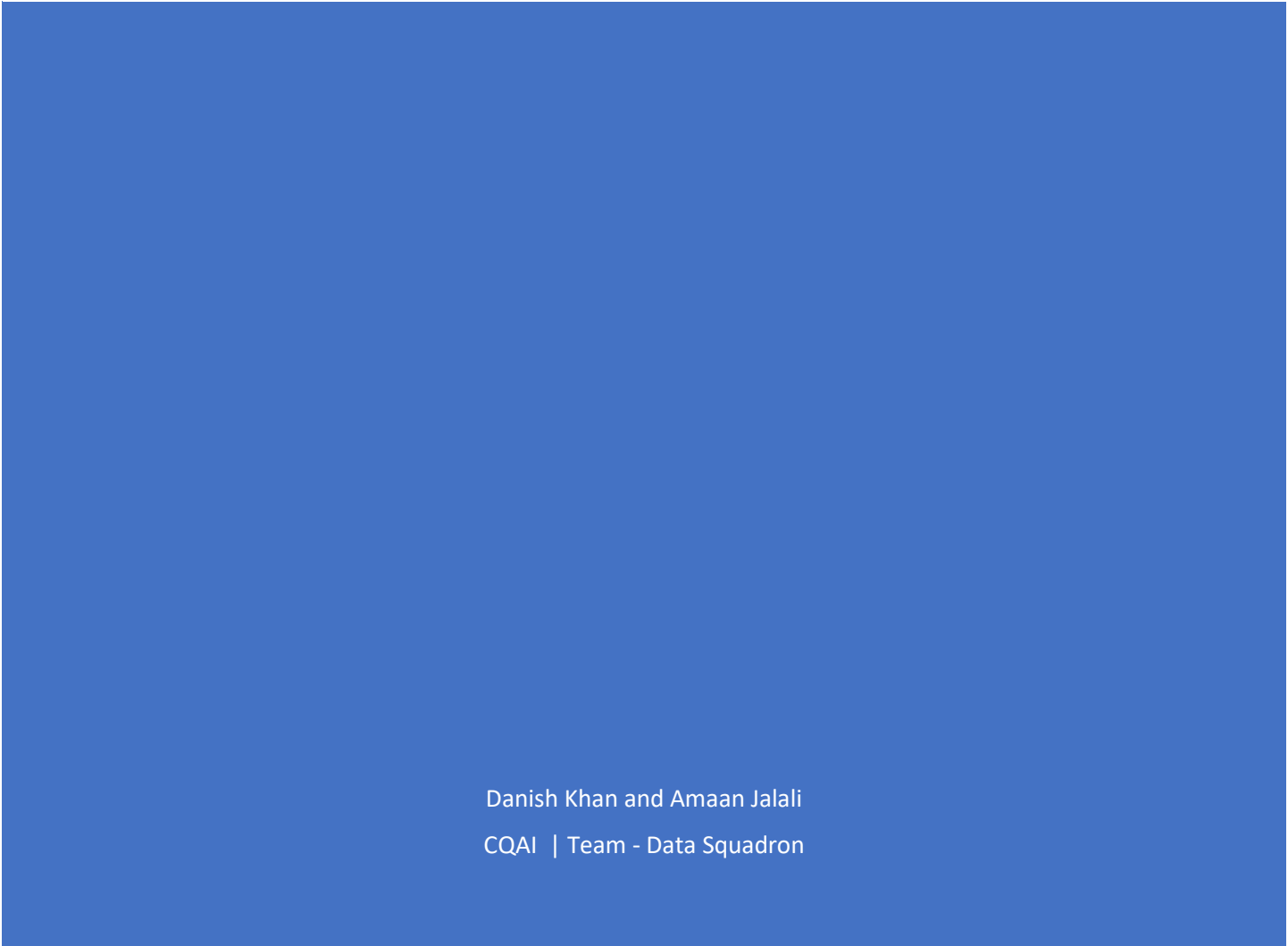# PYTHON BACKEND CODE DOCUMENTATION FOR VISUALIZATION DASHBOARD

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Overview:

This code implements a FastAPI application for uploading CSV files, cleaning the data, and generating various types of plots using Plotly.

Dependencies:

- pandas: Data manipulation library in Python.
- io: Input/output support for working with binary data.
- fastapi: FastAPI framework for building APIs with Python.
- plotly: Library for creating interactive, web-based visualizations.
- plotly.graph_objects: Module for creating graph objects.
- plotly.express: Module for creating high-level, easy-to-use plotly figures.

Endpoints:

1. **Upload CSV Endpoint:**
   - Path: /upload/
   - Method: POST
   - Parameters: file (UploadFile)
   - Description: Accepts a CSV file, reads the content, cleans the dataset, and returns summary statistics and data for further processing.
2. **Scatter Plot Endpoint:**
   - Path: /plot/scatter/
   - Method: POST
   - Parameters: x_column (str), y_column (str)
   - Description: Generates a scatter plot using the specified columns from the uploaded dataset.
3. **Bar Chart Endpoint:**
   - Path: /plot/bar/
   - Method: POST
   - Parameters: x_column (str), y_column (str)
   - Description: Generates a bar chart using the specified columns from the uploaded dataset.
4. **Histogram Endpoint:**
   - Path: /plot/histogram/
   - Method: POST
   - Parameters: column_name (str)
   - Description: Generates a histogram using the specified column from the uploaded dataset.
5. **Heatmap Endpoint:**
   - Path: /plot/heatmap/
   - Method: POST
   - Parameters: x_column (str), y_column (str)
   - Description: Generates a heatmap using the specified columns from the uploaded dataset.
6. **3D Scatter Plot Endpoint:**
   - Path: /plot/scatter3d/
   - Method: POST

- Parameters: x_column (str), y_column (str), z_column (str)
- Description: Generates a 3D scatter plot using the specified columns from the uploaded dataset.

7. **Density Mapbox Endpoint:**
   - Path: /plot/density_mapbox/
   - Method: POST
   - Parameters: column_name (str)
   - Description: Generates a density map using the specified column from the uploaded dataset.

8. **Pie Chart Endpoint:**
   - Path: /plot/pie/
   - Method: POST
   - Parameters: values_column (str), names_column (str)
   - Description: Generates a pie chart using the specified columns from the uploaded dataset.

9. **Violin Plot Endpoint:**
   - Path: /plot/violin/
   - Method: POST
   - Parameters: x_column (str), y_column (str)
   - Description: Generates a violin plot using the specified columns from the uploaded dataset.

10. **Strip Plot Endpoint:**
    - Path: /plot/strip/
    - Method: POST
    - Parameters: x_column (str), y_column (str)
    - Description: Generates a strip plot using the specified columns from the uploaded dataset.

11. **ECDF Plot Endpoint:**
    - Path: /plot/ecdf/
    - Method: POST
    - Parameters: x_column (str)
    - Description: Generates an empirical cumulative distribution function (ECDF) plot using the specified column from the uploaded dataset.

12. **Density Contour Plot Endpoint:**
    - Path: /plot/density_contour/
    - Method: POST
    - Parameters: x_column (str), y_column (str)
    - Description: Generates a density contour plot using the specified columns from the uploaded dataset.

13. **Root Endpoint:**
    - Path: /
    - Method: GET
    - Description: Redirects to the API documentation page.

Usage:

- Upload a CSV file using the /upload/ endpoint.
- Access various plot types using the corresponding endpoints with appropriate parameters.

- The API returns Plotly JSON representations of the generated plots.

Note:

- The uploaded CSV data is stored globally within the application for plotting purposes.
- Error handling is implemented to handle various scenarios such as invalid input and missing data.