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Application Note:

Snapshot, histogram and compare

Table of Contents

1	<i>Introduction</i>	2
2	<i>Build it under PTXdist</i>	3
3	<i>RAW Image save</i>	4
4	<i>Raw images compare</i>	5
5	<i>Histogram sum</i>	6

1 Introduction

This document describes the software examples for phytec digital camera boards which are included in `bvtest.tar.gz`.

At the following address you can download this file:
`ftp://ftp.phytec.de/pub/ImageProcessing/VM-Series/bvtest.tar.gz`.

Further it explains how to proceed, when building is under PTXdist.

The functions use the v4l2 interface that works with the loaded camera driver.

The following hardware is required:

- Embedded Imaging Kit phyCARD-S (Linux) (KPCA-A-S1-Video-L01)

You can also use:

- A digital camera board phyCAM-S
 - (VM-006, VM-007, VM-008, VM-009 or VM-010)
- Linux-phyCARD-S Plattform
 - phyCARD-S with CAM feature (For Example PCA-A-S1-2101000).
 - 5" Display
 - Basisboard
 - SV-023 Power-Supply

2 Build it under PTXdist

Please copy bvtest.tar.gz in \$BSP and then use "tar xvf \$PATH_TO_ARCHIVE...

Next you need to use PTXdist. Go there in the menuconfig menu.

Here you have to select Project Specific Configuration, and then put the star at bvtest (<*> bvtest).

Finally you need to build.

Now you can use the following features.

3 RAW Image save

save_raw_image [-n „filename.raw“] [-r „Registersettings.txt“] [-f format color]

Save a RAW image file in the maximum image size, is passed by the name of the parameter n. (if no path is passed to the storage, it takes place in the working path).

Input:

- n, name of file to be saved (default = image.raw)
- r, name of registry settings file with the extension TXT. The structure of the file is in the document "Local 052-d_AppNote_Set_Cam_Register.pdf" described (default = no file)
- f, color format should be picked up in the image. Available formats are "gray" (monochrome), "bayer" (bayer pattern, 8-bit), "rgb" (5:6:5, 16-bit) and YUV formats following alternatives are available: "YUYV" "YYUV", "YVYU", "UYVY", "VYUY" (default = monochrome)

Output:

- The return is directly after the call to "echo \$?" queried, 0" is stored in order, "1" or "127" store did not work.

Function:

Opening the loaded camera driver. Request the max. Image size. Processing of the register settings file. Request a picture in max. Image size. Save the image in the RAW file 1:1 (gray / bayer than 8-bits per pixel, yuv rgb / as 16-bit per pixel).

4 Raw images compare

result (string) **compare_raw_image** [-n „filename.raw“] [-m „ filename.raw“] [-f format color]

Input:

- n, the first file name (default = image_ref.raw)
- m, the second file name (default = image.raw)
- f, Available formats are "gray" (monochrome), "bayer" (bayer pattern, 8-bit), "yuv" (4:2:2, 16-bit) and "rgb" (5:6:5, 16 - bits) (default = monochrome)

Output:

- result, "the decimal sum of the single differences of all pixels / color components"

Function:

Check whether file sizes match. Open the files.

Depending on the color format, the individual pixels, or color values are compared:

- Mono pattern, bayer, yuv = difference byte by byte
- Rgb = "rgb_5: 6-5" (16-bit) in "rgb_8: 8:8" convert (24-bit), then one byte difference

Mode (Swap Disabled)	Byte	D7	D6	D5	D4	D3	D2	D1	D0
565RGB	First	R7	R6	R5	R4	R3	G7	G6	G5
	Second	G4	G3	G2	B7	B6	B5	B4	B3

The return value is calculated as the sum of all differences (range 32-bit).

5 Histogram sum

result (string) **histogramsum_raw_image** [-n „filename.raw“] [-w range_1] [-x range_2] [-f format color]

Input:

- n, the first file name (default = image_ref.raw)
- w, range_1 xxx,yyy [0..255], two decimal numbers separated by commas (default = "0,30")
- x, range_2 xxx,yyy [0..255], two decimal numbers separated by commas (default = „215,255“)
- f, color format to be picked up in the image. Available formats are "mono" (monochrome), "bayer" (bayer pattern, 8-bit) and YUV formats, the following alternatives: "YUYV", "YYUV", "YVYU", "UYVY", "VYUY "(default = monochrome)

Output:

- "sum of histogram values in range_1", "Sum of the histogram values in range_2" (Separated with a comma)

Function:

Open the file. Request the screen size.

Calculation of the histogram of the image.

- Gray = light fraction, Y = [0 255]
- bayer pattern = each brightness value RGGb be applied in a histogram, as in gray.
- yuv = Only the luminance component Y is applied = [0 ... 255]. U and V are discarded. Note position of the Y value.
- rgb = convert rgb_5:6:5 (16-Bit) in rgb_8:8:8 (24-Bit), then all the components (RGB) in a histogram.

Finally, the sums for the specified range of values are calculated and outputted as a comma-separated decimal string.