VizAgent: An AI-Powered Agentic System for Automated Web Analytics Dashboarding

# Executive Summary

VizAgent is an AI-drive, multi-agent system designed to automate the web analytics workflow-from raw data ingestion to Tableau-ready dashboards. Built around modular “One Task, One Agent” design priniciple, VizAgent enables marketing and data teams to rapidly clean data, extract insights and generate effective visualization plans using large language models (LLMs) and Tableau’s Hyper format.

# Objectives

* Simplify the transformation of raw web analytics CSV data into insightful dashboards
* Reduce time spent on manual cleaning, exploratory data analysis (EDA) and visualization planning
* Enable consistent, LLN-guided storytelling aligned with key business metrics
* Support Tableau integration via .hyper file export and structured chart specs.

# System Architecture

VizAgent is built as a sequence of collaborative agents, each handling a distinct stage of the analytics pipeline:

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| --- | --- |
| **Agent** | **Role** |
| Ingestion Agent | Validated and loads csv data, infers schema and encoding |
| Cleaning Agent | Cleans nulls, converts string-numbers, removes duplicates |
| EDA Agent | Generated profiling reports (YData + SweetViz) and key insights |
| Visualization Agent | Uses GPT-4o-mini to recommend dashboard layouts, chart types and filters |
| Tableau Export Agent | Converts cleaned data to .hyper and saves a chart plan (JSON) and template workbook. |

Each component is built with robustness in mind, using fallback logic and user-friendly Streamlit interfaces.

# Tools and Technologies

* **Python + Streamlit** for UI and orchestration
* **CrewAI-style modular architecture**
* **OpenAI GPT-4 / 3.5** for visualization planning
* **Pantab + Tableau Hyper API** for .hyper file creation
* **YData-Profiling, Sweetviz** for visual EDA reports
* **DuckDB, Pandas, PyJanitor** for scalable ingestion and cleaning

# Outputs and Deliverables

* Cleaned DataFrame view
* Automated data profiling report downloads
* GPT-generated dashboard spec in JSON
* . hyper file compatible with Tableau Public
* Downloadable .twb workbook template scaffold (optional extension)

# Value and Impact

* Reduces hours of repetitive analytics work into a few button clicks
* Empowers analysts with data-driven chart suggestions grounded in best practices
* Demonstrates how LLMs can augment structured analytics workflows
* Portable and extensible—can plug into existing data pipelines

# Future Opportunities

* Generate .twbx packaged Tableau workbooks automatically.
* Add support for semantic querying (e.g., “what device had the highest bounce rate?”)
* Depot as SaaS for drag-and-drop dashboard automation