

FEATURES

For the most current version visit www.visionresearch.com
Subject to change Rev Feb 2012

INTRODUCTION:

This Image Search feature is extremely useful in reducing the time it takes to locate an event of interest that, in some cases, may be difficult to find within a recording by manual search. This feature can be used to search through a cine stored in the camera's DRAM, attached CineMag, or cine files that have been previously saved.

The goal is to find an image change in the recording, based on the difference between image content, triggered by the change of a certain percentage of the pixels. A pixel is considered changed if its value in the current image is different from the value in the reference image by an amount called threshold. This allows the search to tolerate a certain amount of image noise.

Besides image content changes, Image Search can look for images that are tagged as event images based on a change in the Event binary input signal.

In addition, of course, one can jump directly to the first image recorded after the camera was triggered (Image 0).

GENERAL OPERATION:

The Image Search feature utilizes two methods, or algorithms, to discover the image change, based on image differences or correlation.

The Difference Method compares the difference between two images to calculate the image's, user-specified, modified area called the Change Area. A pixel is considered modified when the difference between its values in the two images is greater than a Threshold value, which is also user defined.

The Correlation Method is based on the Normalized Cross Correlation (NCC) coefficient between two images. NCC has values between 0.0 and 1.0. This coefficient measures image similarity. When NCC is 1.0, the current image matches exactly the reference image. The stop condition is NCC being below a threshold. To have a parameter similar to first case we define the image difference as: $(1 - \text{NCC}) \times 100\%$. When the difference between two images is greater than this value a stop condition will be generated.

The search results are based on the following user-specified parameters:

- **Threshold** – the amount a pixel value must change in order to be counted as a changed pixel. The value is calculated as a percentage from the maximum possible pixel value. A higher value for this parameter is useful for noisy images. 8-bit images require a higher threshold than 16-bit images.
- **Changed area** – the percentage of image pixels that must change in order to recognize an image change and generate a player stop condition.

Image Search

IMAGE SEARCH APPLICATIONS:

Applications that benefit most from Image Search include:

- Lightning Studies
- Explosive tests
- Troubleshooting high-speed machinery
- Any environment where the event of interest maybe difficult to locate within a cine.

FEATURES

Image Search

- Search step – the difference between the image numbers to be compared when running the search. This parameter helps to accelerate the search by processing fewer images.
- Incremental search – if disabled, unchecked, the search is done by comparing the current image with the reference image, the image that was displayed when you initiated the search.

If enabled, the comparison will be done between the current image and the previous image, (separated by the step increment).

HOW TO USE IMAGE SEARCH:

Image search is used in conjunction with the cine player. Instead of displaying every image of the cine in one direction or another, you have the option to skip directly to an image change.

The following procedure describes the steps necessary to utilize Image Search:

1. Start the PCC (Phantom Camera Control) application.
2. Open the cine or cines to be searched.
3. Click on the Play Control Panel>Image Search selector to set the search parameters within a cine if you want to search for an image change.
4. Right mouse-click on the Play button to search forward through the file, or the Rewind button to search through the file backwards, then
5. Select:
 - a. Skip To Image Change to get to the image that contains the change according to the search conditions you have set.
 - b. Skip to Event and then one of these three options:
 - 1) Event 0 to get to the next image marked with “E” at the end of the image time field. This means the camera received an active low signal on Event In input of the Capture connector during the recording of that image;
 - 2) Event 1 to get to the next image that is not marked with “E” at the end of the image time field. This means that the image received no event on Event In input of the Capture connector;
 - 3) Event Change to get to the next image with the Event value changed from zero to 1 – no event - or from 1 to zero – event in.
6. To manually stop the search process, click on the Pause button.

Focused

Since 1950, Vision Research has been shooting, designing, and manufacturing high-speed cameras. Our single focus is to invent, build, and support the most advanced cameras possible.



AMETEK®
MATERIALS ANALYSIS DIVISION

100 Dey Road
Wayne, NJ 07470 USA
+1.973.696.4500
phantom@visionresearch.com

www.visionresearch.com