Ensemble Learning for Prediction of Mental Health Status in Employees: Towards a Stress-Free Work Environment

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MOTIVATION / INTRODUCTION

- Modern workplaces face a mounting crisis concerning employees' mental well-being, adversely affecting both individuals and organizational productivity. Research by (Lazarus & Folkman, 1984) illustrates the pervasive nature of workplace stress, emphasizing the urgent need for proactive measures.
- Conventional strategies like counseling services often prove insufficient in addressing the complexities of mental health issues. Trougakos and Hideg (2009) highlight the limitations of reactive measures, emphasizing the necessity for proactive interventions throughout the workday.
- Machine learning offers a novel approach to analyze and understand mental health trends within organizations. By employing data-driven methodologies, companies can identify critical stress indicators and tailor interventions accordingly.
- Ensemble learning integrates diverse algorithms to enhance mental health predictions, aiming to accurately assess employee stress levels and facilitate targeted interventions, thereby promoting a supportive workplace culture.

OBJECTIVES

- Evaluate effectiveness of ensemble learning techniques (KNN and Random Forest) in stress prediction.
- Identify key predictors and risk factors associated with workplace stress.
- Enhance understanding of stress dynamics in organizational settings.
- Inform evidence-based interventions for promoting employee well-being.
- Foster a stress-free work environment through targeted interventions.

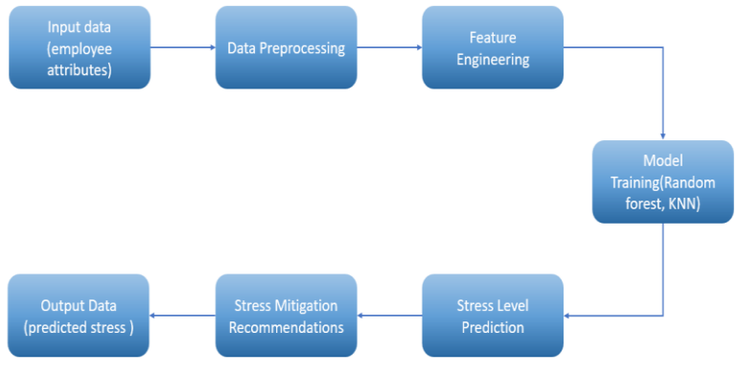
SCOPE OF THE PROJECT

The project aims to develop and evaluate machine learning models for stress prediction in organizational settings, with the primary goal of fostering a stress-free environment for every individual.

METHODOLOGY

The methodology begins with assembling a comprehensive dataset related to employee well-being and work-related factors, followed by thorough preprocessing to address missing values, outliers, and standardization. It then employs ensemble learning techniques, including Random Forest and K-Nearest Neighbors, to capture diverse patterns and relationships within the data. Evaluation metrics such as accuracy are utilized to rigorously assess the model's performance, ensuring its effectiveness in predicting mental health outcomes and guiding intervention strategies within organizational settings.

ARCHITECTURE



The project architecture encompasses data collection, preprocessing, feature engineering, ensemble model training, stress level prediction, and personalized stress mitigation recommendations, culminating in output data comprising predicted stress levels and tailored interventions. This comprehensive approach empowers organizations to proactively manage employee well-being, fostering a supportive workplace culture conducive to productivity and resilience.

RESULTS

Algorithm	Accuracy
Random forest	94.3636
KNN	75.1818

The evaluation showed that the RandomForestClassifier achieved a higher test accuracy (94.36%) than the K-Nearest Neighbours (KNN) Classifier (75.18%), indicating its superior ability in predicting employee mental health status.

CONCLUSION

The RandomForestClassifier achieved a test accuracy of 94.36%, outperforming the K-Nearest Neighbours (KNN) Classifier's accuracy of 75.18%. This difference highlights the RandomForestClassifier's efficacy in predicting employee mental health status, likely attributed to its capability to capture complex feature relationships within the dataset.

CONTACT DETAILS

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