Reduced Reference Original (RR_ORIGINAL) Software Release Version 1.2
Release Notes
September, 2010

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1) Release Contents

The RR_ORIGINAL software was developed by the Institute for Telecommunication Sciences (ITS). RR_ORIGINAL and RR_PROCESSED work together to demonstrate how to process video sequences in an in-service environment (e.g., original and processed video sequences are on separate computers, at different locations). RR_ORIGINAL performs automated processing on original video sequences (e.g., straight from the camera) and produces compressed data that will be used by RR_PROCESSED. This program runs under the Windows operating system on a PC.

2) Package Contents

See CVQM readme file.

3) System Requirements

See CVQM readme file.

4) Technical Support Information

See CVQM readme file.

5) Install/Uninstall Instructions

See CVQM readme file.

6) Operating Instructions

Open a command prompt window by selecting "Start", "Program", "Accessories", "Command Prompt". Change to the c:\CVQM installation directory in step 1 of the Installation Instructions by typing "cd c:\CVQM" at the command prompt.

To start the RR_ORIGINAL software, type "rr_original" at the command prompt.

Execute RR_ORIGINAL with no arguments for syntax and brief operating instructions. See also #10 below for details.

7) Product Release Notes

RR_ORIGINAL and RR_PROCESSED are presented her in the exact form submitted to VQEG for validation. Therefore, this code contains some assumptions and limitations inherent to VQEG's RRNR-TV Test Plan. The models and calibration routines contained herein do not (generally speaking) require these constraints. The constraints on the original video sequences are as follows:

- Original video sequences must be contained in big-YUV formatted video files.
- Original video sequences must be either NTSC (720x486, 30fps, interlaced) or PAL (720x576, 25fps, interlaced).
- Original video sequences must be exactly 8 seconds duration.
- Valid video region assumed to be exactly
  525-line/NTSC: top=21, left=31, bottom=466, right=690
  625-line/PAL: top=21, left=31, bottom=556, right=690
  Thus, this region must contain valid video.

Additionally, this implementation presumes "downstream" monitoring (i.e., the original video information is sent to the processed video, and there exists no mechanism by which information about the processed video can be sent back to the computer that is examining the original video). Thus, the valid region must be constant and cannot be influenced by the processed video sequence's actual valid region. Upstream monitoring (i.e., processed video information sent to the original video location) will require a slightly different implementation. Dual monitoring (i.e., dual direction communication available) allows for greater flexibility.

8) Usage, Copyright, and Patent Information

See CVQM readme file.

9) Use of VQM Numbers in Outside Reporting

See CVQM readme file.

10) Input and Output Arguments

RR_ORIGINAL takes an original test sequences in uncompressed big-YUV file format. This program calculate intermediate data file for NTIA low-bandwidth model (or NTIA fast low-bandwidth model) and reduced reference calibration.

SYNTAX

```
rr_original file_list video_standard model results_log
rr_original file_list video_standard model results_log 'fr'
```

DESCRIPTION

```
'file_list' is a text file containing original and processed file
              names in pairs, one pair on each line.  Paths are okay.
```

```
                Each file must be in big-YUV format.  After the second file
                name, optional (i.e., manual) calibration values may be listed.
                RR_ORIGINAL does not use these values.  See "EXAMPLE LIST".
                Optional calibration values are listed in the following order:
        luma_gain luma_offset horiz_shift vert_shift delay
                luma_gain is luminance gain, double precision
                luma_offset is luminance offset, double precision
                horiz_shift is horizontal shift, integer; positive means
                      processed has been moved right with respect to original
                vert_shift is vertical shift, integer; positive means
                      processed has been moved down with respect to original
                      Odd values mean that the processed video has been reframed
                      (i.e., 1st field in time of original, aligns with 2nd field
                      in time of processed -- i.e., +0.5 frame delay)
                delay is time delay in frames, integer; this value  adjusts
                      the  start frame used by RR_PROCESSED -- it adds "delay" to
                      the 0.8sec starting frame for the processed segment used.
  'video_standard' indicates the frame rate and video size:
    '525'          525-line, 30fps video (720 pixels by 486 rows), "NTSC"
                   Interlaced fields, lower field presented earlier in time
    '625'          625-line, 25fps video (720 pixels by 576 rows), "PAL"
                   Interlaced fields, upper field presented earlier in time
  'model'          The name of the video quality model desired.  Must
                   be one of the following:
    'lowbw'        Low Bandwidth Model
    'fastlowbw'    Fast Low Bandwidth Model, ITU-T Recommendation J.244
    'general'      General Model (FR-TV Phase II), ITU-T Recommendation J.144
    'developers'   Developers Model (approximates the FR-TV Phase II model)

  'results_log' is the prefix (with path) for text files, where results will
                   be written.  If results_log is 'c:\temp\525log', then
                   errors will be appended to 'c:\temp\525log_error.txt'
  'fr'          Optional flag, indicating that "full reference bandwidth" should
                be used for calibration features.  Intended for validation.

Compressed reduced reference calibration and model features will be written to
files named after the original video sequence.  The calibration features will
have "_calibration.mat" appended, in the directory that contains that original
video sequence.  The model features will have "_features.dat" appended, in the
directory that contains the original video sequence.

EXAMPLE CALL:
  rr_original 'list_525.txt' '525' 'lowbw' 'log525'
  rr_original 'list_625.txt' '625' 'fastlowbw' 'log625'
EXAMPLE LIST:
  c:\v525\SRC_08__525.yuv  c:\v525\SRC_08_MPEG2_m2@1000_525.yuv
  c:\v525\SRC_15__525.yuv  c:\v525\SRC_15_v1@3000_525.yuv
  c:\v525\SRC_16__525.yuv  c:\v525\SRC_16_H264_h4@6000_525.yuv 1.01 -3.2 +1 -1 2

RESTRICTIONS:
  All video sequences must be exactly 8-seconds in duration.

  Test plan and model constraints taken together produces a maximum temporal
  segment of 7-seconds for VQM and calibration.  The first 0.8 sec
  and last 0.2s of the original video sequence will be ignored.
  This software assumes valid video for the following region:
     525-line/NTSC: top=21, left=31, bottom=466, right=690
```

625-line/PAL: top=21, left=31, bottom=556, right=690
RRNR-TV test plan constraints demand that the random algorithms use
a pseudo-random sequence (e.g., output the same VQM score when run twice).
This impacts the FastLowbw model and spatial shift registration.