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Design And Development Of Desktop Statistical Package Using Statista(Stapp)

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ABSTRACT
This research, Design and Development of Desktop Statistical Package Using Statista aim to Develop Desktop Statistical Package Using Statista and the Objectives are to provide a comprehensive platform for solving statistical problems across multiple domains, to enhance the learning experience by showing detailed workings and statistical formulas, to enable users to visualize statistical computations through interactive plots and graphs, to allow users to save results and plots for documentation and reporting purposes and to create a modular and scalable system that can be expanded to include additional statistical methods in the future. StApp was use with Language and libraries, Python 3.11, PyQt5 for GUI, pandas/numpy/matplotlib/scipy/scikit-learn for data and analysis to solve Descriptive Statistics, Discrete Probability, Continuous Probability, Bayes Theorem, Matrix Methods, Regression, Hypothesis Testing, Chi-square and ANOVA, also the Package allow Import and Visualize, Practice Center, Testing and validation, this Package provide a comprehensive platform for solving statistical problems across multiple domains, it enhance the learning experience by showing detailed workings and statistical formulas, it enable users to visualize statistical computations through interactive plots and graphs, it allow users to save results and plots for documentation and reporting purposes and it create a modular and scalable system that can be expanded to include additional statistical methods in the future. This Package serve as a valuable tool for teaching and learning statistics, it showcases the institution's commitment to innovation and technology in education. We thereby recommend this Desktop Package to all institution of higher learning because is friendly users, more efficient and accurate.
Key words: stApp, statistical methods,Desktop and Package.

I. INTRODUCTION

STATISTA(stApp) is an innovative software application designed to simplify and automate the process of solving statistical problems. It is a user-friendly, GUI-based tool that caters to students, researchers, and professionals who require accurate and efficient solutions to a wide range of statistical problems. The application is modular, covering various topics in statistics, and provides interactive visualizations, detailed workings, and the ability to save results and plots for further use. The emergence of statistical software has undoubtedly contributed enormously to the development in research studies in this 21st century. The high premium placed on ICT by human beings, researchers and organizations has undoubtedly made it a major drive of every nation [3] (2013). Statistical Software (SS) is a vital tool for research analysis, data validation and findings. ‘Over the course of history, different forms of data analysis methods have been in existence. Initially, it was paper and pen and later the advent of which computer has helped invention of punching machines and later upgraded to simple calculator and complex scientific calculator. Nevertheless, pundits have revealed that statistical software is a software program that makes the calculation and presentation of statistics relatively easy[4]. Statistical software allows researchers to avoid routine mathematical mistakes and produce accurate figures in their research if they input all data correctly [2].

1.1 SIGNIFICANCE OF STUDY

Several statistical tools and software have been developed over the years, each catering to specific user needs. Some of the most notable ones include SPSS (Statistical Package for the Social Sciences),R Programming, Excel, MATLAB and Python Libraries (e.g., SciPy, NumPy, Pandas),While these tools are powerful, they often require a step learning curve or significant financial investment. This creates a gap for a user-friendly, affordable, and comprehensive statistical problem solver that caters to both beginners and advanced users. The aim to bridge the gap between accessibility and functionality by providing a GUI-based statistical problem solver. Unlike existing tools, This Desktop Application (stApp) focuses on: Ease of Use, Comprehensive Coverage, Educational Value, Visualization and Affordability for effective, accurate, appropriate and efficient statistical analysis.

II. LITERATURE REVIEW

On daily basis, we encounter data that is applicable in life but it remains meaningless except it is collected, presented, tabulated and analyzed. Errors in human data entry can sabotage results and conclusions. A single data entry error can cause a moderate correlation to vanish and a significant t-test to become non-significant. As a result, scientists should create and use human-computer interface (Statistical Software) that reduce data entry errors [7]. Scientific data analysis aids in the creation of new information or a deeper understanding of natural events. Data analysis is where statistical software comes in handy. SPSS and Minitab appear to be the most popular, especially among those who can't code or aren't mathematically oriented enough to use complex tools like R, MATLAB, or Maple [5]. The aim of this research work is to compare statistical software in quantity data analysis. The objectives are to determine the level of awareness and usage of statistical software, evaluate the relevance of statistical software in data analysis and to derive a multiple regression model. Over the years, statistical analysis has been carried out using manual analysis methods which is cumbersome and prone to a lot of human errors especially in a case where we have large information [1]. This led to the emergence of Statistical Software (SS) which has undoubtedly contributed enormously to the development in research in this 21st century [6]. There are different forms of data analysis methods. Initially, it was paper and pen, punching machines, simple calculator, and complex scientific calculator. By advancement in technology, we now have executable statistical software. Statistical software allows researchers to avoid routine mathematical mistakes and produce accurate figures in their research if all data are inputted correctly [6].

