LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel)	:	An artifact-free thyroid shield in CT examination: a phantom study		
Jumlah Penulis	:	9 orang		
Status Pengusul	:	~~Penulis pertama~~/ Penulis ke-6/ ~~Penulis Korespondesi~~ **		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Biomedical Physics & Engineering Express
		b. Nomor ISSN	:	2057-1976
		c. Volume, Nomor, Bulan, Tahun	:	Vol. 6 , No. 1, Januari 2020
		d. Penerbit	:	IOP Publishing
		e. DOI artikel (jika ada)	:	http://dx.doi.org/10.1088/2057-1976/ab6ed1
		f. Alamat web jurnal	:	https://iopscience.iop.org/article/10.1088/2057-1976/ab6ed1
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Total = (100%)			38
Nilai untuk Pengusul : (40% x 38) / 8 = 1,9			

Semarang, 26 Mei 2022

Reviewer 1	Reviewer 2
Prof. Dr. Drs. Wahyu Setia Budi, M. S.	Prof. Dr. Kusworo Adi, S.Si., M.T.
NIP. 195806151985031002	NIP. 197203171998021001
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Semarang, 26 Mei 2022
Reviewer 1

Prof. Dr. Drs. Wahyu Setia Budi, M. S.
NIP. 195806151985031002
Unit Kerja : Fisika
Bidang Ilmu: Fakultas Sains dan Matematika

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2. **Ruang lingkup dan kedalaman pembahasan:**
   Paper ini membahas studi tentang pengurangan dosis dan kualitas gambar yang dihasilkan dari pelindung tiroid sintetis baru dari bahan komposit karet silikon (SR)-timbal (Pb), yang dibandingkan dengan kertas tungsten (WP) dan pelindung tiroid Radibabarrier pada pemeriksaan CT organ leher. Penggunaan pelindung tiroid SR-Pb dapat mengurangi dosis tiroid. Pengurangan dosis meningkat dengan meningkatnya persentase Pb.
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Semarang, 7 Juni 2022
Reviewer 2

Prof. Dr. Kusworo Adi, S.Si., M.T.
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An artifact-free thyroid shield in CT examination: A phantom study

Sutanto, Heri[a] ; Irdawati, Yulia[a]; Anam, Choirul[a]; Fujibuchi, Toshioh[b]; Dougherty, Geoff[c]; Hidayanto, Eko[a]; Arifin, Zaenal[a]; Soedarsono, Johny Wahyuadi[d]; Bahrudin[e]

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Abstract

This study was to evaluate dose reduction and resulting image quality of a new synthetic thyroid shield based on silicon rubber (SR)-lead (Pb) composites and compare to tungsten paper (WP) and a Radibabarrier thyroid shields in CT examination of the neck. The synthetic SR-Pb thyroid shield had a Pb percentage from 0 to 5 wt% and a thickness of 0.6 cm. Scanning on the neck of an anthropomorphic

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PAPER

Classification of left and right foot kinaesthetic motor imagery using common spatial pattern

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Keywords: common spatial pattern (CSP), filter bank common spatial pattern (FBCSP), kinaesthetic motor imagery (KMI), brain-computer interface (BCI), supervised machine learning, EEG

Abstract

Background and objectives: Brain-computer interface (BCI) systems typically deploy common spatial pattern (CSP) for feature extraction of *mu* and *beta* rhythms based on upper-limbs kinaesthetic motor imageries (KMI). However, it was not used to classify the left versus right foot KMI, due to its location inside the mesial wall of sensorimotor cortex, which makes it difficult to be detected. We report novel classification of *mu* and *beta* EEG features, during left and right foot KMI cognitive task, using CSP, and filter bank common spatial pattern (FBCSP) method, to optimize the subject-specific band selection. We initially proposed CSP method, followed by the implementation of FBCSP for optimization of individual spatial patterns, wherein a set of CSP filters was learned, for each of the time/frequency filters in a supervised way. This was followed by the log-variance feature extraction and concatenation of all features (over all chosen spectral-filters). Subsequently, supervised machine learning was implemented, i.e. logistic regression (Logreg) and linear discriminant analysis (LDA), in order to compare the respective foot KMI classification rates. Training and testing data, used in the model, was validated using 10-fold cross validation. Four methodology paradigms are reported, i.e. CSP LDA, CSP Logreg, and FBCSP LDA, FBCSP Logreg. All paradigms resulted in an average classification accuracy rate above the statistical chance level of 60.0% ($P < 0.01$). On average, FBCSP LDA outperformed remaining paradigms with kappa score of 0.41 and classification accuracy of 70.28% $\pm$ 4.23. Similarly, this paradigm enabled discrimination between right and left foot KMI cognitive task at highest accuracy rate i.e. maximum 77.5% with kappa $= 0.55$ and the area under ROC curve as 0.70 (in single-trial analysis). The proposed novel paradigms, using CSP and FBCSP, established a potential to exploit the left versus right foot imagery classification, in synchronous 2-class BCI for controlling robotic foot, or foot neuroprosthesis.

