FaceReader Masterclass

Questions & answers

Lighting conditions and camera position

Camera position

It is important to place the camera at a location that will give the steadiest frontal view of the subject's face throughout the experiment. The ideal position for the camera is directly in front of the test participant.

If the subject faces a computer screen, place the camera either directly above or directly below the screen. When placing the camera on top of the monitor, try to position it slightly below eye level, either by raising the chair and/or by lowering the monitor.

When placing the camera below the monitor, lower the chair to position the camera slightly below eye level. The classification output may have a small bias towards 'angry' when the camera is placed on top of the monitor and a small bias towards 'surprised' when the camera is placed below the monitor. This is due to the fact that people tend to tilt their head when showing these emotions. If that is a problem, you can compensate for it by calibration.

Camera settings

It is important to adjust your camera to provide images with a good contrast and brightness. You can adjust the contrast and brightness by adjusting the hardware settings using the software provided by the manufacturer of your camera.

When adjusting your hardware settings, do not pay attention to the lighting of the background. Focus only on the face area of the image and ignore a very light or very dark background.

The images below show a good quality image, and two images in which one image is too bright, and the other one has too little contrast.


Light conditions

A good lighting setup is vital to get a good image. Diffuse frontal and natural lighting are desirable. The light intensity or color is less relevant.
Avoid strong shadows or reflections. If possible, place the FaceReader setup in front of a window. Make sure to blind any windows to the sides or behind the subject. Lights from the ceiling, common in most buildings, will produce shadows below the eyebrows and nose.

In situations in which you cannot control the interior lighting, use stronger lights (e.g., professional photo lights) to negate the effect of other, undesirable, light sources. You can also use (near) infrared light, in combination with a camera that is sensitive to this type of light.

Face coverage

FaceReader 10 is quite tolerant for parts of the face being covered with hands, glasses or facial hair. The facial analysis algorithm simply uses the parts of the face that are visible. FaceReader also has some tolerance for the participant not directly facing the camera.

Default values for Pitch (participant looking up or down) and Yaw (participant looking left or right) are +30 and -30 degrees. You can change these values to change the tolerance for the face model to be rejected.
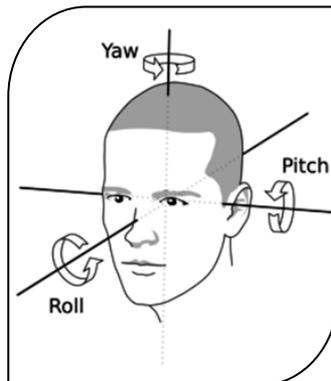
Gaze tracking in FaceReader

Gaze tracking in FaceReader is not the same as eye tracking. Gaze tracking classifies whether the test participant looks left, forward or right, while taking the head orientation into account.

The output is one of nine gaze directions: Left, Left-Up. Left-Down, Right, Right-Up, Right-Down, Up, Down and Forward. In addition, the gaze angle of the eyes can be logged and visualized (Horizontal gaze angle and Vertical gaze angle).

Voice analysis

The voice analysis functionality enables you to analyze vocal characteristics. FaceReader can currently detect the following emotions in a voice: Neutral, Happy, Sad, Angry. The software was trained and tested using British and American English data, both acted and at natural speed. Preliminary tests show potential applicability to other languages, particularly those with close linguistic and cultural similarities.

The voice analysis functionality employs Voice Activity Detection (VAD) based on a Gaussian Mixture Model (GMM) to distinguish between speech and non-speech segments. If there is noise in the audio signal this will be analyzed as well. An audio buffer is used to collect approximately one second of data before starting the analysis because audio (unlike video) cannot be segmented into discrete frames.

Using a high-quality microphone and limiting background noise is recommended to improve the accuracy of the voice analysis. Furthermore, it might be necessary to adjust the microphone's sensitivity to achieve the best results.

Please note that you cannot combine the voice analysis functionality with Baby FaceReader and you cannot analyze emotions in voices in a multi-subject analysis.

Voice analysis classifies Neutral from Voice, Happy, Sad and Angry as well as for Valence, Arousal, Loudness, and Speech rate.

Each expression has a value between 0 and 1, indicating the intensity of the expression. '0' Means that the expression is not detected in the voice, '1' means that it is maximally present. Arousal, Loudness and Speech rate also have a value between 0 and 1. Valence from Voice has a value between +1 and -1.

FaceReader features

The following features in FaceReader are only activated when you purchased the corresponding package:

- Project Analysis
- Action Units
- Vital Signs
- Consumption behavior
- Voice analysis
- Webcam-based eye tracking
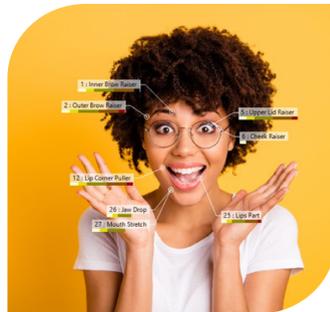
More information about the packages

Upgrade to FaceReader 10

When you have an active NoldusCare contract you are entitled to a free upgrade to FaceReader 10. When in doubt about the status of your NoldusCare contract, please go to your MyNoldus account to get an overview of all your licenses and their NoldusCare status.

In MyNoldus you can also download Noldus software, relevant documentation and get access to our Noldus Academy learning platform. Please note that access to the Noldus Academy learning platform is only possible with active NoldusCare.

To try out FaceReader 10, please contact your account manager or Noldus representative to request a free trial.

FaceReader integration with eye-tracking software

There is no direct integration possible of FaceReader with eye-tracking software. You can use Noldus' The Observer as an integration and synchronization tool.

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Heart rate (rPPG) measurement

Remote photoplethysmography is a simple and low-cost optical technique that can be used to detect blood volume changes in the tissue under the skin. It is based on the principle that changes in the blood volume result in changes in the light reflectance of the skin. With each cardiac cycle the heart pumps blood to the periphery. Even though this pressure pulse is somewhat damped by the time it reaches the skin, it is enough to distend the arteries and arterioles in the subcutaneous tissue.

FaceReader can detect the change in blood volume caused by the pressure pulse when the face is properly illuminated. The amount of light reflected is then measured. When reflectance is plotted against time, each cardiac cycle appears as a peak. This information can be converted to heart rate average and variability.

Remote PPG accuracy is affected by skin color. Individuals with darker skin tones (higher melanin concentration) tend to have lower signal-to-noise ratios (SNR), resulting in higher error rates in heart rate compared to lighter skin tones.

Custom expression (for example pain)

Custom Expressions are facial expressions/states that you can define yourself by combining the facial expressions and Action Units that FaceReader can recognize by default (Neutral, Happy, Sad, Angry, Surprised, Scared, Disgusted and Contempt and the 20 Action Units).

You can, for instance, define 'Duchenne smile' as a Custom Expression by combining Action Unit 6 and 12. You can also use Valence, Arousal, Head Orientation, Head Position, Gaze Angles, Landmarks, Heart Rate, Heart Rate Variability, Expressions in the voice, and Model quality in your definition of a Custom Expression.

For example, to be able to create a custom expression for pain, you first need to know, based on previous research, which action units or other FaceReader variables are potentially involved.

FaceReader and API

With FaceReader, an Application Programming Interface (API) is included. This API allows you to analyze images or videos with FaceReader on one computer and send the logged data to an application on another computer.

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