Student Performance Statistical Analysis

This report presents an applied statistical analysis examining how participation in student support programs (AVID, SPED, ELL, Migrant) is associated with academic performance measured by grade percentage. The objective is to demonstrate statistical reasoning, inference, and interpretability rather than predictive modeling.

Dataset Overview

The dataset consists of anonymized student-level academic records. Each observation represents an individual student, including indicators for support program participation, grade level, class type, and overall academic performance.

Methodology

The analysis followed a structured workflow including exploratory data analysis, distribution assessment, hypothesis testing, linear regression modeling, interaction analysis, effect size estimation, and model comparison using adjusted R-squared and AIC.

Key Findings

1. Student support programs exhibit statistically significant associations with academic performance.
2. Effect size analysis indicates that most observed differences are small in magnitude.
3. Interaction models suggest that migrant status modestly modifies outcomes across certain grade levels.

Limitations

The data is observational and non-randomized; therefore, results reflect associations rather than causal effects. Unobserved confounding variables may influence the results.

Conclusion

This project demonstrates disciplined statistical analysis, emphasizing effect sizes, model comparison, and clear interpretation. The findings are relevant for education analytics and policy-oriented data analysis, and the methodology is transferable to other applied domains.