III. RESEARCH METHODOLOGY

3.1 STATISTICAL METHODS IN FOCOUS

1. Descriptive Statistics:
Descriptive statistics summarize and describe the main features of a dataset. Measures such as mean, median, mode, variance, and standard deviation are essential for understanding data distribution.
2. Bayes' Theorem:
Bayes' Theorem is a fundamental concept in probability theory that calculates the probability of an event based on prior knowledge. It is widely used in fields like machine learning, medical diagnosis, and decision-making.
3. Chi-Square Test and ANOVA:
1. The Chi-Square Test is used to determine whether there is a significant association between categorical variables.
2. ANOVA (Analysis of Variance) is used to compare means across multiple groups and determine if the differences are statistically significant.

4. Regression and Correlation:
Regression analysis examines the relationship between dependent and independent variables, while correlation measures the strength and direction of the relationship.
5. Graphical Tools:
Visualizations such as bar chart histograms, pie chart, boxplots, and scatterplots are crucial for understanding data patterns and trends.

3.2 TECHNOLOGICAL ADVANCEMENTS IN STATISTICAL TOOLS

The integration of graphical user interfaces (GUIs) with statistical computation has revolutionized the way users interact with data. Tools like Tableau and Power BI have demonstrated the importance of visualization in data analysis. Similarly, the use of open-source libraries like Matplotlib and Seaborn in Python has made it easier to create high-quality visualizations. stApp leverages these advancements to provide an interactive and visually appealing user experience.

3.3 METHODOLOGY

1. Research and Requirement Analysis
(a). Conduct a detailed analysis of user needs and existing tools.
(b). Identify the key statistical methods and features to include in STATISTA.
2. Design and Development
(a). GUI Design: Create an intuitive interface using Tkinter.
(b). Module Development: Implement statistical methods as independent modules (e.g., Bayes' Theorem, Chi-Square Test).
(c). Visualization: Integrate Matplotlib for interactive plots and graphs
3. Testing and Validation

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(a). Perform unit testing for each module to ensure accuracy.
(b). Conduct usability testing with students and researchers to gather feedback.

4. Deployment
a. Package the application for distribution.
b. Provide user manuals and tutorials for easy adoption.
5. Maintenance and Updates
Continuously update the application to include new features and address user feedback.

3.4 ARCHITECTURE AND DESIGN CHOICES
Language and libraries, Python3.11,PyQt5 for GUI, pandas/numpy/matplotlib/scipy/scikit-learn for data & analysis.
1. Project layout (key files):
- **a.** `main.py` — application entry, navigation, splash, startup logic.
- **b.** `modules/*.py` — each module is a QWidget subclass with its own UI and logic.
- **c.** `data/questions.json` — practice question bank.
- **d.** `data/scores.json` — persisted per-category scores.
- **e.** `assets/` — icons and splash images.
- **f.** UI contract per module (consistent pattern):
- **g.** Top row: import/save/plot controls (where applicable).
- **h.** Middle: interactive controls (form inputs, dropdowns) and a central result area (QTextEdit) for step-by-step outputs.
- **i.** Bottom: action buttons (Calculate, Submit, Next) and optional plotting windows.
- **j.** Packaging approach: used PyInstaller with `--onefile --windowed`, included `data` and `assets` via add-data`, and added a runtime resource helper to locate files inside the PyInstaller bundle.
- **k.** Persistence: JSON files for question bank and scores. Pandas used for CSV import/export.

