

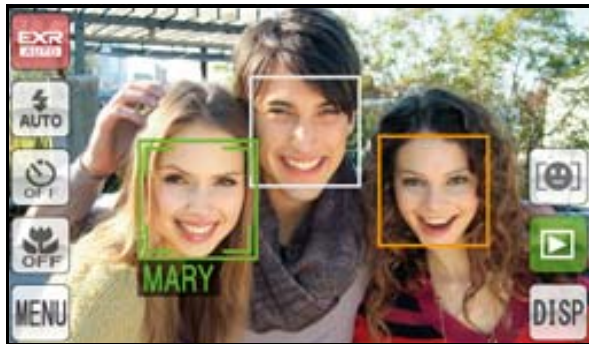
Face Detection and Tracking in Digital Still Cameras

by John S. Butterworth, May 2010

Overview

We take more photographs of family and friends than anything else. To make this easier, camera manufacturers have developed sophisticated face detection and tracking. Coupled with continuous automatic focusing (Canon's "Servo AF") and continuous shooting mode, your chances of taking successful photos of active subjects such as children are much improved.

Recent advances have made individual face registration, naming and priority ranking possible, so that your loved one can now be the true focus of your attention every time you pick up your camera. Some cameras include a "Baby" mode to make baby face recognition and tracking easier.



Display showing recognition of three faces with naming and priority ranking (Fujifilm Corp.)

Even pet faces can be recognized by some cameras made by Fujifilm Corporation, with about forty dog breeds and twenty cat breeds identifiable (with some limitations) as "dog face" or "cat face."

Face Detection Technology

The following three photographs show what happens when you have face ID activated and a subject crosses the frame from right to left. A face-detect frame appears around the face and tracks the subject.



As the subject walks through the frame, the face ID box is displayed. This is about the minimum face size in the frame for successful ID.

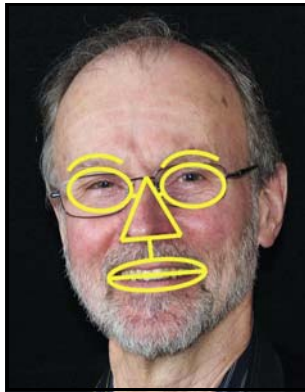


The ID box tracks the subject and increases in size.



The ID box will become a green square when the release is partially depressed and focusing is acquired.

When face detection is active, the auto-focusing and auto-exposure systems link to a special microprocessor which scans the image



Elements of feature detection (Tessera)

to identify areas that have the pattern of human faces, including leading elements such as eyebrows, eyes, nose and mouth, placed in the correct arrangement. Early algorithms could only detect full-frontal faces in the normal orientation, but re-

cent algorithms can detect faces even in semi-profile and in almost any orientation. Up to ten faces can be identified by some cameras. In the absence of ranking, the photographer can select the face which will be the focusing and exposure target.

Obviously, face detection can only work on cameras which provide a “live view” on an LCD display or electronic viewfinder. For this reason it has been limited to mostly non-reflex cameras. The current exception is the Nikon D90 DSLR which can provide detection of up to five faces when used in “live view” mode.

Advanced Systems

Some Panasonic cameras (in particular the ZS3) will automatically prompt you to register a face after you have photographed it several times. You can register details about the person, such as birth date, and have a special symbol displayed when the person is detected in the image. Some of this information can be included in prints.

Up to fifteen faces can be detected.

In playback mode, you can choose to view only images that contain the registered face. The detection system can also remove unwanted red-eye.

“Quick AF tracking,” not requiring the release to be depressed, can be used to lock onto any subject and to keep it in focus when it moves, making spontaneous in-focus shots easier to achieve.

The soon-to-be-introduced Panasonic G2, a leading example of the micro-four-thirds system, even adds touch-screen convenience, enabling target designation and tracking by just touching its image on the LCD screen.

Conclusions

I hope that this brief overview of just one area of the application of digital technology to photography will give you some idea of the huge potential of non-reflex “live view” cameras. This is an area of intense development by the leading camera manufacturers. In addition to the micro-four-thirds system introduced by Olympus and Panasonic about 18 months ago, manufacturers such as Sony Corp. are now introducing hybrid cameras such as their Nex-3 and Nex-5 which are very small and yet use the same APS-C size sensor which is used in most DSLRs. Likewise, Samsung has introduced its NX-10.

DSLRs are an awkward pairing of optically and mechanically complex systems left over from the days of film, with cutting-edge electronics. Their bulk and the difficulty of incorporating the latest digital technology means that they will likely be gradually phased out as the quality of alternatives improves.

Further Reading

Tessera Corp. Application Note, Sept. 2009: *Evaluating Face Tracking Solutions for Digital Still Cameras and Camera-Enabled Cell Phones*. Available from:

http://www.tessera.com/technologies/imagingandoptics/Documents/Tessera_Face_Tracking_App_Note_09.2009.pdf

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