

Dedication

I'd like to dedicate this work with all love to my parents, who taught me that even the largest task can be accomplished if it is done one step at a time, to my family, without their faith and encouragement I wouldn't have achieved any progress in my life. To my colleagues and to all those I love with my all gratitude.

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Abstract

Brain–computer interface provides a voluntarily, non-manual control for artificial limb or device by translating brain activity patterns into control commands. The research investigated the classification of multiclass motor imagery for electroencephalogram (EEG)-based Brain-Computer Interface (BCI) using independent component analysis (ICA), principle component analysis (PCA) and support vector machine (SVM) techniques. The proposed techniques were evaluated by Cohen's kappa coefficient and gave average accuracy around ($97\pm2\%$) in session one and ($31\pm4\%$) in session two in classifying four different motor imageries (MI) from EEG measurements for nine subjects under investigating.

المستخلص

يوفر نظام الاتصال بين العقل البشري والحاسوب مقدرة تحكم إرادية وآلية على الأطراف الصناعية أو أي جهاز آخر عن طريق ترجمة أنماط نشاط المخ إلى أوامر تحكم.

هذه الدراسة قامت ببحث إمكانية تمييز أربع إشارات خاصة بحركة اليدين اليمنى واليسرى والقدمين واللسان عن طريق استخدام تحليل المكونات الأساسية والمستقلة (ICA & PCA) وخوارزمية التصنيف الآلية (SVM).

تم اختبار التقنيات المقترحة بواسطة معامل الاتفاق المشترك (κ) وأعطت متوسط دقة بنسبة في الجلسة الأولى ونسبة في الجلسة الثانية في تصنيف أربع إشارات من إشارات رسم مخ ناتجة من عملية التخليل لحركة هذه الأطراف، وليس التحريك الفعلي لها، بواسطة تسعة أفراد تحت الاختبار.