3.5 RESULTS OF THE PROGRAM
Descriptive Statistics
Descriptive Statistics
Screenshot placeholder

Figure 1: Showing Screenshot of Descriptive Statistics

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Discrete Probability
Screenshot placeholder

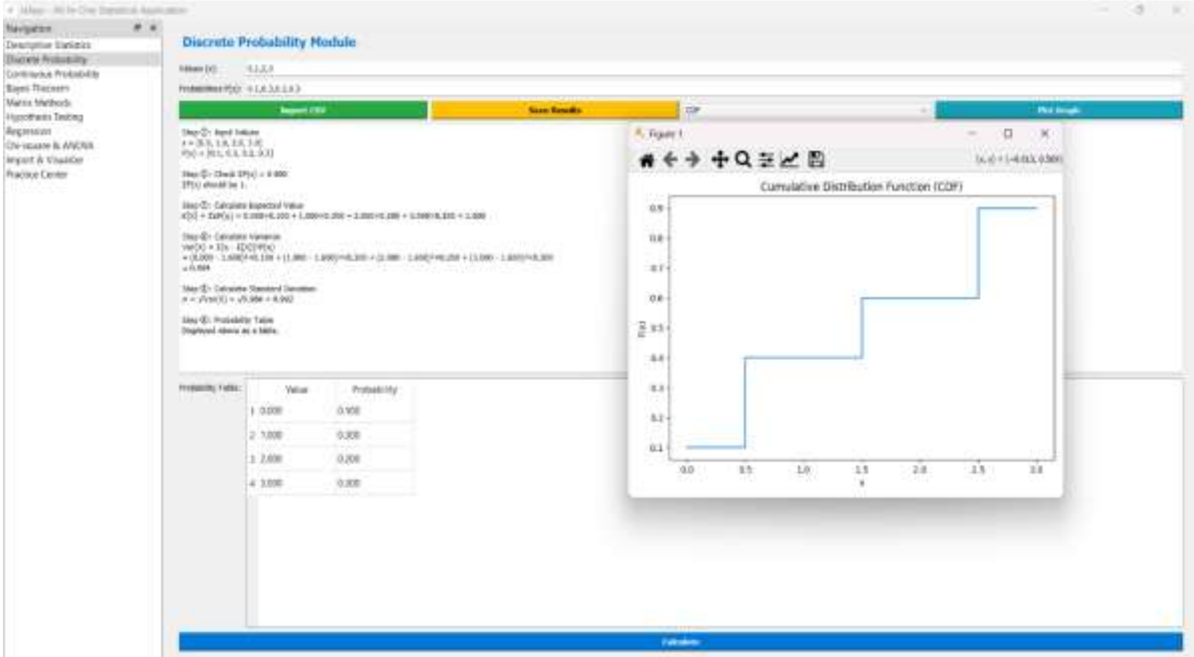

Figure 2: Showing Screenshot of Discrete Probability

Continuous Probability
Screenshot placeholder

