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Title   [INVR] IV-PSNR with support for calculations in RGB color space
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Abstract

The document presents a new version of IV-PSNR software, which is able to perform the quality assessment in the RGB color space. Recommendation: * use the IVPSNR software (*rgb* tag) for calculation of IV-PSNR$_{RGB}$ and PSNR$_{RGB}$ in INVR experiments.

1   Quality assessment in the RGB color space

By default, IV-PSNR software assesses the quality in the YCbCr space. However, assessment in the RGB space can be enabled by adding the '-rgb' flag in the commandline. If the RGB mode is enabled, the IV-PSNR software internally converts the YCbCr input sequence to the RGB color space. All the calculations are then performed on RGB pictures.

IV-PSNR software in the RGB mode outputs values of:
- IV-PSNR$_{RGB}$,
- PSNR$_R$, PSNR$_G$, PSNR$_B$, PSNR$_{RGB}$,
- WS-PSNR$_R$, WS-PSNR$_G$, WS-PSNR$_B$, WS-PSNR$_{RGB}$.

If the RGB mode is enabled, the '-cs' argument shall be provided in order to define the original color space of the video sequence. One of color spaces below can be used:
- BT601,
- SMPTE170M,
- BT709,
- SMPTE240M,
- BT2020.

When the RGB mode is enabled, weight for 3 color components should be equal. It is assured by setting parameters '-cws' and '-cwa' to "1:1:1:0" (quotes mandatory).

Other parameters used by the IV-PSNR software did not change and are described in the IV-PSNR 5.0 manual [N0411].

Example of use:
IV-PSNR of *SA_ref.yuv* and *SA_test.yuv*. Sequence resolution is 4096×2048, format: yuv420p10le. Metrics calculated for the first 20 frames will be written into IV-PSNR.txt. Assessment will be performed in the RGB space, weight for all 3 RGB components is the same. Input color space of the YCbCr sequence is BT601.

```
IVPSNR  -i0 SA_ref.yuv  -i1 SA_test.yuv  -w 4096  -h 2048
        -bd 10  -l 20  -o IV-PSNR.txt
        -rgb  -cs BT601  -cws "1:1:1:0"  -cwa "1:1:1:0"
```

or using config file

```
IVPSNR -c RGB.cfg
```

while `RGB.cfg` contains the following content:

```
InputFile0        = SA_ref.yuv
InputFile0        = SA_test.yuv
PictureWidth      = 4096
PictureHeight     = 2048
BitDepth          = 10
NumberOfFrames    = 20
ResultFile        = IV-PSNR.txt
CalcMetricInRGB   = 1
ColorSpace        = BT601
CmpWeightsSearch  = "1:1:1:0"
CmpWeightsAverage = "1:1:1:0"
```

2 Recommendations

We recommend using the IVPSNR software (*rgb* tag) for calculation of IV-PSNR$_{RGB}$ and PSNR$_{RGB}$ in INVR experiments.

3 Acknowledgement