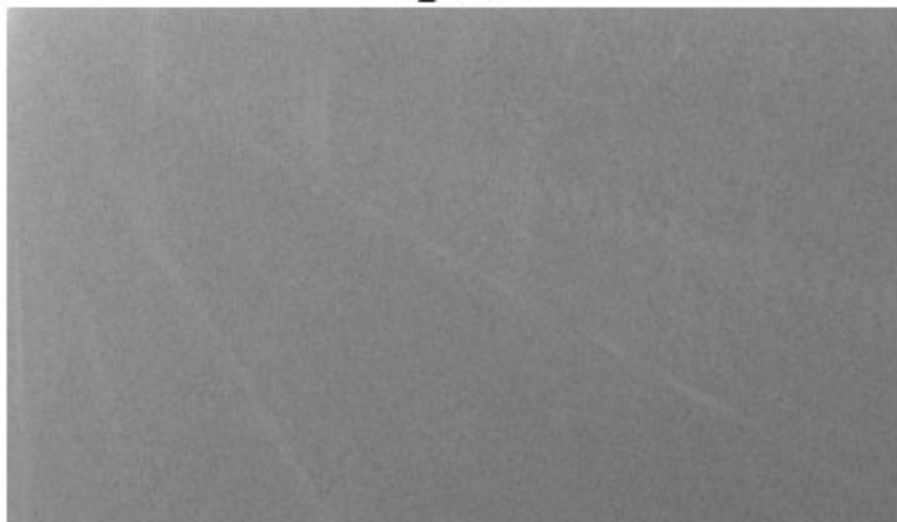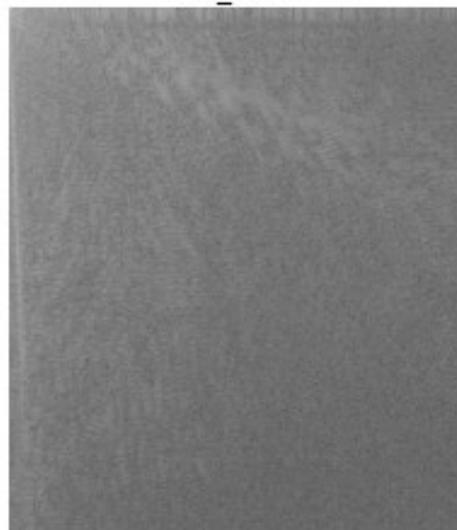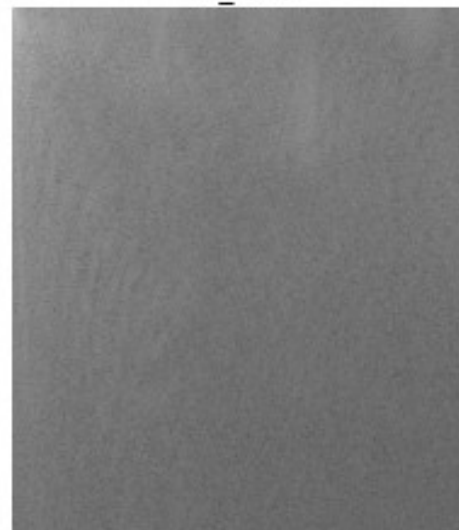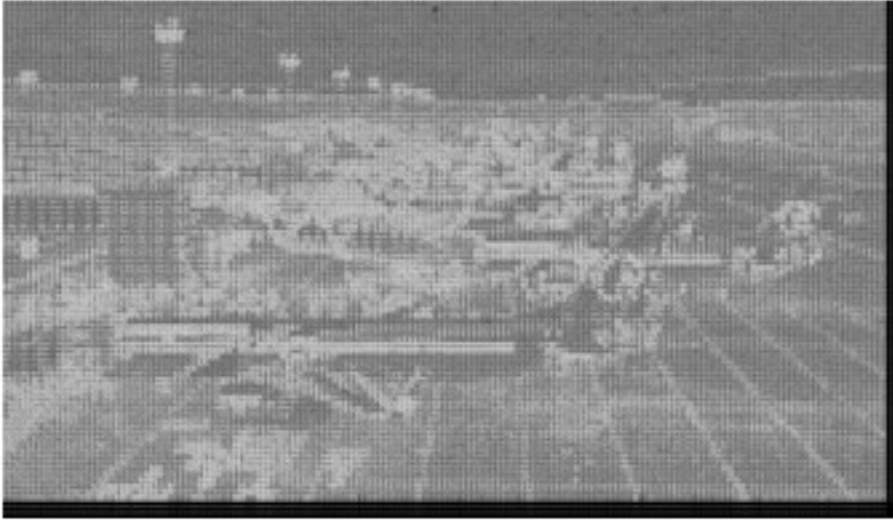
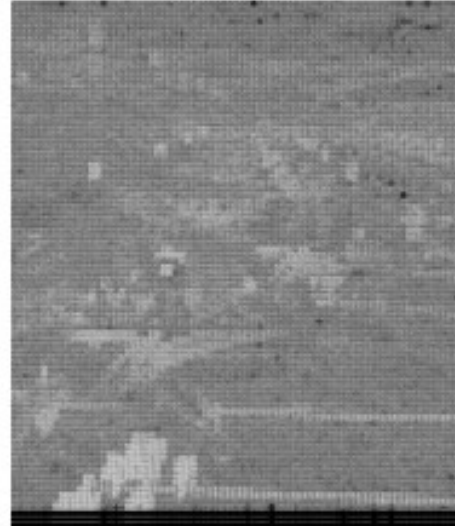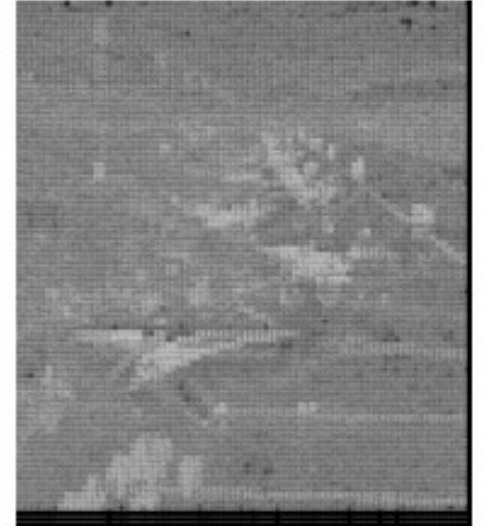Y_DCT   Cb_DCT   Cr_DCT