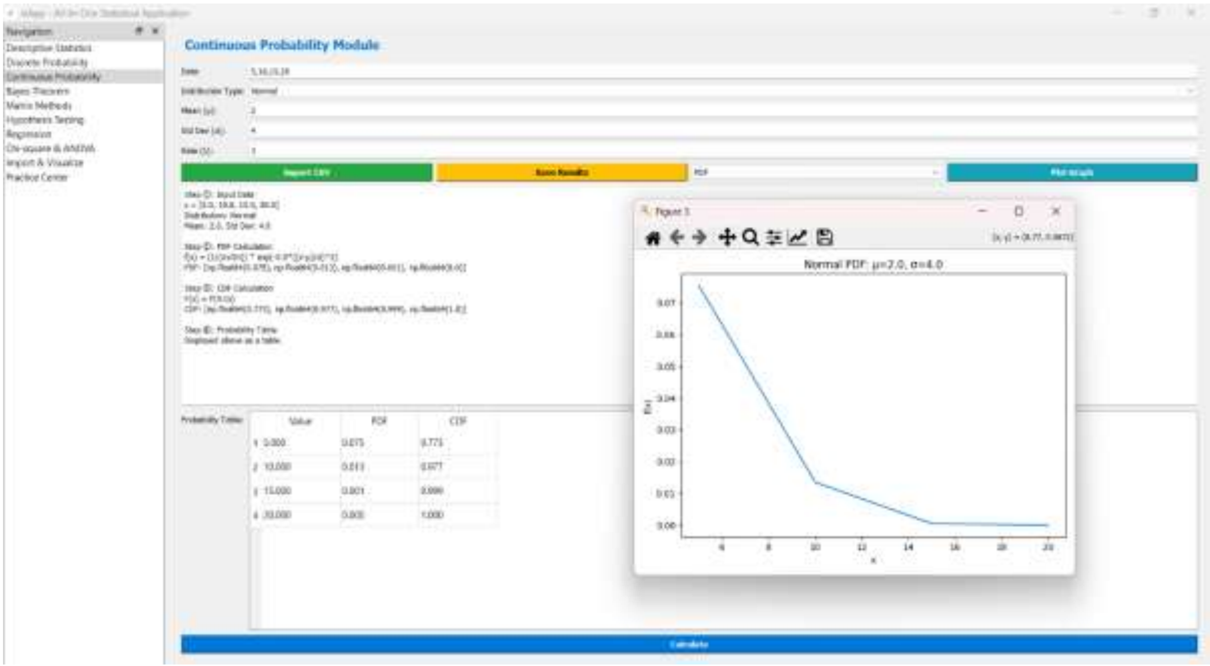

Figure 3: Showing Screenshot of Continuous Probability

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Bayes Theorem
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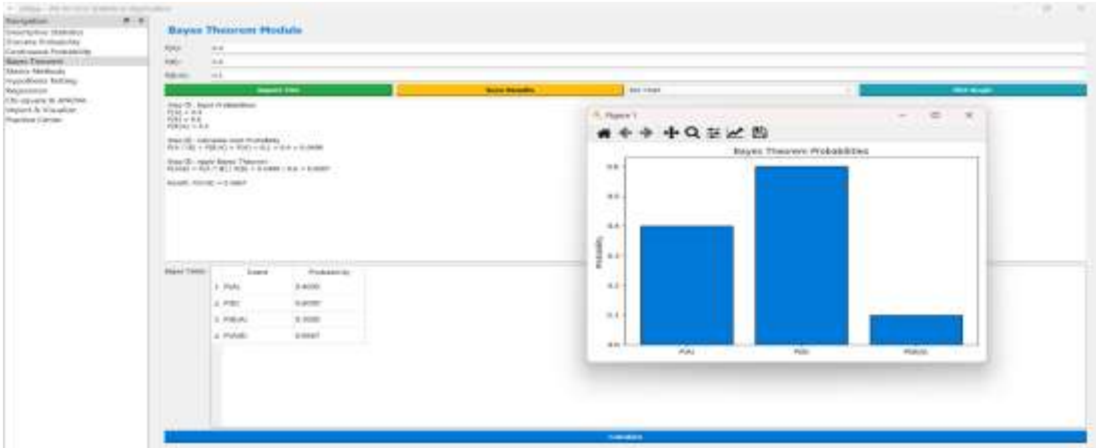

Figure 4: Showing Screenshot of Bayes Theorem

Matrix Methods
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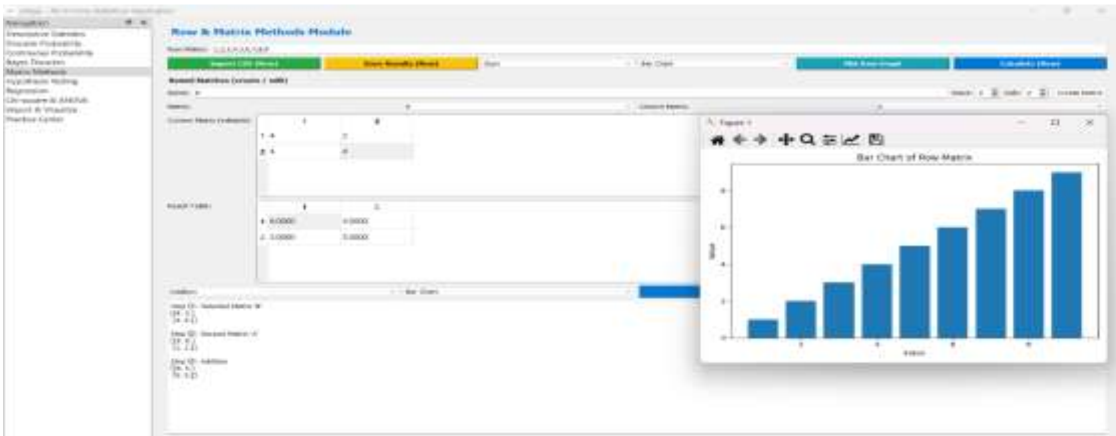

