

**RANCANG BANGUN SISTEM DETEKSI LEVEL STRES PADA
MANUSIA BERBASIS *ELECTROENCHEPALOGRAM* MENGGUNAKAN
SUPPORT VECTOR MACHINE UNTUK INSTRUMENTASI
PENGUKURAN PSIKOTERAPI**

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INTISARI

Psikoterapi merupakan interaksi antara terapis dengan klien yang bertujuan memperbaiki masalah psikologis. Skala-skala yang ada untuk mengetahui efektivitas psikoterapi memiliki beberapa kelemahan, di antaranya bersifat subjektif dan tidak dapat digunakan untuk mengukur kondisi klien secara kontinu selama proses psikoterapi. Pada penelitian ini, dikembangkan sistem deteksi level stres berbasis *electroencepalogram* sebagai alternatif untuk mengatasi kelemahan dari skala-skala yang ada.

Sejumlah 30 orang diminta mengerjakan *Stroop Color Word Test* sambil direkam sinyal *electroencepalography* (EEG). *Digital filtering* dan *Independent Component Analysis* diterapkan pada *electroencepalogram* untuk mengurangi *artefact*. Fitur berupa *relative average power spectral density* pada frekuensi theta, alpha, dan beta dari 16 kanal pengukuran diekstrak menggunakan metode Welch's Periodogram. Vektor fitur diklasifikasikan menggunakan *Support Vector Machine* (SVM).

Kesimpulan dari penelitian ini menyatakan bahwa SVM dengan kernel *Radial Basis Function*, $\gamma = 9,70$ dan $C = 2,30$ dapat mengklasifikasikan 4 jenis level stres dengan akurasi rata-rata 64,54%. Implementasi model sebagai Psikoterapi Stres Meter (PSM) dapat menampilkan secara kontinu level stres manusia berbasis *electroencepalogram*.

Kata kunci: psikoterapi, stres meter, EEG, SVM

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**DESIGN OF HUMAN STRESS LEVEL DETECTION SYSTEM BASED
ON ELECTROENCHEPALOGRAM USING SUPPORT VECTOR
MACHINE FOR PSYCHOTHERAPY MEASUREMENT
INSTRUMENTATION**

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ABSTRACT

Psychotherapy is an interaction between therapist and client that aims to correct psychological disorder. The existing scales for measuring the effectiveness of psychotherapy have several weaknesses, including being subjective and they cannot be used to measure the client's condition continuously during the psychotherapy process. In this study, a stress level detection system based on electroencefalogram was developed as an alternative to overcome the weaknesses of the existing scales.

A total of 30 people were asked to do the Stroop Color Word Test, and their EEG signal were recorded. Digital filtering and Independent Component Analysis were applied to electroencefalogram to reduce artifacts. The relative average of the power spectral density in theta, alpha, and beta band from 16 measurement channels was extracted using the Welch's Periodogram method. Feature vectors were classified using the Support Vector Machine (SVM).

The conclusion of this study states that a SVM with Radial Basis Function kernel, with $\gamma = 9.70$ and $C = 2.30$ can classify 4 types of stress levels with an average accuracy of 64.54%. The implementation of the model as a Psychotherapy Stress Meter (PSM) can continuously display human stress levels based on electroencefalogram.

Keywords: psychotherapy, stress meter, EEG, SVM

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