Yb_DCT   Cbb_DCT   Crb_DCT

Yb_DCT8x8 [8:16, 8:16]

```
[[ 1.80777663e+03 -9.23242261e-01 -5.29636497e-01  3.59445648e-01  -1.76362500e+00  5.55083588e-01 -2.98406749e-01 -4.60890519e-02]
 [-2.03673479e+01 -9.82171542e-01 -8.86593039e-02 -5.92479366e-01   2.05786124e-01 -4.40442200e-01 -2.79880553e-01 -8.09695807e-02]
 [ 3.01421591e+00  2.96358656e+00 -5.05785655e-01  5.32572109e-01   2.78262642e-01  2.64984553e-01 -1.70624815e-01  4.42421783e-01]
 [-1.55397910e+00 -5.90294119e-01 -2.27573528e-01  4.87826728e-01   1.58910590e-01  2.61243202e-01  3.27367962e-01 -2.07981922e-01]
 [ 1.15787500e+00  2.03021506e-01  2.68178989e-01 -1.23757464e-01   7.06250000e-02 -4.00909176e-01  1.85897985e-01 -9.99756393e-02]
 [ 3.91716121e-01 -2.49542185e-01 -3.88121070e-01  8.46698258e-02  -1.12999755e-01  1.77816633e-01 -2.46778824e-01 -1.26352968e-01]