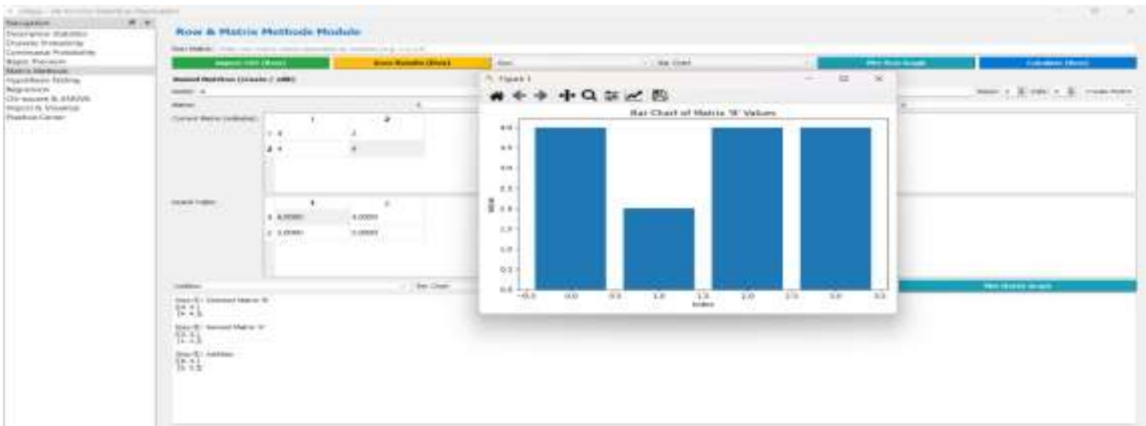

Figure 5: Showing Screenshot of Matrix Method

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Regression
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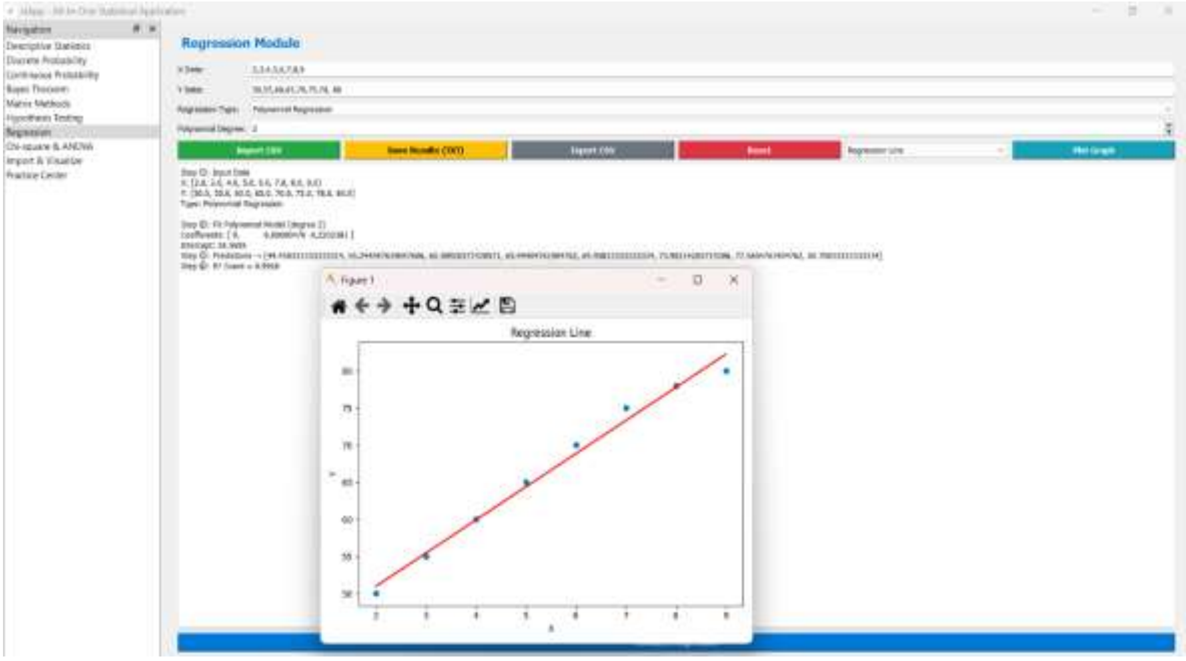

