SONY

VIDEO COMMUNICATION SYSTEM-TECHNICAL DOCUMENTATION

BrightFace Technology

IPELA ™

PCSA-CXG80   All

Introduction

The Sony 1/3 type CMOS HD camera designed for exclusive use with the PCS-XG series HD visual communication system is equipped with BrightFace as a standard feature.

BrightFace is a newly developed brightness correction function for real-time processing with HD picture quality.
To improve visibility in scenes with high-contrast lighting, BrightFace technology produces the following effects:

- Increases brightness in underexposed black areas to improve contrast
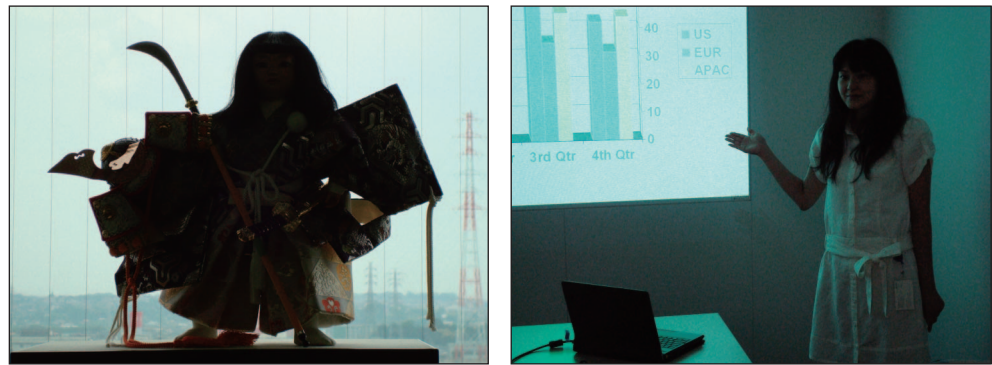- Reduces brightness in overexposed white areas to improve contrast

This document describes the BrightFace technology.
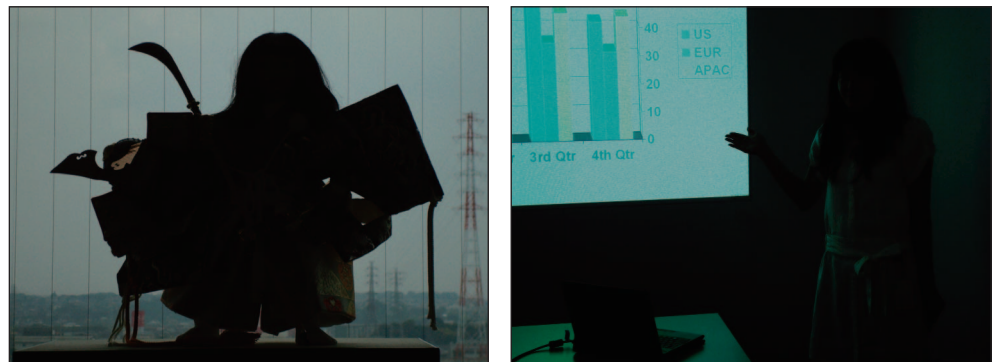
BrightFace Processing

Video cameras generally use lens aperture and AGC (auto gain control) to adjust the brightness of the image in response to the lighting conditions of the shooting environment. However, sometimes these brightness adjustment methods alone are unable to properly handle poor lighting conditions.

Examples of poor lighting conditions include environment that produce extremely high-contrast on the screen such as dark appearance of people nearby windows of meeting rooms under unfavorable backlighting conditions or dimly lit meeting room where projectors are being used (Figure 1).

