Machine Learning Approach for Lateralization of Temporal Lobe Epilepsy

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Abstract : Lateralization of temporal lobe epilepsy (TLE) is very important for positive surgical outcomes. We propose a machine learning framework to ultimately identify the epileptogenic hemisphere for temporal lobe epilepsy (TLE) cases using magnetoencephalography (MEG) coherence source imaging (CSI) and diffusion tensor imaging (DTI). Unlike most studies that use classification algorithms, we propose an effective clustering approach to distinguish between normal and TLE cases. We apply the famous Minkowski weighted K-Means (MWK-Means) technique as the clustering framework. To overcome the problem of poor initialization of K-Means, we use particle swarm optimization (PSO) to effectively select the initial centroids of clusters prior to applying MWK-Means. We demonstrate that compared to K-means and MWK-means independently, this approach is able to improve the result of a benchmark data set.

Keywords : temporal lobe epilepsy, machine learning, clustering, magnetoencephalography

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