Figure 6: Showing Screenshot of Regression

Hypothesis Testing
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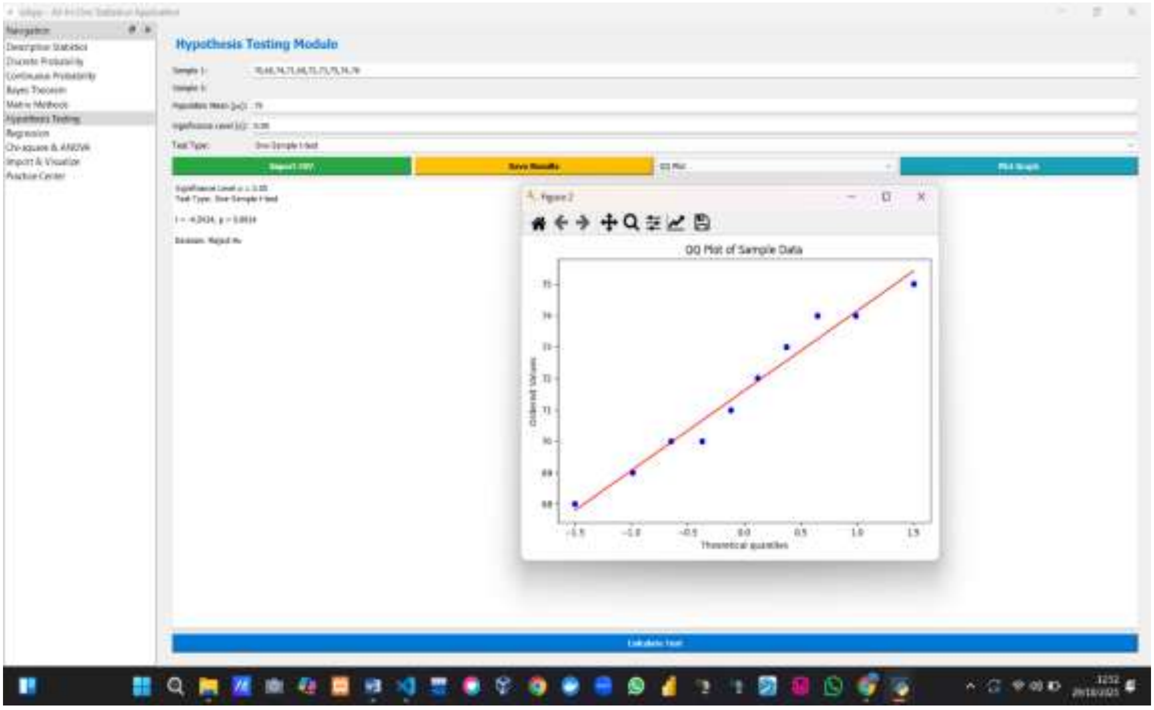

