

Eye Movement EOG Data Description

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1 Experimental Paradigm

This dataset comprises electrooculography (EOG) data recorded from six healthy participants (2 males and 4 females; mean age 24.7 ± 3.1 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 before each recording session, each subject provided their informed consent. Subjects were seated 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 a highlighted cue on the screen. Specifically, a number of 4 s trials as shown in Figure 1 were recorded, wherein the subject was asked to perform a saccade originating from the centre of the screen to a random target location in the first 1 s. This was followed by the corresponding return movement towards the centre of the screen in the next 1 s, and a blink in the last 2 s of each trial. A total of 300 such trials were recorded for each subject, in three separate sessions, specifically with 100 trials being recorded in each session. Intermittent breaks were provided in between sessions.

The corresponding eye movements were recorded using a standard EOG setup. The electrode configuration adopted is shown in Figure 2 where two electrodes were placed adjacent to the lateral canthi while another pair was placed above and under the right eye, as shown. A ground ('G') and a reference ('R') electrode were also attached on the forehead and on the mastoid behind the left ear respectively. The EOG signals were recorded using the g.tec g.USBamp bio-signal amplifier (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. The EOG potential differences between the

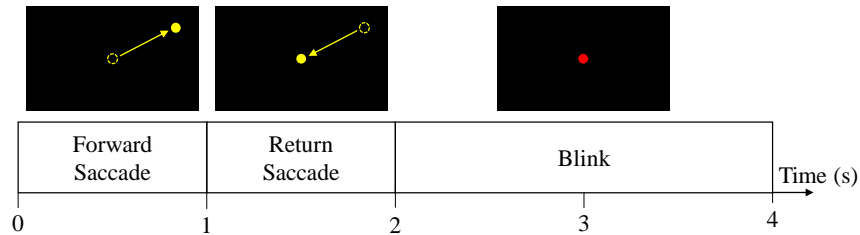


Figure 1: Timing scheme of one trial.

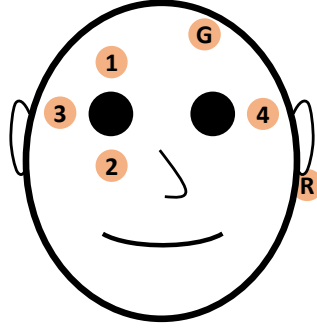


Figure 2: EOG electrode configuration.

horizontally-aligned and vertically-aligned electrodes were then computed to yield what are generally referred to as the horizontal and vertical EOG signal components, $EOG_h(t)$ and $EOG_v(t)$ respectively:

$$EOG_h(t) = V_3(t) - V_4(t) \quad (1)$$

$$EOG_v(t) = V_1(t) - V_2(t) \quad (2)$$

where $V_1(t)$, $V_2(t)$, $V_3(t)$ and $V_4(t)$ denote the EOG potential recorded by electrodes 1-4 in Figure 2.

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 horizontal and vertical EOG component data. Specifically, the first row comprises the horizontal EOG component, whereas the second row comprises the vertical EOG component.
- `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 a forward saccade ('1'), return saccade ('2') or blink ('3').
- `TargetGA.mat`: This file contains the horizontal (1st column) and vertical (2nd column) absolute target gaze angles for each saccade, in degrees.

3 Reference

N. Barbara, T. A. Camilleri, and K. P. Camilleri, "A comparison of EOG baseline drift mitigation techniques," *Biomedical Signal Processing and Control*, vol. 57, Mar. 2020. doi: <https://doi.org/10.1016/j.bspc.2019.101738>