# ABSTRACT

*Pornography addiction is a condition where compulsive use of pornographic content negatively impacts an individual's physical, psychological, and social health. The main challenge in detecting this addiction lies in the lack of effective methods for identifying relevant brain activity patterns and the limitations in data and optimal machine learning models. This study aims to develop an accurate model for detecting pornography addiction using a Brain-Computer Interface (BCI) based on Electroencephalography (EEG) and machine learning techniques. The EEG dataset was collected from 14 participants, seven of whom were addicted to pornography and seven who were not. Recordings were made while they performed executive tasks with pornographic content stimuli. EEG data were decomposed into Delta, Theta, Alpha, Beta, and Gamma waves and represented in topographic maps for visual analysis. Upsampling and SMOTE (Synthetic Minority Over-sampling Technique) techniques were also applied to increase the amount of data to be processed. The topographic visualizations showed differences in brain wave patterns between addicted and non-addicted subjects, particularly in the Alpha, Beta, and Gamma waves. Feature extraction was then performed using the Common Spatial Pattern (CSP) method, followed by machine learning analysis with algorithms such as linear discriminant analysis (LDA), logistic regression, Support Vector Machiness (SVM), extreme gradient boosting (XGBoost), and random forest. The results showed that the Random Forest method achieved the highest average accuracy of 90% in detecting pornography addiction, while the other methods reached an average accuracy of 85%. This research significantly contributes to understanding the brain activity patterns associated with pornography addiction and offers an accurate detection model for preventing this addiction.*

**Keywords:** *Brain-Computer Interface (BCI), EEG, Addiction, Pornography*

# INTISARI

Adiksi pornografi adalah kondisi di mana penggunaan konten pornografi secara kompulsif berdampak negatif pada kesehatan fisik, psikologis, dan sosial individu. Tantangan utama dalam mendeteksi adiksi ini adalah kurangnya metode yang efektif untuk mengidentifikasi pola aktivitas otak yang relevan dan keterbatasan data serta model *machine learning* yang optimal. Penelitian ini bertujuan mengembangkan model deteksi adiksi pornografi yang akurat dengan menggunakan *Brain-Computer Interface* (BCI) berbasis *Electroencephalography* (EEG) dan teknik *machine learning*. *Dataset* EEG dikumpulkan dari 14 partisipan, tujuh diantaranya mengalami adiksi pornografi dan tujuh lainnya tidak. Perekaman dilakukan saat mereka menjalankan tugas eksekutif dengan stimulus konten pornografi. Data EEG diuraikan menjadi gelombang *Delta, Theta, Alpha, Beta,* dan *Gamma* serta direpresentasikan dalam peta topografi untuk analisis visual. Penerapan teknik *Upsampling* dan SMOTE (*Synthetic Minority Over-sampling Technique*) juga digunakan untuk menambah jumlah data yang akan diproses. Hasil visualisasi topografi menunjukkan perbedaan pola gelombang otak antara subjek yang adiksi dan tidak adiksi, khususnya pada gelombang *Alpha*, *Beta*, dan *Gamma*. Selanjutnya, ekstraksi fitur dilakukan menggunakan metode *Common Spatial Pattern* (CSP) diikuti oleh analisis *machine learning* menggunakan algoritma seperti *Linear Discriminant Analysis* (LDA), *Logistic Regression*, *Support Vector Machines* (SVM), *Extreme Gradient Boosting* (*XGBoost*), dan *Random Forest.* Hasil menunjukkan bahwa metode *Random Forest* memiliki akurasi rata-rata tertinggi sebesar 90% dalam mendeteksi adiksi pornografi, sementara metode lainnya mencapai akurasi rata-rata 85%. Penelitian ini memberikan kontribusi signifikan dalam memahami pola aktivitas otak yang terkait dengan adiksi pornografi dan menawarkan model deteksi yang akurat untuk pencegahan adiksi ini.

**Kata kunci –** *Brain-Computer Interface (BCI)*, EEG, Adiksi, Adiksi, Pornografi.