

# **Sleep Disorder Detection Using Deep Learning and Genetic Algorithm Optimization**

## **ABSTRACT**

Understanding and categorizing sleep problems is crucial for enhancing general health and quality of life since conditions like sleep apnea and insomnia can significantly impair day-to-day functioning. Because medical professionals' traditional diagnosis methods can be inconsistent and time-consuming, automated solutions are a desirable substitute. In this study, the classification of sleep disorders using deep learning and traditional machine learning approaches is compared. The Sleep Health and Lifestyle Dataset, 400 records and 13 characteristics defining different lifestyle, health, and sleep aspects, is made freely accessible for use in this study. Encoding categorical data, transforming blood pressure measurements into numerical form, normalizing feature values, and dividing the data into training and testing sets were all steps in the preprocessing procedure. A Random Forest Classifier, an XGBoost Classifier, and a Keras-based Artificial Neural Network (ANN) with Dense and Dropout layers are among the models that were put to the test. Confusion matrices, classification reports, and accuracy scores were used to gauge the model's performance. The ANN outperformed the other models and had the greatest classification accuracy among the evaluated methods; Random Forest and XGBoost also showed promising results. These results demonstrate the usefulness of deep learning architectures in developing precise, scalable systems for the early identification of sleep problems, assisting medical professionals in establishing diagnoses. Index Terms—Sleep disorder detection, Artificial Neural Network, Random Forest model, XGBoost algorithm healthcare data analysis, feature encoding and scaling