Module Purpose

This module (visualizer.py) provides the core data visualization functionality for applications using Streamlit and Plotly. It accepts a dataset in the form of a pandas DataFrame and dynamically generates interactive visualizations along with descriptive statistical summaries. The module is optimized for easy integration into analytical dashboards and AI-driven financial or operational reporting systems.

What This Module Does

- Sets up a clean and responsive visualization section within a Streamlit interface.
- Accepts a DataFrame and a custom title as inputs.
- Validates the input data:
    - Displays a warning if the dataset is empty or None.
    - Informs the user if there are no numeric columns available for plotting.
- Detects numeric columns in the data and:
    - Plots a line chart using up to the first three numeric columns.
    - Displays a bar chart showing the top 10 rows based on the first numeric column.
- Outputs a statistical summary table using pandas' .describe() function.
- Ensures all charts are rendered responsively using use_container_width=True.

Dependencies

This module relies on the following libraries:

- streamlit – for building the web-based user interface.
- plotly.express – for creating interactive charts (line and bar).
- pandas – for data manipulation and statistical summaries.

Note: While pandas is not explicitly imported in this file, the passed data argument is expected to be a pandas DataFrame.

UI Behavior

- If the dataset is missing or empty, a warning message is shown and no chart is rendered.
- If numeric columns are not found in the dataset, a message is shown indicating the absence of numeric data.
- If valid numeric data is found:
    - A line chart is displayed showing up to three numeric columns over their index.

- A bar chart is displayed using the top 10 entries of the first numeric column.
- A data summary table is presented with statistical measures (mean, std, min, max, etc.).

Sample Usage (Functional Flow)

1. The user uploads a dataset via Streamlit file uploader in another module.
2. The dataset is passed to create_enhanced_visuals(data, title) along with a relevant title.
3. If valid, the function:
    - Renders a line chart for trend analysis.
    - Renders a bar chart to highlight top records.
    - Displays a summary statistics table for all numeric features.
4. If invalid, appropriate user-friendly messages are displayed.

Functionality

- Defines a single function: create_enhanced_visuals(data, title)
- Automatically detects and handles empty or non-numeric data scenarios.
- Combines visual insight (charts) and quantitative analysis (summary table) in one unified block.
- Designed for modular reuse across Streamlit apps that involve data exploration or dashboarding.

Contribution

This module was independently developed to streamline the process of visualizing numeric data within a Streamlit-based application. It serves as a reusable component that bridges raw data with insightful visual representations. It was structured to be modular, easily extendable, and capable of delivering immediate value in interactive analytics contexts. The design ensures that even basic datasets can be explored with minimal user configuration, while maintaining clean layout integration and responsive design.