Figure 7: Showing Screenshot of Hypothesis Testing

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Chi-square and ANOVA
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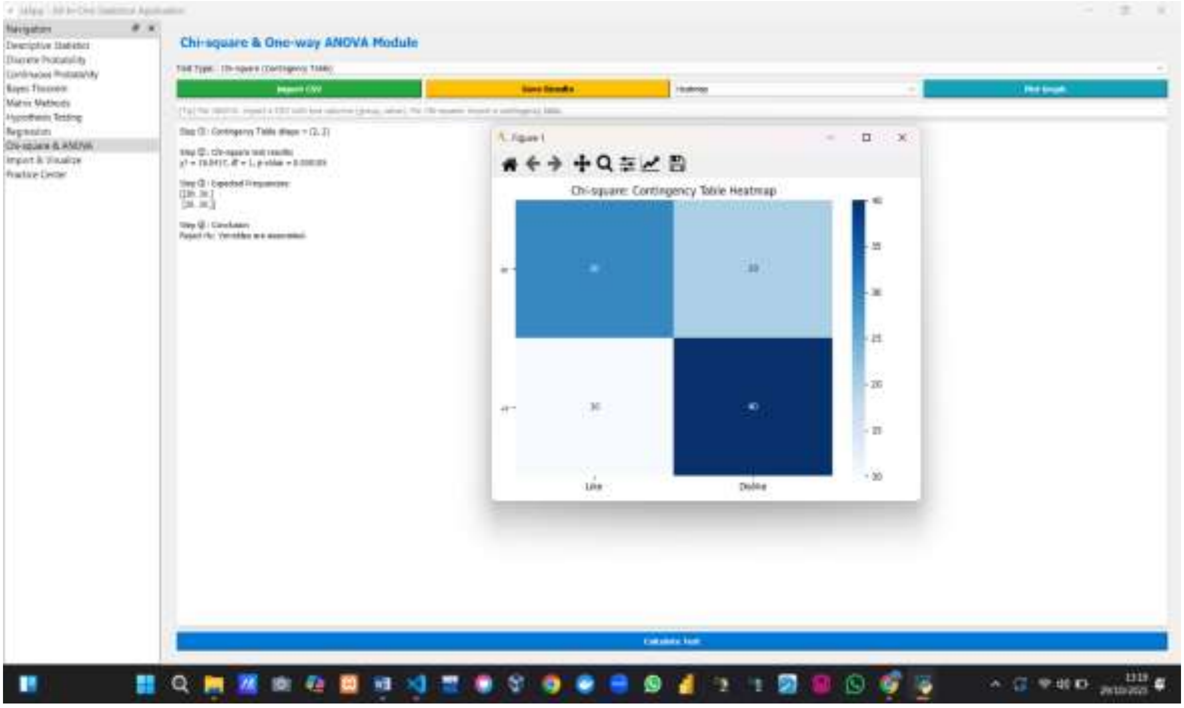
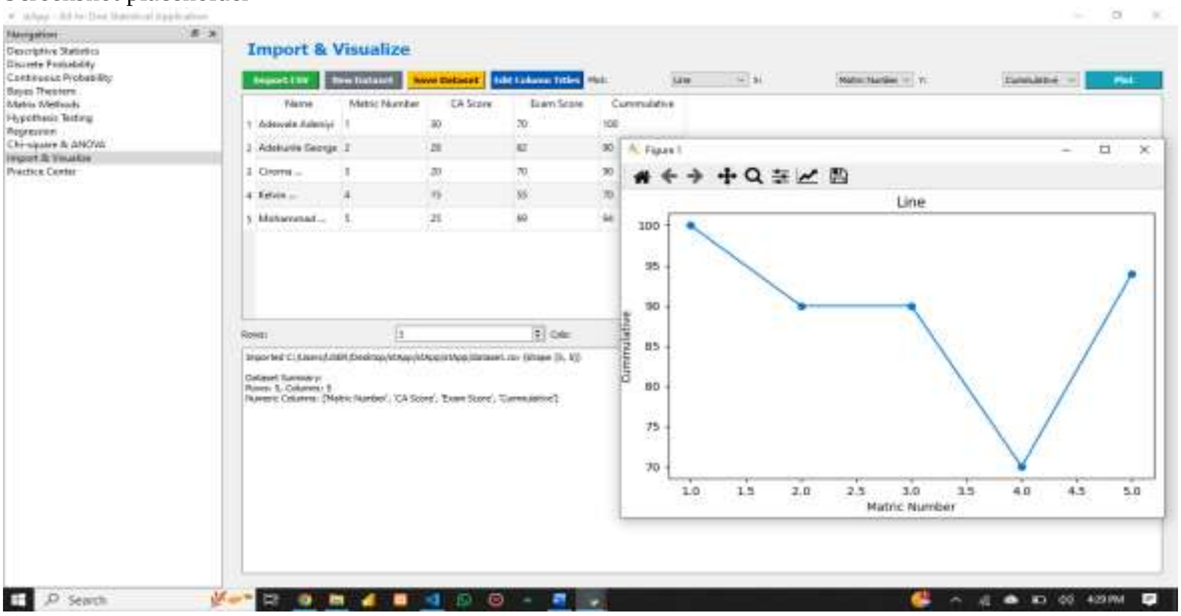


Figure 8: Showing Screenshot of Chi-square and ANOVA

Import and Visualize
Purpose**:** Provide a user-friendly interface for importing, creating, editing, and visualizing datasets to support data analysis and hypothesis testing modules. It enables users to prepare clean datasets, explore variable relationships, and generate quick insights before applying statistical methods.

