Data Preparation:

* Raw data is loaded and preprocessed using Pandas.
* Columns are renamed, and target variable is converted to boolean.
* The updated DataFrame is saved to a CSV file.

Graphical User Interface (GUI):

* A Tkinter-based GUI is designed for algorithm, metrics, and file path selection.
* User can choose the machine learning algorithm and specific metrics to evaluate.
* The selected file path is stored for further processing.
* Machine Learning Algorithm Execution:
* Train-test split is performed on the dataset.
* Three metaheuristic algorithms (Sparrow Search, Squirrel Search, Bat Algorithm) are executed.

Evaluation and Normalization:

* The selected features from the algorithms are evaluated and normalized.
* MinMaxScaler is used to scale selected columns to a normalized range.
* Feature selection is applied using the chi-squared test with SelectKBest.
* Display or Save Final Results:
* Results are displayed to the user or saved, based on the application's design.
* Options include showing results on the GUI or saving them to files.

Results Saving:

* The results of each algorithm are saved separately.
* This may involve saving feature-selected data, performance metrics, or other relevant information.

Final Output:

* The final output includes the processed and selected features, performance metrics, and any additional relevant information.
* Results can be used for further analysis or comparison.

This workflow combines data preprocessing, algorithm execution, and result presentation in a user-friendly interface. It allows users to explore and analyze machine learning algorithm performance on a given dataset.