Eye Movement Data Recorded Using EOG Under Stationary Head Pose Conditions

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1 Experimental Paradigm

This dataset comprises electrooculography (EOG) data recorded from ten healthy participants (5 males and 5 females; mean age 24.8±3.9 years), having normal or corrected-to-normal vision. The adopted eye movement data acquisition protocol was approved by the University Research Ethics Committee (UREC) at the University of Malta and each subject provided their informed consent before each recording session. Subjects were seated approximately 60 cm away from a 24-inch LCD monitor, with their head held immobile using ophthalmic chin and forehead rests.

Subjects were asked to fixate their point of gaze (POG) on the highlighted cue that was shown at different positions on the screen. Specifically, a number of 4 s trials as shown in Figure 1 were recorded. At the beginning of a given trial j, the cue was displayed at position P_{1_j} and after one second it was moved to a different position P_{2_j} for another second. Then the colour of the cue was changed for two seconds to instruct the subject to perform a blink. Therefore, in a given trial j, the user is instructed to perform (i) a saccade from $P_{2_{j-1}}$ to P_{1_j} during the first one-second interval, (ii) a saccade from P_{1_j} to P_{2_j} during the next one-second interval, and (iii) a blink in the last two-second interval of the trial. The initial target position P_{2_0} was set to the centre of the screen, whereas all the other positions P_{1_j} and P_{2_j} were random, as shown in Figure 1. A total of 200 trials were recorded for each subject.

The corresponding eye movements were recorded using a standard EOG setup. Specifically, the electrode configuration comprised of four electrodes ('E_1', 'E_2', 'E_3' and 'E_4') including a ground ('G') and a reference ('R') electrode that were attached as shown in Figure 2. The EOG signals were recorded using the g.tec g.USBamp bio-signal amplifier

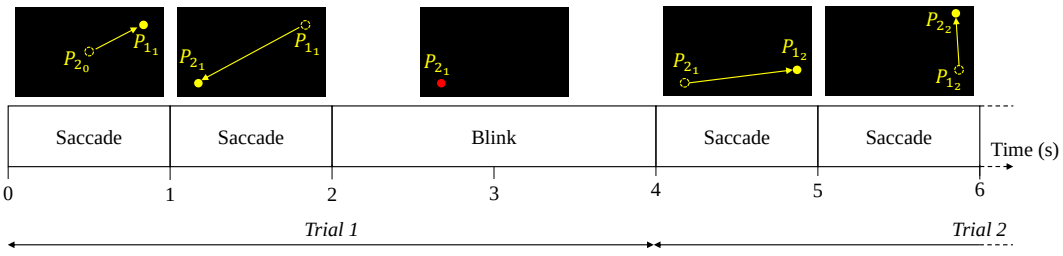

Figure 1: Trial timing scheme.

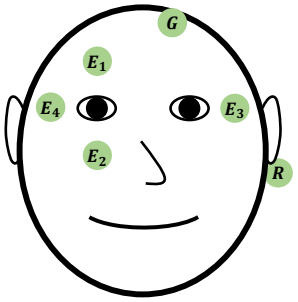

Figure 2: EOG electrode configuration.

(g.tec medical engineering GmbH, Austria) with a sampling frequency, $F_s = 256$ Hz. The recorded data was filtered using a bandpass filter between 0-30 Hz and a 50 Hz notch filter was also applied.

2 Data Format

The data is provided in `MATLAB` (`*.mat`) format. The data recorded for each subject X is provided in separate folders, which are named `SX`. In each folder, the following files are provided:

- `EOG.mat`: This stores the recorded monopolar EOG signals. Specifically, the first row comprises the EOG signal recorded by electrode E_1, the second row comprises the EOG signal recorded by electrode E_2, etc.
- `ControlSignal.mat`: This file stores a control signal, of the same size as `EOG.mat`, where each sample contains a value, '1', '2' or '3', which identifies whether that particular sample corresponds to the first one-second interval of the trial ('1'), the second one-second interval of the trial ('2'), or the last two-second interval of the trial ('3').
- `Target_GA_stream.mat`: This file contains the gaze angles corresponding to the target cues on the screen that were shown to the user at each time sample. Specifically, the horizontal gaze angles are in the first row and the vertical gaze angles are in the second row, both in degrees. The reader is directed to the article whose citation may be found in Section 3 below for the definition of the horizontal and vertical gaze angles.
- `PD.mat`: This file contains the inter-pupillary distance of the subject, in metres.
- `Dist_screen.mat`: This file contains the distance of the subject from the screen, in metres.

3 Reference

N. Barbara, T. A. Camilleri, and K. P. Camilleri, "Part 1: Real-Time Continuous EOG-based Gaze Angle Estimation with Baseline Drift Compensation Under Stationary Head Conditions," *Biomedical Signal Processing and Control*.