Screenshot placeholder



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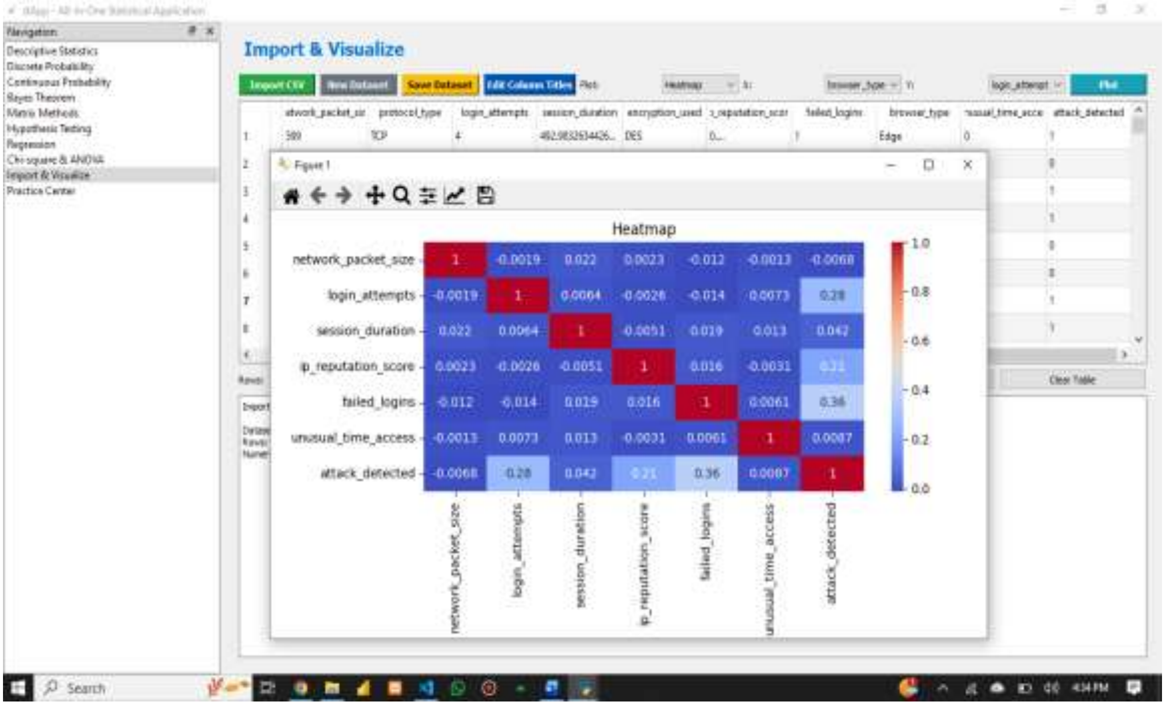

Figure 9: Showing Screenshot of Import and Visualize

Practice Center

Purpose: provide an interactive environment for testing understanding across all modules through quizzes, guided problems, and instant feedback.

Features: supports randomized questions, numeric/text input, immediate evaluation with solutions, score tracking, and per-category performance display. Includes a banner image (test_header.png) for visual appeal and a clickable info popup. Covers all key modules — Descriptive Statistics, Probability (Discrete and Continuous), Bayes Theorem, Matrix Methods, Hypothesis Testing, Regression, Chi-square and ANOVA, Import and Visualize, and Practice Center meta exercises.

Screenshot placeholder

Figure 10: Showing Screenshot of Interactive Practice Centre

IV. GENERAL CONCLUSION

This research was carried out to Development Desktop Statistical Package Using Statista, we use stApp Language and libraries, Python 3.11, PyQt5 for GUI, pandas/numpy/matplotlib/scipy/scikit-learn to develop a program and application Desktop for data analysis to solve Descriptive Statistics, Discrete Probability, Continuous Probability, Bayes Theorem, Matrix Methods, Regression, Hypothesis Testing, Chi-square and ANOVA. Result of the Desktop Application using the stApp provide a comprehensive platform for solving statistical problems across multiple domains, it enhance the learning experience by showing detailed workings and statistical formulas, it enable users to visualize statistical computations through interactive plots and graphs, it allow users to save results and plots for documentation and reporting purposes and it create a modular and scalable system that can be expanded to include additional statistical methods in the future. Also the Application allow Import and Visualize, Practice Center, Testing and validation. This Desktop Application serve as a valuable tool for teaching and learning statistics, it enhancing the institution's academic offerings and also showcases the institution's commitment to innovation and technology in education, this Desktop Application will aid Lecturer, Students and educationalist to Understand descriptive summaries and their calculation, it will help to translate probability models into calculations and visual intuition. This Desktop Application will help to interpret regression output and diagnostic plots and to connect theoretical formulas to numeric results using step-by-step displays. stApp addresses the challenges of automating calculations, providing detailed explanations, and offering an affordable solution. It user-friendly, affordable, and comprehensive statistical problem solver that caters to both beginners and advanced users

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