

Analisis sinyal elektroensefalogram dengan transformasi wavelet dan extreme learning machine sebagai alat bantu identifikasi stroke iskemik akut = Electroencephalogram analysis with wavelet transform and extreme learning machine as a supporting tool for acute ischemic stroke identification

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Abstrak

Prevalensi stroke di Indonesia berdasarkan diagnosis tenaga kesehatan sebesar 7% dan yang mempunyai riwayat gejala sebesar 12,1%. Pemeriksaan awal menggunakan CT Scan menimbulkan dampak radiasi serta membutuhkan biaya operasional yang tinggi, sedangkan prevalensi stroke berdasarkan diagnosis atau gejala lebih tinggi pada kuintil indeks kepemilikan terbawah (13,1%) dan menengah bawah (12,6%).

Penelitian ini mencoba melakukan analisis sinyal EEG secara otomatis berdasarkan data EEG pasien normal dan pasien stroke iskemik akut dengan pemrosesan sinyal digital berupa transformasi Wavelet serta jaringan saraf tiruan jenis feedforward dengan algoritma Extreme Learning Machine (ELM). Jordan mengemukakan bahwa elektroensefalografi dapat membantu mengkonfirmasi atau mendeteksi adanya stroke iskemik akut yang ditunjukkan dengan adanya perlambatan gelombang serta adanya ketidaksimetrisan antara gelombang otak kanan dan kiri.

Penelitian ini menggunakan nilai Delta/Alpha Ratio (DAR), (Delta+Theta)/(Alpha+Beta) Ratio (DTABR) dan Brain Symmetry Index (BSI) sebagai nilai fitur masukan ELM yang diperoleh dengan transformasi Wavelet (Daubechies 4) serta metode Welch untuk mengidentifikasi stroke iskemik akut. Hasil penelitian ini diperoleh nilai akurasi di atas 85% dengan nilai sensitivitas di atas 86%

The prevalences of stroke in Indonesia are 7% based on the health professionals' statement and 12.1% based on patients' symptoms' history. Early examination using CT scan causes radiation effects and spent high operational cost while the prevalence of stroke based on diagnosis or symptoms were higher in the lowest (13.1 %) and mid lower (12.6 %) quintile of ownership index.

This study tried to analyze the signals of EEG automatically based on training data sets from normal patients and patients with acute ischemic stroke (AIS) using digital signal processing such as Wavelet transform and feedforward type of neural network with Extreme Learning Machine (ELM) algorithm. It was claimed that electroencephalography could help to confirm or detect acute ischemic stroke which is shown by the presence of the slow wave and the asymmetrical wave of right and left hemisphere.

This study uses Delta Alpha Ratio (DAR), (Delta+Theta)/(Alpha+Beta) Ratio (DTABR) and Brain Symmetry Index (BSI)'s value as the ELM input feature score which were obtained by Wavelet (Daubechies 4) transformation and Welch's method to identify acute ischemic stroke. In this study, the average performances of system test accuracy were above 85% with 86% sensitivity.