1. Introduction

Brain-computer interface (BCI) is an augmented muscle-free communication channel between the human brain and output devices for assisting subjects with neuromotor disorders, spinal cord injuries (SCI) or amputated residual limbs [1–4]. It decodes a specific brain activity into computer command to control external device. Amongst the popularly used electroencephalography (EEG)-based brain activity is event-related (de)synchronization (ERD/ERS) localized in the sensorimotor cortex [5–9]. The ERD/ERS features can be quantified via band-power changes that occur during any kinaesthetic motor imagery (KMI) task performed by the subject, e.g. imagination of limb movement (left-right hand or foot) [5, 7]. Frequency bandwidths, that reflect imaginary activity in EEG, lie in the *mu* and *beta* oscillatory activity, i.e. between 7 to ~35 Hz.

In order to extract ERD/ERS EEG features for BCI, various methods have been introduced based on application requirements [1, 9–10]. According to [11], for a BCI that uses *mu* and *beta* rhythms, the selection of spatial filter can markedly affect its signal-to-noise ratio. The common spatial pattern (CSP) is one efficient method that has generally been used with oscillatory processes in the KMI feature extraction due to its simplicity, relatively high speed and robustness.

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PAPER

Textile band electrodes as an alternative to spot Ag/AgCl electrodes for calf bioimpedance measurements

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Keywords: calf bioimpedance, bioimpedance, remote monitoring, dry electrodes, textile electrodes

Abstract

Objective: To evaluate the performance of five different types of textiles as band electrodes for calf bioimpedance measurements in comparison with conventional spot Ag/AgCl electrodes. ***Approach:*** Calf bioimpedance measurements were performed in 10 healthy volunteers with five different textile materials cut into bands and Ag/AgCl spot electrodes as a baseline. Collected bioimpedance data were analyzed in terms of precision, fit error and presence of measurement artifacts. Each textile material was also evaluated for participant comfort. ***Main Results:*** Bioimpedance values for spot electrodes were higher at low frequencies as compared with band electrodes but not at high frequencies. This suggests that spot electrodes have frequency dependent current distributions that adversely impact their use for volume measurements and band electrodes are preferable. The SMP130T-B fabric had the highest precision and the lowest best fit error to the Cole model of the tested textile materials. However, it was the least comfortable textile and most expensive. The Stretch material performed slightly worse than the SMP130T-B fabric, but was half the cost and the most comfortable. ***Significance:*** These results suggest that there are suitable textile materials for use as dry, band electrodes for calf bioimpedance measurements and that these band electrodes enable greater current uniformity. These textiles could be integrated into a compression sock for remote monitoring of diseases such as Congestive Heart Failure.

1. Introduction

Bioimpedance is a measurement of the electrical properties of tissue typically obtained by driving a small current through the body and sensing the resulting voltage [1, 2]. The technique can be used for a number of different applications, including body composition [3], hemodynamic monitoring [4], and assessment of volume status [5, 6]. Most bioimpedance measurements are 'tetrapolar' and involve the placement of two pairs of electrodes; outer electrodes that drive current and inner electrodes that sense the resulting voltage. A tetrapolar configuration minimizes the impact of electrode polarization at frequencies above about 1kHz assuming equal electrode area and material [7]. These electrodes are most frequently spot electrodes such as those used for ECG measurements.

Bioimpedance measurements for full body composition involve placement of electrodes on the wrist and ankle and measure the properties of the arm, trunk and leg in series. In recent years there has also been an interest in 'segmental' bioimpedance that involves placing electrodes closer together to measure just one smaller area of the body. These measurements can be used, for example, for monitoring knee or ankle joint health [8, 9], for monitoring fluid status during hemodialysis using calf bioimpedance measurements [10–13] or in Congestive Heart Failure patients [14, 15].

When a wrist to ankle bioimpedance measurement is performed, the long conductor length of the measurement ensures that the current is distributed evenly through the measured segments for the majority of the current path, other than small areas of constriction close to the electrodes [16]. However, segmental measurements involve shorter inter-electrode spacing and