 [ 1.25161893e-01  2.41893572e-01  1.28375185e-01  3.35478925e-01  -5.71082576e-01  4.37425155e-01 -4.84643446e-02  3.97998520e-01]
 [-1.29250561e-01 -1.08042957e-01 -4.65970112e-01 -3.52498952e-01  -3.18990577e-01 -1.04955260e-01 -5.53132343e-01 -1.24718188e-02]]
```
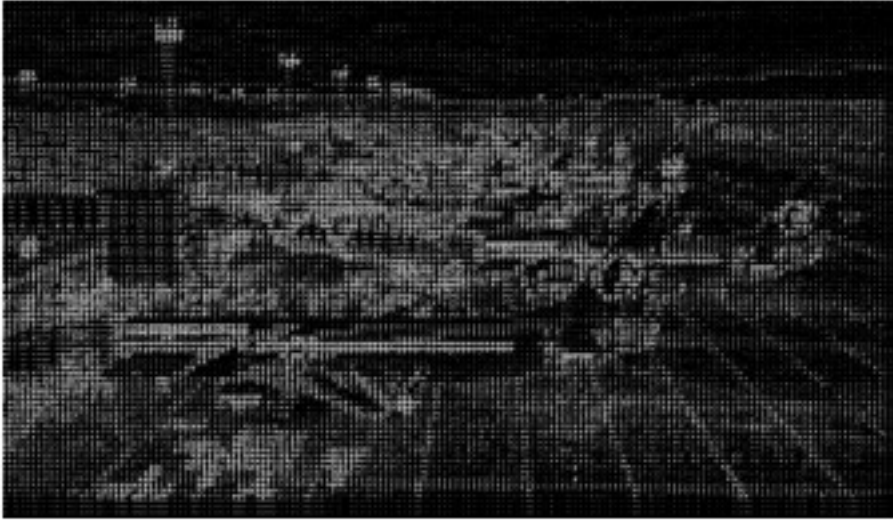
Yb_Q Cbb_Q Crb_Q
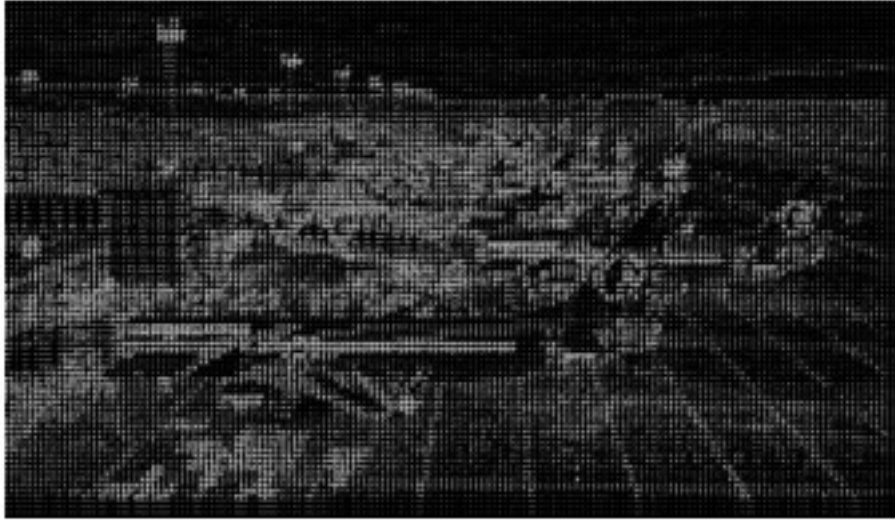
QY

Yb_Q [8:16, 8:16]

[[8 6 5 8 12 20 26 30]
 [6 6 7 10 13 29 30 28]
 [7 6 8 12 20 28 34 28]
 [7 8 11 14 26 44 40 31]
 [9 11 18 28 34 54 52 38]
 [12 18 28 32 40 52 56 46]
 [24 32 39 44 52 60 60 50]
 [36 46 48 49 56 50 52 50]]

[[226 0 0 0 0 0 0 0]
 [-3 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0]]

Yb_DPCM [8:16, 8:16]

```
[[0  0  0  0  0  0  0  0]
 [-3  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0]]
```
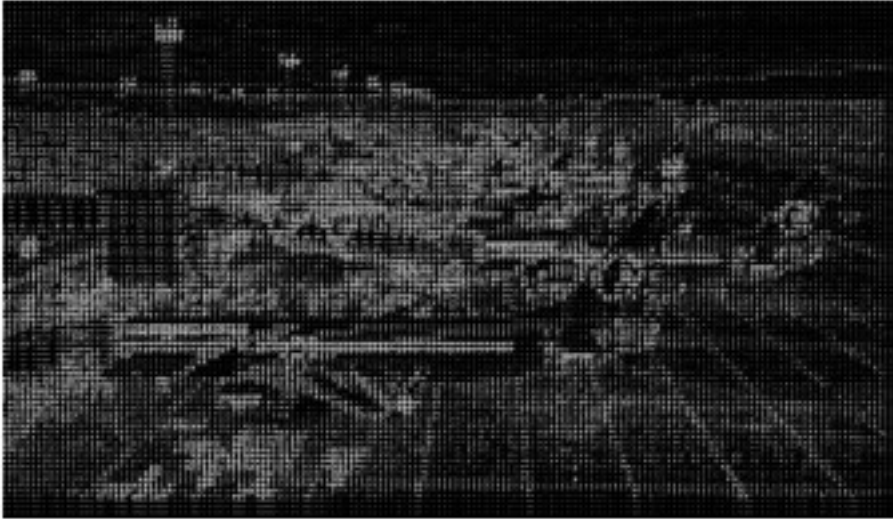
Yb_iDPCM

