Week 4: Student Performance Visualization

Data Science for Mathematics Teachers

November 11, 2025

Course Information

Course: Data Science for Mathematics Teachers
Series: Professional Development Series
Duration: 8 weeks
Level: Beginner To Intermediate
Target: Mathematics Teachers

1 Week 4: Student Performance Visualization

1.1 Learning Objectives

By the end of this week, you will be able to:

- Create clear visualizations of student performance
- Build progress tracking charts for individual students
- Design interactive dashboards for stakeholder communication
- Generate automated visual reports for administration

1.2 Topics Covered This Week

- Creating grade distribution charts with Matplotlib
- Progress tracking visualizations with Seaborn
- Interactive dashboards for parent-teacher conferences

1.3 Key Concepts You Will Work With

- Basic plotting with plt.{plot()}, plt.{scatter()}, plt.{bar()}
- Histograms and distribution plots with plt.{hist()}
- Box plots for statistical summaries with plt.{boxplot()}
- Heatmaps for correlation analysis with sns.{heatmap()}
- Line plots for progress tracking with sns.{lineplot()}
- Customizing plots with titles, labels, and legends
- Color schemes and styling with matplotlib.style
- Saving plots with plt.{savefig()} for reports

1.4 Practical Exercises

Difficulty Level: Intermediate
Total Exercises: 3

Exercise 1: AI-Enhanced Challenge: Creating grade distribution charts with Matplotlib

Difficulty: Intermediate
AI-Enhanced Programming Exercise
Task: Using Python, develop a Python solution focusing on basic plotting with plt.{plot()}, plt.{scatter()}, plt.{bar()}.
Step-by-Step Instructions:

1. Focus on implementing basic plotting with plt.{plot()}, plt.{scatter()}, plt.{bar()} effectively
2. Create clear, educational examples for student understanding
3. Test your implementation with classroom scenarios
4. Add comprehensive comments for teaching purposes
5. Validate results and create sample outputs

Technical Requirements:

- Use Basic plotting with plt.{plot()}, plt.{scatter()}, plt.{bar()} in your implementation
- Use Histograms and distribution plots with plt.{hist()} in your implementation
- Use Box plots for statistical summaries with plt.{boxplot()} in your implementation

Expected Output: A working Python script that mathematics teachers can run in their classroom to solve real educational problems.
Assessment: Your solution should be practical, well-commented, and directly applicable to teaching mathematics.
Teaching Context: Visual communication with students, parents, and administrators

Exercise 2: AI-Enhanced Challenge: Progress tracking visualizations with Seaborn

Difficulty: Intermediate
AI-Enhanced Programming Exercise
Task: Using Python, develop a Python solution focusing on box plots for statistical summaries with plt.{boxplot()}.
Step-by-Step Instructions:

1. Focus on implementing box plots for statistical summaries with plt.{boxplot()} effectively
2. Create clear, educational examples for student understanding
3. Test your implementation with classroom scenarios
4. Add comprehensive comments for teaching purposes
5. Validate results and create sample outputs

Technical Requirements:

- Use Box plots for statistical summaries with plt.{boxplot()} in your implementation
- Use Heatmaps for correlation analysis with sns.{heatmap()} in your implementation
- Use Line plots for progress tracking with sns.{lineplot()} in your implementation

Expected Output: A working Python script that mathematics teachers can run in their classroom to solve real educational problems.
Assessment: Your solution should be practical, well-commented, and directly applicable to teaching mathematics.
Teaching Context: Visual communication with students, parents, and administrators

Exercise 3: AI-Enhanced Challenge: Interactive dashboards for parent-teacher conferences

Difficulty: Intermediate

AI-Enhanced Programming Exercise

Task: Using Python, develop a Python solution focusing on line plots for progress tracking with sns.{lineplot()}.

Step-by-Step Instructions:

1. Focus on implementing line plots for progress tracking with sns.{lineplot()} effectively
2. Create clear, educational examples for student understanding
3. Test your implementation with classroom scenarios
4. Add comprehensive comments for teaching purposes
5. Validate results and create sample outputs

Technical Requirements:

- Use Line plots for progress tracking with sns.{lineplot()} in your implementation
- Use Customizing plots with titles, labels, and legends in your implementation
- Use Color schemes and styling with matplotlib.style in your implementation

Expected Output: A working Python script that mathematics teachers can run in their classroom to solve real educational problems.

Assessment: Your solution should be practical, well-commented, and directly applicable to teaching mathematics.

Teaching Context: Visual communication with students, parents, and administrators

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