

Project name: AI-Powered Statistical Analysis Tool for Single-Subject Research in Behavioral Studies

Project description: This project involves developing a tool to assist in the statistical analysis of single-case design data in behavior analytic research. The tool will guide users in selecting appropriate statistical methods based on the design type and other characteristics of the data. It will perform analyses, such as statistical tests and machine learning predictions, and present the results in a user-friendly interface. This project addresses a real-world need in behavior analysis, facilitating better research practices and collaboration.

Tools to be used / Programming language to be used: You are free to choose any programming language and tools that best fit the project requirements. Options include:

- **Programming Languages:** Python, R, JavaScript, or any other suitable language.
- **Data Manipulation and Analysis Libraries:** Libraries for handling and analyzing data, such as Pandas, NumPy, or their equivalents.
- **Statistical Analysis Tools:** Libraries for statistical tests and modeling, such as SciPy or similar tools.
- **Machine Learning Libraries:** For predictive analytics, tools like Scikit-Learn, TensorFlow, or their equivalents.
- **User Interface Development:** Tools for creating user interfaces, including desktop GUI libraries or web frameworks, such as Tkinter, PyQt, Streamlit, Dash, or alternatives.

By the end of the project, the students are expected to deliver:

1. **Functional Statistical Analysis Tool:** A tool that can perform basic statistical analyses relevant to single-case design data. This includes at least one or two statistical tests suitable for different design types (e.g., paired t-test for ABA Reversal or logistic regression for Multiple Baseline).
2. **Basic User Interface:** A simple and intuitive user interface that allows users to input data, select design types, and execute analyses. The interface should be straightforward, focusing on essential functionality without advanced features.
3. **Documentation and Guides:** Comprehensive documentation detailing how to use the tool, including step-by-step guides and instructions for interpreting results. This should also include a basic user manual and examples of data inputs and outputs.
4. **Integration with External Tools (Optional):** If feasible within the timeframe, explore basic integration with existing statistical tools or libraries (e.g., R). This integration should be straightforward and enhance the tool's capabilities.
5. **Initial Testing and Feedback:** Conduct preliminary testing with sample data to ensure the tool functions as intended. Gather feedback from a small group of users to identify and address any major issues or improvements needed.

The focus will be on developing a practical and functional prototype that can be built upon in the future, with an emphasis on achieving the core functionalities and ensuring usability.

Expected number of students who may work on the project: 1 to 2 students.

How this experience will benefit your future career: Working on this project will provide you with valuable experience in developing complex software solutions and handling data analysis tasks. You'll gain practical skills in programming, statistical analysis, and user interface design, which are highly sought after in many industries. This hands-on experience will not only enhance your technical expertise but also improve your problem-solving abilities and project management skills, making you a strong candidate for careers in data science, software development, and analytics.