Cbb_iDPCM

Crb_iDPCM

Yb_iDPCM [8:16, 8:16]

```
[[226  0  0  0  0  0  0  0]
 [ -3  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]
 [  0  0  0  0  0  0  0  0]]
```

Yb_iQ

Cbb_iQ

Crb_iQ

QY

[[8 6 5 8 12 20 26 30]
 [6 6 7 10 13 29 30 28]
 [7 6 8 12 20 28 34 28]
 [7 8 11 14 26 44 40 31]
 [9 11 18 28 34 54 52 38]
 [12 18 28 32 40 52 56 46]
 [24 32 39 44 52 60 60 50]
 [36 46 48 49 56 50 52 50]]

Yb_iQ [8:16, 8:16]

[[1808.   0.   0.   0.   0.   0.   0.   0.]
 [-18.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]
 [0.   0.   0.   0.   0.   0.   0.   0.]]

Yb_iDCT

Cbb_iDCT

Crb_iDCT

Yb_iDCT8x8 [8:16, 8:16]

```
[[222.87916035 222.87916035 222.87916035 222.87916035 222.87916035 222.87916035 222.87916035 222.87916035]
 [223.35427989 223.35427989 223.35427989 223.35427989 223.35427989  223.35427989 223.35427989 223.35427989]
 [224.23218634 224.23218634 224.23218634 224.23218634 224.23218634  224.23218634 224.23218634 224.23218634]
 [225.3792264  225.3792264  225.3792264  225.3792264  225.3792264  225.3792264  225.3792264  225.3792264 ]
 [226.6207736  226.6207736  226.6207736  226.6207736  226.6207736  226.6207736  226.6207736  226.6207736 ]
 [227.76781366 227.76781366 227.76781366 227.76781366 227.76781366  227.76781366 227.76781366 227.76781366]
```
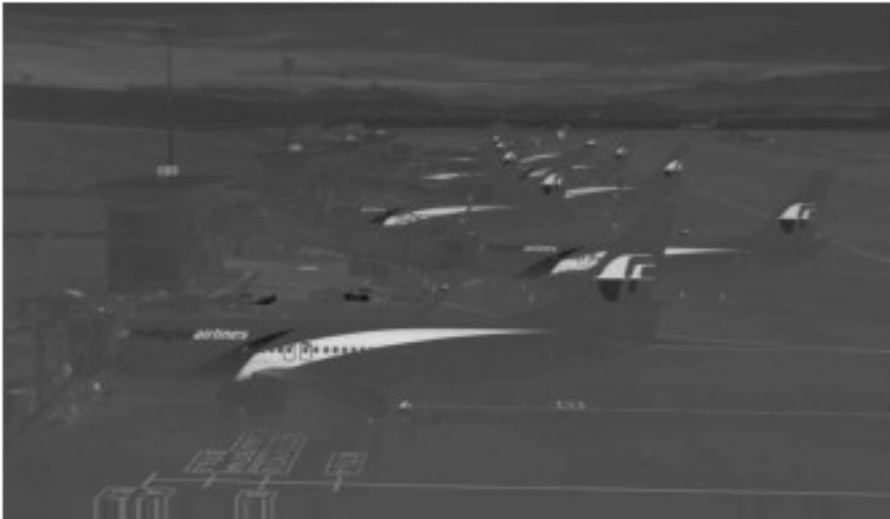
Y upsampling

