

Accepted Manuscript

Codebook-based electrooculography data analysis towards cognitive activity recognition

P. Lagodzinski, K. Shirahama, M. Grzegorzek

PII: S0010-4825(17)30352-9

DOI: [10.1016/j.combiomed.2017.10.026](https://doi.org/10.1016/j.combiomed.2017.10.026)

Reference: CBM 2819

To appear in: *Computers in Biology and Medicine*

Received Date: 11 April 2017

Revised Date: 18 October 2017

Accepted Date: 23 October 2017

Please cite this article as: P. Lagodzinski, K. Shirahama, M. Grzegorzek, Codebook-based electrooculography data analysis towards cognitive activity recognition, *Computers in Biology and Medicine* (2017), doi: [10.1016/j.combiomed.2017.10.026](https://doi.org/10.1016/j.combiomed.2017.10.026).

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Codebook-based Electrooculography Data Analysis towards Cognitive Activity Recognition

P. Lagodzinski^{a,*}, K. Shirahama^{b,**}, M. Grzegorzec^{a,**}

^a*Department of Knowledge Engineering, University of Economics in Katowice,
Bogucicka 3 Str., 40-226 Katowice, Poland*

^b*Pattern Recognition Group, University of Siegen,
Hoelderlinstr. 3, 57076 Siegen, Germany*

Abstract

With the advancement in mobile/wearable technology, people started to use increasingly a variety of sensing devices to track their daily activities as well as health and fitness conditions in order to improve the quality of life. This work addresses an idea of eye movement analysis, which due to the strong correlation with cognitive tasks can be successfully utilized in activity recognition. Eye movements are recorded using an electrooculographic (EOG) system built into the frames of glasses, which can be worn more unobtrusively and comfortably than other devices. Since the obtained information is low-level sensor data expressed as a sequence representing values in constant intervals (100Hz), the cognitive activity recognition problem is formulated as sequence classification. However, it is unknown what kind of features are useful for accurate cognitive activity recognition. To overcome this, a codebook approach is adopted where the sequences of recorded EOG data are described by the distribution of characteristic subsequences – codewords, obtained by clustering a large number of subsequences. Further, statistical analysis of the codeword distribution results in discovering features which are characteristic to a certain activity class. Experimental results demonstrate good accuracy of the codebook-based cognitive activity recognition reflecting the effective usage of the codewords.

Keywords: Ambient assisted living, Cognitive activity recognition, Electrooculography (EOG), Sequence classification, Codebook approach

*Principal corresponding author

**Corresponding author

Email addresses: przemyslaw.lagodzinski@ue.katowice.pl (P. Lagodzinski),
kimiaki.shirahama@uni-siegen.de (K. Shirahama), marcin.grzegorzec@ue.katowice.pl
(M. Grzegorzec)

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات