

## Data Visualization Assignments

### Assignment 1: Basic - Creating Simple Charts with Matplotlib

**Objective:** Create basic visualizations to understand AI engineer expertise distribution on the One Hour AI Solution platform.

**Task Description:** You are working with the One Hour AI Solution platform to analyze their AI engineer expertise data. Your goal is to create simple visualizations to help understand the distribution of skills among their engineers.

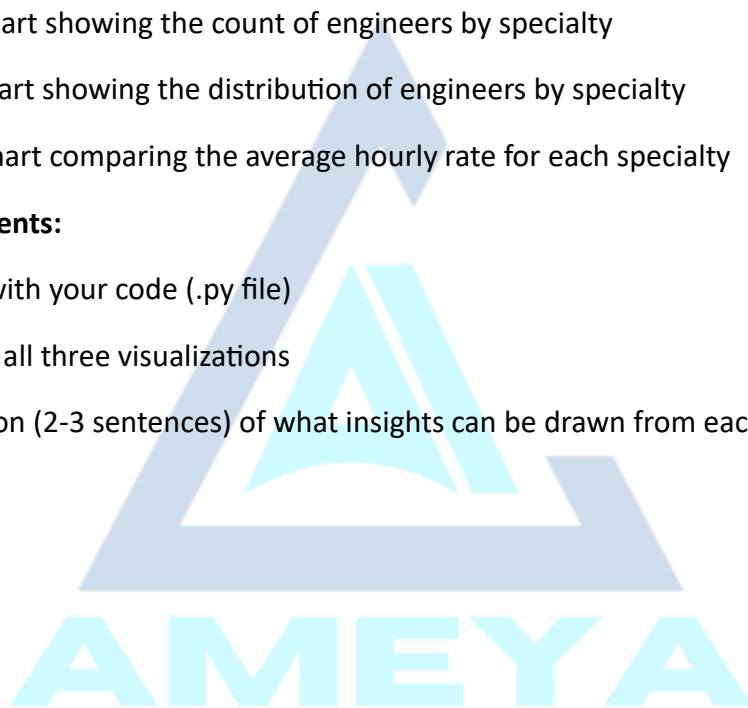
**Dataset:** ai\_engineers.csv

#### Assignment Tasks:

1. Create a bar chart showing the count of engineers by specialty
2. Create a pie chart showing the distribution of engineers by specialty
3. Create a line chart comparing the average hourly rate for each specialty

#### Submission Requirements:

- Python script with your code (.py file)
- Screenshots of all three visualizations
- Brief explanation (2-3 sentences) of what insights can be drawn from each visualization



## Assignment 2: Intermediate - Dashboard-Style Visualization for Client Analytics

**Objective:** Create a comprehensive dashboard-style visualization to analyze client engagement data for the One Hour AI Solution platform.

**Task Description:** The One Hour AI Solution platform wants to better understand client engagement patterns. You'll create a multi-panel dashboard to analyze session data, including booking patterns, session durations, and client satisfaction scores.

**Dataset:** client\_sessions.csv

### Assignment Tasks:

1. Create a 2x2 subplot dashboard with the following components:
  - Top-left: Bar chart showing average session duration by problem category
  - Top-right: Line chart showing weekly number of sessions over time
  - Bottom-left: Box plot showing distribution of satisfaction scores by client industry
  - Bottom-right: Pie chart showing proportion of new vs. repeat clients
2. Apply professional styling to your dashboard, including:
  - Consistent color scheme
  - Clear titles and labels
  - Grid lines where appropriate
  - Proper handling of axis ticks and rotations

### Submission Requirements:

- Python script with your code (.py file)
- Screenshot of the final dashboard
- Written analysis (5-7 sentences) explaining the key insights from your dashboard and how they might be useful to the One Hour AI Solution platform

### Assignment 3: Advanced - Multi-Dimensional Analysis of AI Solution Performance

**Objective:** Create advanced visualizations to analyze the relationship between multiple variables in AI solution performance data.

**Task Description:** As a data analyst for One Hour AI Solution, you need to analyze how different factors affect client satisfaction and solution quality. You'll create several sophisticated visualizations to explore these relationships.

**Dataset:** solution\_performance.csv

#### Assignment Tasks:

1. Use Seaborn to create a heatmap showing the correlation between numerical variables (engineer experience, implementation time, client satisfaction, and success metric)
2. Create a scatter plot with the following features:
  - X-axis: Implementation time
  - Y-axis: Client satisfaction
  - Point size: Success metric
  - Point color: Solution complexity
  - Add a regression line to show the trend
3. Create a custom visualization using both Matplotlib and Seaborn that groups the data by solution complexity and client industry, showing:
  - Distribution of client satisfaction scores using violin plots
  - Mean satisfaction score for each group
  - Proportion of solutions requiring follow-up using a secondary visual element

#### Submission Requirements:

- Python script with your code (.py file)
- Screenshots of all three visualizations
- Detailed analysis (8-10 sentences) interpreting the visualizations, identifying key patterns, and providing actionable recommendations for the One Hour AI Solution platform
- Brief explanation of your design choices for the custom visualization