# The Classification of Electrooculography Signals: A Significant Feature Identification via Mutual Information

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**ABSTRACT**

Stroke is currently known as the third most frequent reason for disability worldwide where the quality of life of its survivors in terms of their daily functioning is seriously affected. Brain-Computer Interface (BCI) is a system that can acquire and transform brain activity into readable outputs. This system is particularly beneficial to the people who encounter physical challenges in carrying out their daily life as the BCI outputs can be applied to BCI-based assistive devices. One of the BCI inputs that are frequently used is the Electrooculography (EOG) signal. EOG signal is the electrical voltage emitted from the movement of our eyeballs. This study aims to extract and identify significant statistical-based time-domain features based on the EOG signals acquired that would facilitate the classification of EOG movements via Support Vector Machine (SVM). The EOG signals were obtained via BioRadio. Five healthy subjects that ranged between 22 and 30 years old were involved in the EOG data acquisition. A total of 7 statistical time-domain features, namely, mean, standard deviation, variance, median, minimum, maximum, and standard error mean were extracted from all four BioRadio channels. The Mutual Information (MI) feature selection technique was employed to identify significant features. The 70:30 hold-out cross-validation technique was used in the study. It was demonstrated from the present investigation that an excellent comparable classification on both train and test dataset is attainable even by utilising the identified features. The findings further suggest the possible application of neurorehabilitation owing to the reduced computational expense resulting from the reduced feature set.

**KEYWORDS**
Electrooculography (EOG); Eyeball movement; Brain-computer interface (BCI); Time-domain features; Machine learning; Feature selection; Classification

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