Data Analysis of Alcohol Consumption as a Risk Factor for Alzheimer's and Dementia

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Problem

- Alzheimer's and dementia are significant public health issues.
- Alcohol may influence cognitive decline, with effects varying by consumption level.
- This study analyzes how alcohol impacts Alzheimer's and dementia progression.
- Aims to fill gaps in understanding these associations.

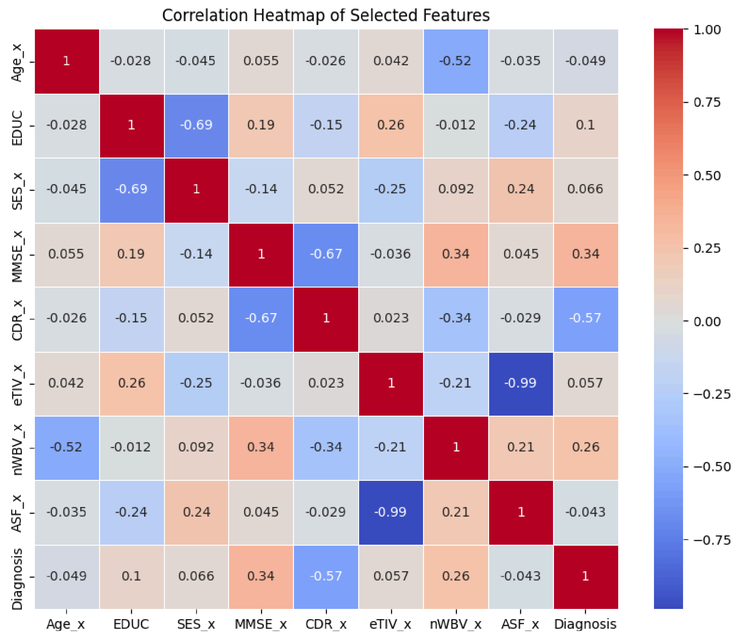
Background

- Lao, Yongfeng et al. (2021): Explores alcohol intake's impact on cognitive decline, highlighting dose-response relationships.
- Ran, L.S. et al. (2021): Compares alcohol, coffee, and tea intake on cognitive health.
- Zhang, Ruiyuan et al. (2020): Investigates the effects of low-to-moderate alcohol consumption on cognitive function by age group.

Approach

Datasets used:
- Alzheimer's Disease Prediction Datase
- Dementia Dataset Comprehensive EDA

Method:
- Performed Exploratory Data Analysis (EDA) to identify relationships between alcohol levels and cognitive outcomes.
- Built a Random Forest classifier to predict the progression of dementia.
- Performed hypothesis testing to evaluate alcohol consumptions impact on congnitative decline



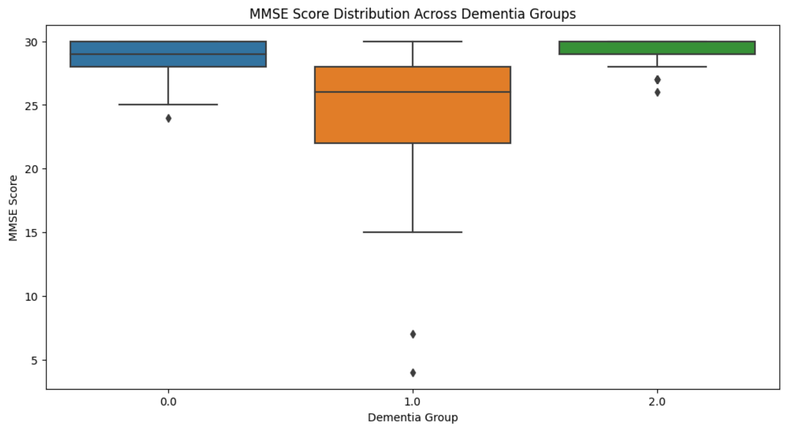
Correlation Heatmap showing relationships between key features, such as age, cognitive scores, and dementia diagnosis.

Evaluation

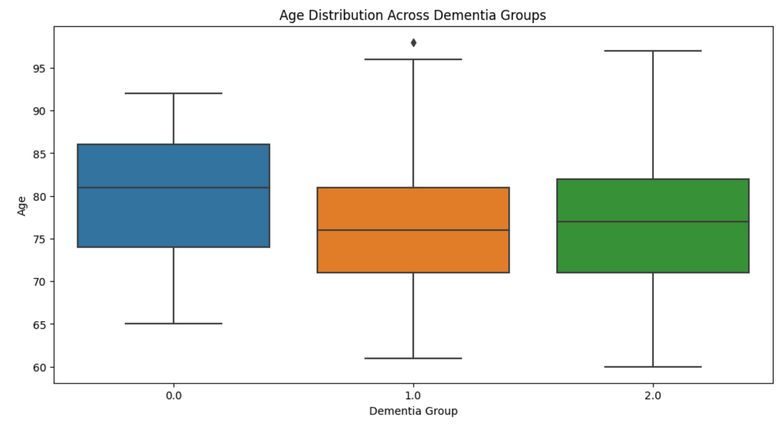
Metrics Used: Accuracy, Precision, Recall, and AUC were used to evaluate model performance.

Results Summary

- Heavy alcohol consumption is consistently correlated with an increased risk for Alzheimer's and dementia, as indicated by the correlation heatmap.
- Moderate alcohol consumption produced mixed results, with potential protective effects in some cases, supported by the MMSE score distribution boxplot.
- Age distributions among the different dementia groups, as shown by the age boxplot, indicate potential age-related trends in dementia progression.



illustrates the variance in MMSE scores across different dementia groups, indicating differences in cognitive performance among nondemented, demented, and other groups.



Shows age distributions across nondemented, demented, and other dementia groups, highlighting trends related to age in relation to dementia progression.

Conclusions

- Heavy alcohol consumption significantly correlates with an increased risk of dementia
- Moderate consumption shows mixed effects – further analysis is required to understand protective factors
- Findings may help develoip public health guidelines for alcohol consumption aimed at reducing dementia risk

References

Lao, Yongfeng, et al. "Association between alcohol intake, mild cognitive impairment and progression to dementia: a dose–response meta-analysis." Aging Clinical and Experimental Research 33 (2021): 1175-1185.
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