Lifestyle Impact on Sleep Health

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Introduction & Background

This research delves into the interplay between lifestyle choices, physical health, and demographic factors in determining sleep health. By examining variables such as physical activity, dietary habits, stress levels, BMI, blood pressure, and demographic details, the study seeks to uncover patterns and correlations that influence sleep quality and susceptibility to sleep disorders. Understanding these relationships is crucial for developing targeted interventions to enhance sleep health across different population segments.

Research Question

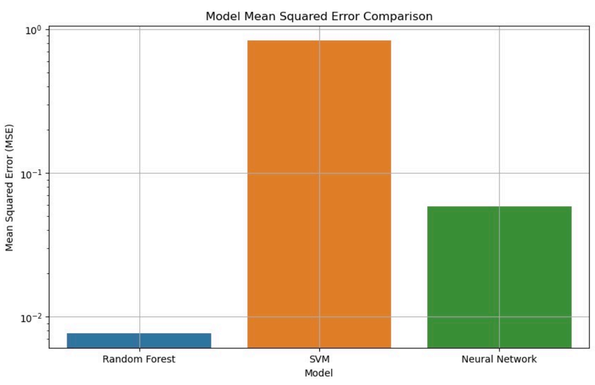
- Investigate how various lifestyle factors, physical health metrics, and demographic characteristics influence sleep health, including sleep duration, quality, and disorders.
- The study aims to identify key predictors of sleep health and potential risk factors for sleep disorders.

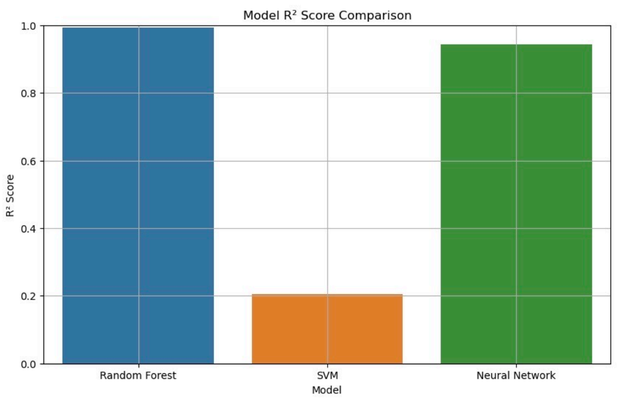
Methodology

- Random Forest Regressor: This ensemble learning method uses multiple decision trees to improve prediction accuracy and control over-fitting, providing importance scores for each feature.
- Support Vector Machine (SVM) Regressor: Used for more complex regression tasks, SVM maps input features into higher-dimensional space to find the optimal separation.

Model Comparison: MSE and R^2 Score

- MSE Plot: Displays model errors; lower is better. Random Forest excels.
- R^2 Plot: Shows model fit; higher is better. Random Forest and Neural Network excel, SVM less so.

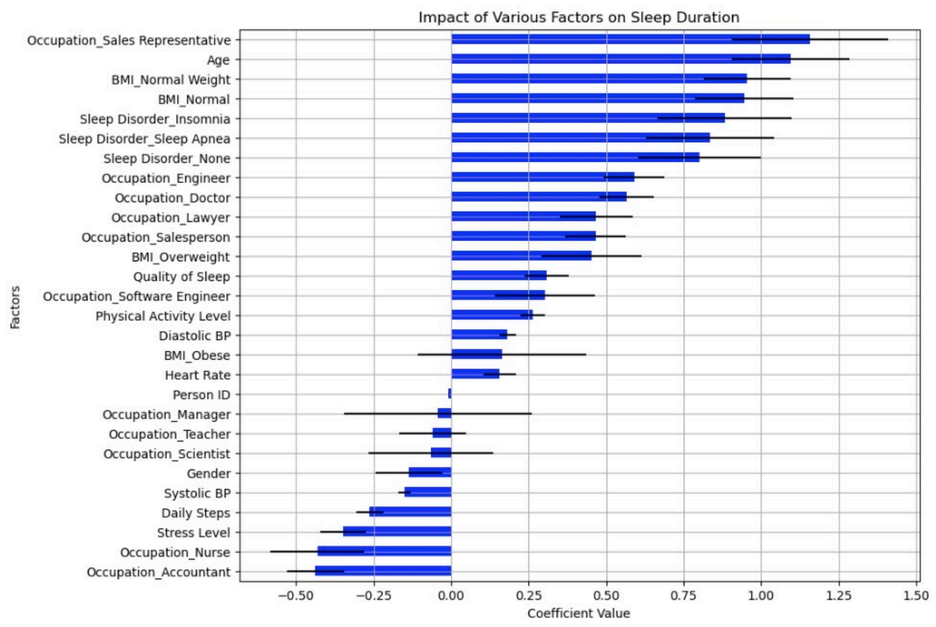




OLS Regression Model

Impact of Various Factors on Sleep Duration

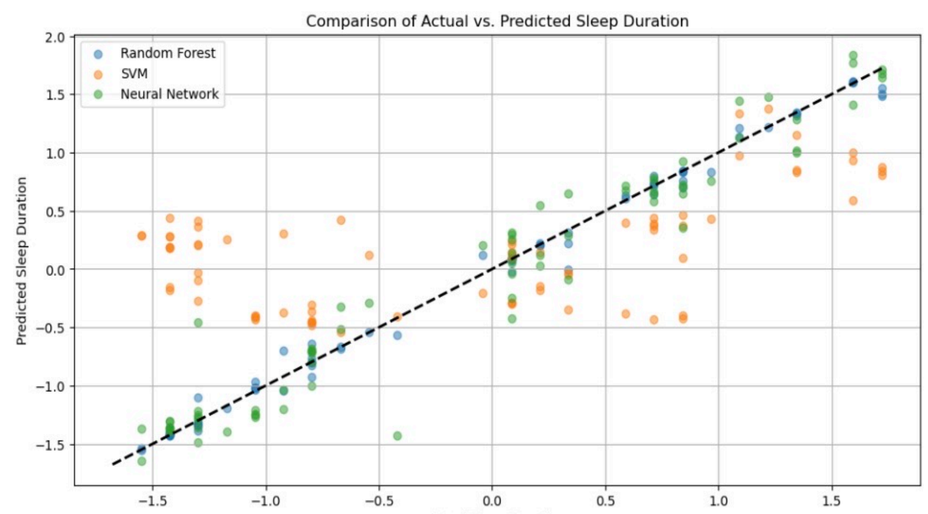
- Positive Coefficients: Factors like "Age" and "BMI Normal" suggest longer sleep duration.
- Negative Coefficients: "Stress Level" and "Occupation_Accountant" indicate shorter sleep duration.
- Error Bars: Show confidence range; smaller bars mean more precise estimates.



Scatter Plot

Comparison of Actual vs. Predicted Sleep Duration

- Data Points: Dots represent observations; closeness to line indicates accuracy.
- Fit Quality: Tight clusters suggest good predictions; Random Forest and Neural Network perform well.
- Outliers: Dots far from line signify prediction inaccuracies.



Business Impacts

- Healthcare: Tailor products using age, stress, and physical activity for sleep disorder management.
- Wellness & Fitness: Integrate sleep data into tech and programs, highlighting activity-sleep connection.

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