



CSPB 4502: Data Mining Project

Jarryd Allison

Colorado Public School Academic Performance
A Study of Financing versus Student Performance

Overview

- Description
- Data preparation work
- Tools used
- Classification applied
- Knowledge gained
- Applications





Description

- Analyzed the academic performance of Colorado public school students from 2019 - 2023
 - Does a correlation exist between the spend per student and the mathematical academic performance of a student body?
 - If a correlation exists, is it positive or negative?
 - How has funding and performance changed over the time period from 2019 to 2023?

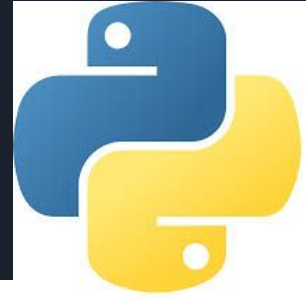


Data preparation work

- Data Cleaning
 - Transform and standardize formats
 - Scrape financial data
- Data Preprocessing
 - Data reduction
 - Convert to pandas dataframes
- Data Integration
 - Combine financial data
 - Combine annual data

Tools used

- Jupyter Notebooks
- Python
 - Numpy
 - Pandas
 - Beautiful Soup
 - Matplotlib





Classification applied

- Association Rules
 - MSS: Mean Scale Score
 - SPS: Spend Per Student
- Correlation Analysis

2019 Grade 3 Contingency Table

	>= Avg SPS	< Avg SPS	Row Sum
>= Avg MSS	200	279	479
< Avg MSS	293	184	477
Col Sum	493	463	956

Mean Spend Per Student: 12053
Mean Mean Scale Score: 739
Lift Calculation: 0.8097
Correlation: negative correlation
X^2 Calc: 37.032
Support: 20.92
Confidence: 41.75 %

Summary

- A negative correlation exists between the spend per student and the mathematical academic performance

2023 Grade 8 Contingency Table

	\geq Avg SPS	$<$ Avg SPS	Row Sum
\geq Avg MSS	97	143	240
$<$ Avg MSS	164	124	288
Col Sum	261	267	528

Mean Spend Per Student: 14734

Mean Mean Scale Score: 730

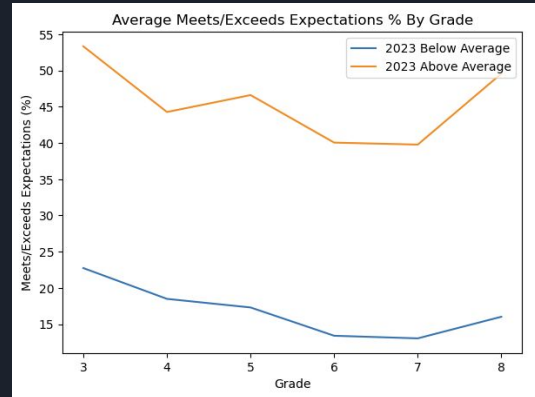
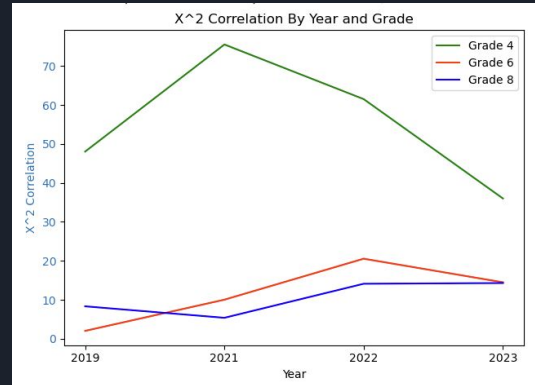
Lift Calculation: 0.8176