Fig.1: Brightness Adjustment by existing cameras

Input signal

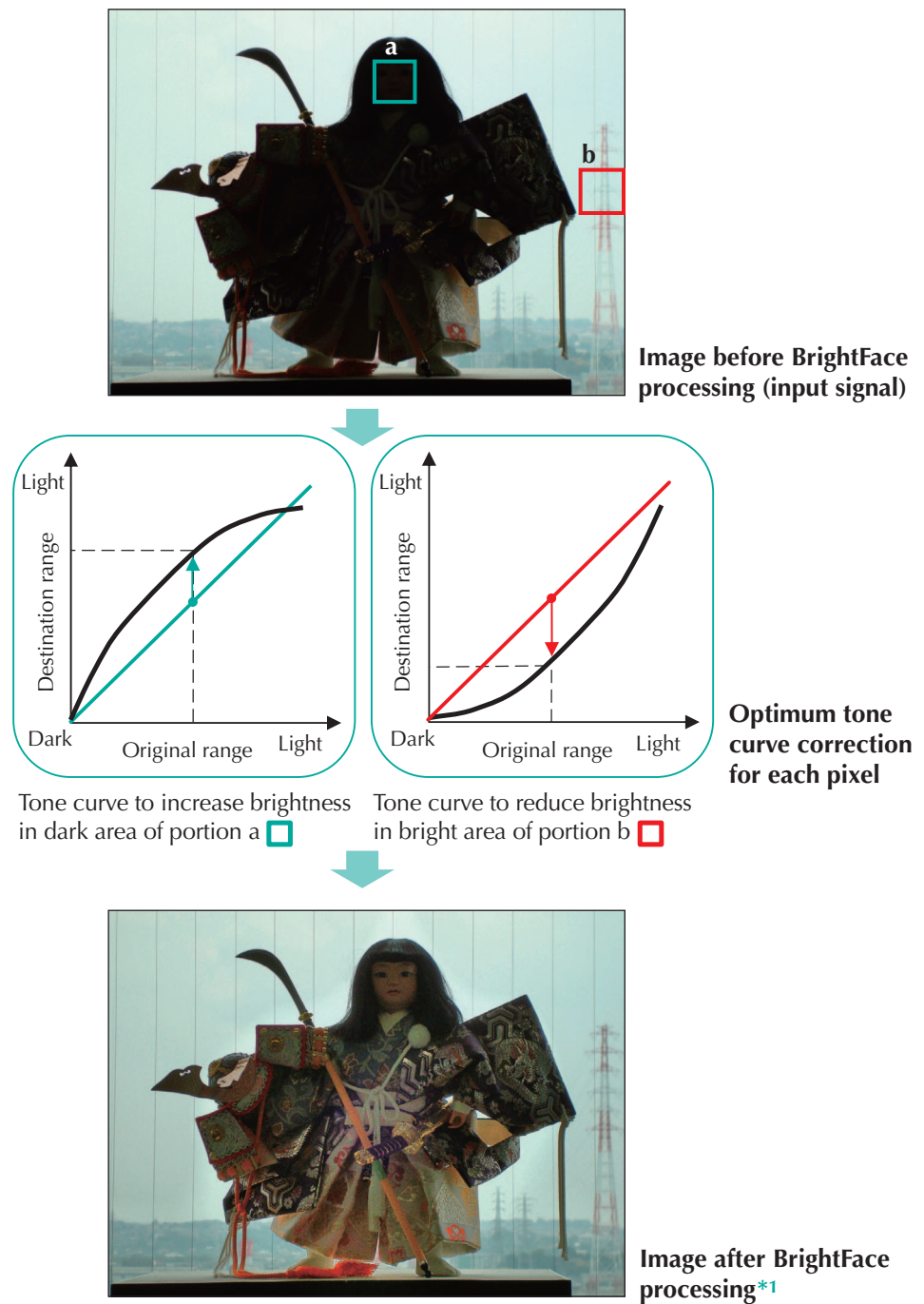**Brightness adjusted to accommodate bright areas (dark area is underexposed)**

Brightness adjusted to accommodate dark areas (bright area is overexposed)

BrightFace Brightness Adjustment

By the BrightFace function, the signal processing module in the video camera analyzes the previous and present frame's input signal and generates an individual tone curve with optimum brightness for every pixel in the image frame. In other words, by increasing the brightness in dark area and reducing the brightness in bright area for every pixel, the optimum luminance is provided to each pixel regardless of the contrast differences in the captured image, resulting in a highly visible overall image (Figure 2).
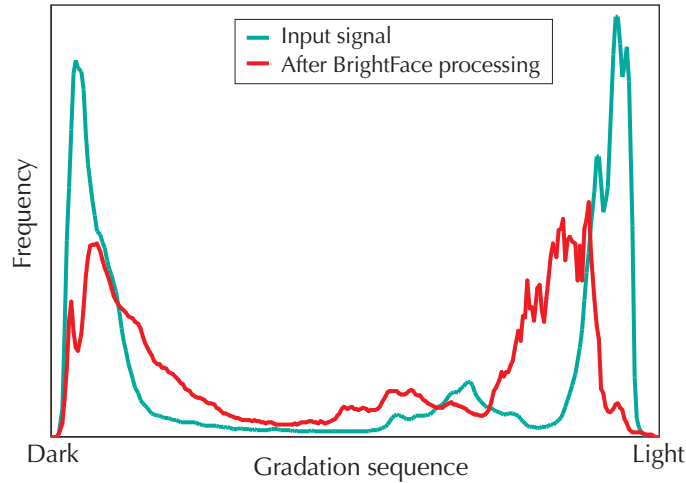
Fig.2: BrightFace Structure