Cb upsampling
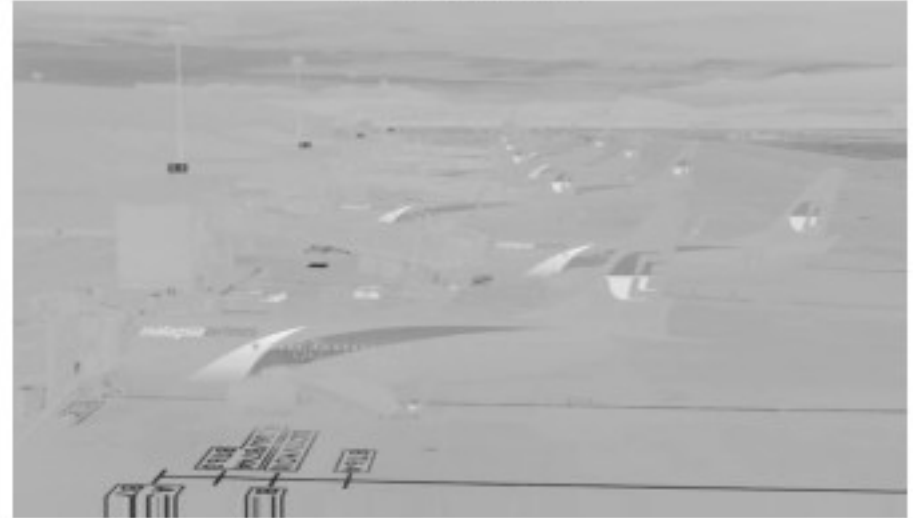
Cr upsampling

Cb_UP [8:16, 8:16]

```
[136.56  136.56  136.56  136.56  136.56  136.56  136.56  136.56 ]
 [136.323 136.323 136.323 136.323 136.323 136.323 136.323 136.323]
 [135.884 135.884 135.884 135.884 135.884 135.884 135.884 135.884]
 [135.31  135.31  135.31  135.31  135.31  135.31  135.31  135.31 ]
 [134.69  134.69  134.69  134.69  134.69  134.69  134.69  134.69 ]
 [134.116 134.116 134.116 134.116 134.116 134.116 134.116 134.116]
 [133.677 133.677 133.677 133.677 133.677 133.677 133.677 133.677]
 [133.44  133.44  133.44  133.44  133.44  133.44  133.44  133.44 ]]
```
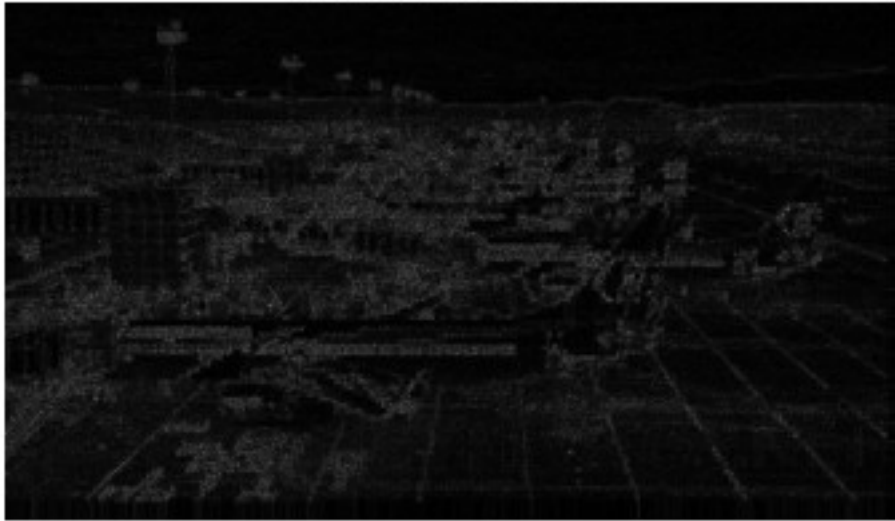
Img Reconstr

R_decoded [8:16, 8:16]

```
[[209 209 209 209 209 209 209 209]
 [210 210 210 210 210 210 210 210]
 [212 212 212 212 212 212 212 211]
 [214 214 214 214 214 214 214 213]
 [216 216 216 216 216 216 216 215]
 [218 218 218 218 218 218 218 217]
 [219 219 219 219 219 219 219 219]
 [220 220 220 220 220 220 220 220]]
```

Imagem diferenças

Erros

Erros no canal Y:

Max diff: 42.59069819768291
Avg diff: 2.6200078911493367

Erros na imagem de 3 canais reconstruída:

MSE = 91.10299012345679
RMSE = 9.544788636918934
SNR = 30.055578935200067
PSNR = 28.53547729528211