Correlation: negative correlation

χ^2 Calc: 14.3059

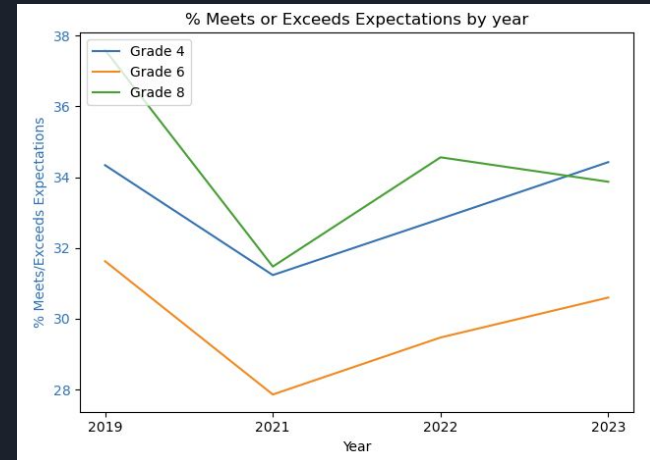
Support: 18.37 %

Confidence: 40.42 %



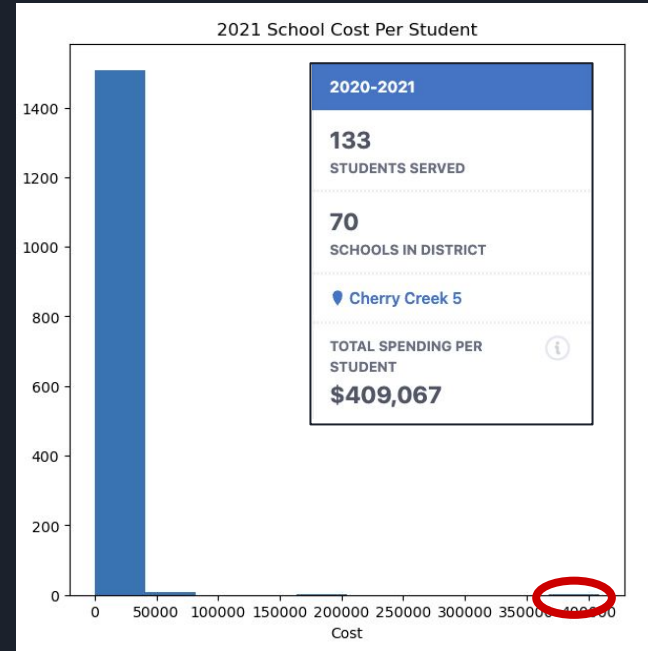
Summary (continued)

- Performance has yet to recover to pre-COVID levels.



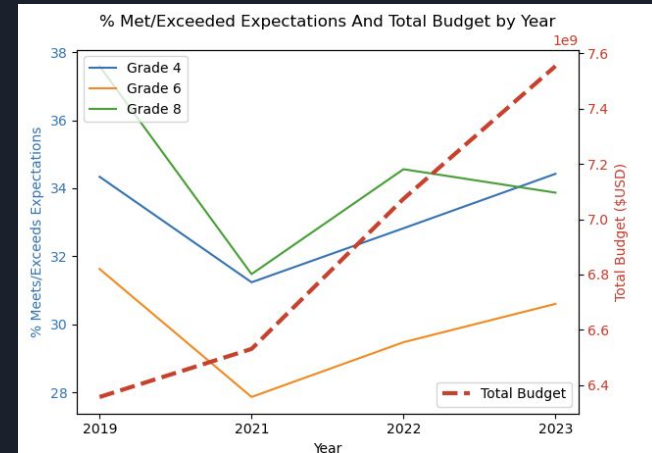
Summary (continued)

- Largest reported an average spend per student was \$400,000+ USD during the 2020-2021 school year.



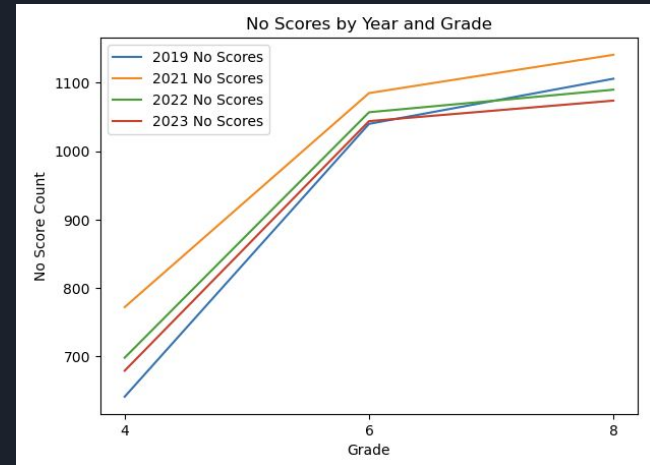
Summary (continued)

- Performance is improving at a lower rate than which the budget for education is growing.



Summary (continued)

- Colorado does not require reports for low numbers of valid tests (< 16).



Applications

- Articles and awareness
- Further analysis
- Legislative action
- School action

