**LIFESTYLE IMPACT ON SLEEP HEALTH**

**Sadhika Varakala, Siddharth Sunkam**

**Business Problem:**

In modern workplaces, employee health is vital for productivity and cost management. Poor sleep health can lead to decreased productivity and higher healthcare expenses. Predictive analytics can identify key factors affecting sleep, aiding in the design of personalized wellness programs. By analyzing a dataset of 500,000 employees, predictive models can segment employees by sleep risk factors and predict sleep disorders. This allows for targeted interventions like flexible scheduling and stress management workshops, aiming to improve productivity and reduce healthcare costs.

**Approach:**

Our approach to understanding the impact of various factors on sleep health involves several stages: data preprocessing ensures quality, handles missing values, and transforms variables into numeric formats. Exploratory data analysis uncovers variable distributions and relationships. Predictive modeling, including Logistic Regression and advanced algorithms like RandomForest and Gradient Boosting, identifies key patterns. Autoencoders enhance prediction accuracy, with dimensionality reduction aiding interpretation. We select the autoencoder model for its ability to capture complex patterns effectively, allowing for a thorough understanding of sleep health factors and targeted intervention development.

**Results:**

The analysis uncovers key factors impacting sleep duration, including age, gender, physical health, lifestyle, occupation, and sleep disorders. Notably, age and higher systolic blood pressure reduce sleep, while physical activity promotes it. Certain occupations experience varied sleep patterns. Surprisingly, sleep disorders like insomnia and sleep apnea are associated with longer sleep durations. The methodology involves data collection, preprocessing, statistical analysis, and predictive modeling using machine learning algorithms like Random Forest and Neural Networks, validated with evaluation metrics. Python and libraries like Pandas and scikit-learn facilitate this process, providing robust insights for informed decision-making.

**Business Impact:**

The analysis of factors influencing sleep duration offers valuable insights for various industries. In healthcare, tailored products and personalized treatment plans enhance patient satisfaction. Wellness and fitness companies can design programs and wearables to improve sleep quality. Corporate HR departments can develop better wellness programs and consider flexible scheduling. Insurers can refine risk assessment models, while businesses can utilize consumer insights for targeted marketing campaigns. Productivity software developers can integrate features to optimize sleep, enhancing overall well-being and productivity.