

## ABSTRACT

Online games are a popular form of entertainment across all age groups. However, excessive gaming can lead to problematic gaming, where individuals neglect other activities, increasing the risk of several psychological issues. Electroencephalogram (EEG) is commonly used to study addictive behaviors due to its accessibility, low cost, and excellent temporal resolution. Event-Related Potential (ERP) analysis, derived from EEG signals, measures neural responses to stimuli, providing insights into the cognitive and emotional aspects of problematic gaming. To extract relevant information from ERP, feature extraction techniques are applied to EEG signals. With numerous potential features, efficient feature selection is crucial. Without it, the high dimensionality of features can hinder model development. Traditional approaches, such as filter-based and wrapper methods, are limited as they do not consider feature interactions and may reduce predictive performance.

Metaheuristic algorithms have been effective for EEG feature selection, especially when fewer features are needed. Hybrid metaheuristic approaches, which combine two algorithms, have demonstrated improved classification performance with fewer features and faster computation times. This thesis implements both metaheuristic and hybrid metaheuristic algorithms for feature selection in classifying ERP signals from problematic online gamers. Results show that hybrid metaheuristic approaches enhance classification performance, achieving perfect accuracy, sensitivity, and specificity. However, computational time is not always reduced, and the number of selected features does not always decrease. Max Peak feature is consistently selected, emphasizing its importance in ERP analysis. This thesis demonstrates the potential of hybrid metaheuristic methods to optimize EEG feature selection, improving classification models for problematic online gamers.

**Keywords:** Electroencephalogram, Event-Related Potential, Metaheuristic Algorithm, Problematic Gamers.