Image before BrightFace processing (input signal)

Tone curve to increase brightness in dark area of portion a ▢

Tone curve to reduce brightness in bright area of portion b ▢

Optimum tone curve correction for each pixel

Image after BrightFace processing*1

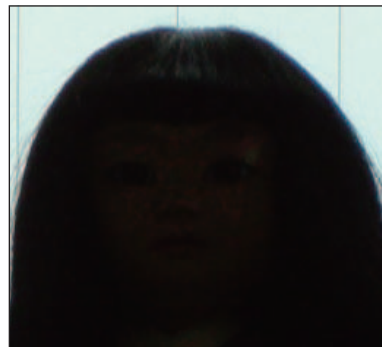*1 This photograph shows a digital camera image that has undergone the equivalent of BrightFace processing.

Figure 3 shows the histograms for the luminance signal from before and after the processing shown in Figure 2. The figure shows that the pre-processed image exhibits strong gradation deviation and low contrast in the bright and dark areas, but the deviation is reduced and gradation is increased after processing, resulting in an image with good luminous efficacy and contrast over a wide gradation range.

Fig.3: Luminance Signal Histogram

Figures 4-1 and 4-2 show enlarged views of the bright areas and dark areas. Contrast and visibility are improved.

Fig.4-1: Enlarged view of dark area   Fig.4-2: Enlarged view of bright area

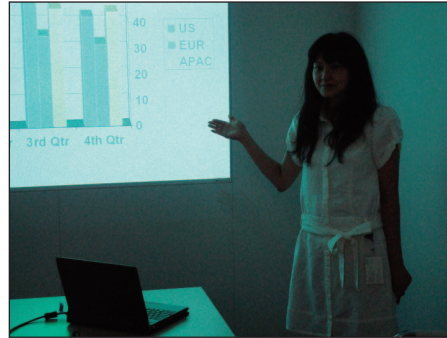**Before processing**

Before processing

After processing

After processing

Figure 5 shows an effect of BrightFace when a projector is used in a dimly lit room. By the effect of BrightFace, less visible expression of the person before BrightFace becomes clear after the process while letters and figures of the documents on the screen are readable without over exposure.

Fig.5

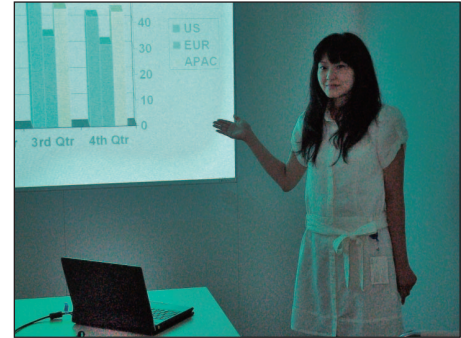**Image before BrightFace processing (input signal)**

Image after BrightFace processing*1

Noise may become visible when you use AGC or BrightFace to increase the gain under poor lighting conditions, such as in dimly lit meeting rooms.
BrightFace technology works along with the noise reduction filter to suppress the amplification of noise by correcting the image after the noise component has been separated from the actual input signal.

BrightFace Parameters

The correction strength can be set to high, medium, low or OFF in the PCS-XG series main unit's "Camera Setup" menu. (The default setting is medium.)
If you are concerned about noise, set the correction strength to a lower level.
If you are not concerned about noise and want to see dark areas more clearly, set the correction strength to a higher level.
You can change the correction strength while viewing the actual camera image.*2

Noise Reduction Filter

The noise correction (suppression) level is adjusted according to the correction level applied to each pixel in AGC or BrightFace.
The correction strength can be set to high, medium, low or OFF in the PCS-XG series main unit's "Camera Setup" menu. (The default setting is medium.)
You can change the correction strength while viewing the actual camera image.*2

With these features, BrightFace technology automatically adjusts the brightness and contrast in real-time by identifying the dark and bright areas in the captured image, increasing the brightness in dark areas and reducing the brightness in overexposed white areas. The correction strength can also be changed in the menu, so the adjustment can be optimized for each environment in addition to reducing noise and there is virtually no delay.
In other words, BrightFace technology enables clear and pleasant visual communication with no delay, even in rooms with unfavorable backlighting from bright windows or when using projectors in a dimly lit room. BrightFace technology is a suitable function for every videoconference system.

*2 Supported at ver.2.0 or later
IPELA and BrightFace are trademarks of Sony Corporation.

SONY