**Quiz Data Analysis System**

**Overview**

This comprehensive quiz analysis system provides insights into student performance, question difficulty, attempt patterns, and learning effectiveness. The system processes quiz data to generate statistical analyses and visualizations that help educators understand student learning patterns and question effectiveness.

**Requirements**

1. **Python Packages**

* Python 3.7+
* pandas
* numpy
* matplotlib
* seaborn
* scipy
* scikit-learn

Installation: pip install pandas numpy matplotlib seaborn scipy scikit-learn

1. **Data Requirements**

CSV file named [transformed\_quiz\_data.csv](https://drive.google.com/drive/folders/1dOJGtLukTmK81phR0pJqi-0PINgKTwhF?usp=sharing)containing quiz attempt data with specific columns:

* user\_id
* quiz\_id
* quiz\_attempts
* question\_id
* question\_text
* is\_correct
* total\_score
* correct\_answer
* selected\_option
* difficulty\_level
* question\_number
* question\_attempts
* question\_score

**Code Structure**

**Main Components**

1. **Performance Metrics (1-10)**

* Overall accuracy rates
* Question difficulty analysis
* Score distributions
* Student performance categories

1. **Question-Specific Insights (11-20)**

* Individual question analysis
* Common misconceptions
* Most missed concepts

1. **Attempt Behavior Analysis (21-30)**

* Attempt patterns
* Retry behavior
* Drop-off rates

1. **Question Design Analysis (36-40)**

* Question type effectiveness
* Wording impact
* Learning curve

1. **Advanced Statistical Analysis (41-44)**

* Question discrimination
* Reliability analysis
* Student clustering

**Key Functions**

**Analysis Functions**

* calculate\_overall\_accuracy(): Calculates perfect attempt rate
* calculate\_question\_difficulty(): Identifies hardest/easiest questions
* analyze\_question\_specific(): Provides question-specific insights
* analyze\_attempt\_behavior(): Examines student attempt patterns
* advanced\_statistical\_analysis(): Performs advanced psychometric analysis

**Visualization Functions**

* plot\_performance\_metrics(): Visualizes core performance metrics
* plot\_question\_specific(): Shows question-specific insights
* plot\_attempt\_behavior(): Displays attempt pattern visualizations
* plot\_advanced\_stats(): Presents statistical analysis results

**Usage**

1. Prepare your quiz data in the required CSV format
2. Place the CSV file in the same directory as the script
3. Run the script: python file\_name.py
4. The system will:

* Process the data
* Calculate metrics
* Display visualizations
* Return analysis results

**Output**

**The system provides:**

1. Console output with key metrics
2. Interactive visualizations of all analyses
3. Returned dictionary containing all computed metrics when used programmatically

**Conclusion**

This quiz analysis system provides comprehensive insights into student learning patterns and question effectiveness. The modular design allows for easy extension and customization to meet specific institutional needs. Future enhancements will continue to improve its analytical capabilities and integration potential with educational platforms.