**Report on Methodology, Findings, and Assumptions**

**Objective:**

The objective of this analysis was to evaluate the performance of various Binance accounts based on historical trade data over 90 days, calculate key financial metrics for each account, rank them accordingly, and provide a top 20 list. The financial metrics calculated include ROI, PnL, Sharpe Ratio, Maximum Drawdown (MDD), Win Rate, and the total number of positions.

**Methodology:**

1. **Data Preprocessing:**
   * **Data Loading:** The dataset, provided in CSV format, contained historical trade data for multiple Binance accounts. Each account is identified by a unique Port\_IDs, and trade information is stored in a JSON-like structure under the Trade\_History column.
   * **Data Cleaning:** The Trade\_History was parsed from string format into proper JSON format using ast.literal\_eval() to handle malformed or inconsistent values.
   * **Trade Flattening:** Each trade history was extracted and flattened into individual rows, with each trade record containing the relevant Port\_IDs for proper identification.
2. **Feature Engineering:**
   * **PnL Calculation:** The Profit and Loss (PnL) for each trade was derived directly from the realizedProfit field.
   * **ROI Calculation:** Return on Investment (ROI) for each trade was calculated by dividing the PnL by the total investment (quantity \* price).
   * **Sharpe Ratio:** For each account, the Sharpe Ratio was calculated as the mean of the PnL divided by the standard deviation of PnL over all trades.
   * **Maximum Drawdown (MDD):** The Maximum Drawdown for each account was calculated by evaluating the cumulative profit over time and finding the greatest peak-to-trough loss.
   * **Win Rate and Win Positions:** The win rate was calculated by counting the number of profitable trades (PnL > 0) and dividing it by the total number of trades. The number of win positions (profitable trades) was also counted.
3. **Ranking Algorithm:**
   * The following key metrics were computed and used for ranking:
     + **Total PnL:** Sum of all realized profits and losses.
     + **Average ROI:** Mean ROI for all trades within an account.
     + **Sharpe Ratio:** To assess the risk-adjusted return.
     + **Maximum Drawdown (MDD):** To measure the worst peak-to-trough loss.
     + **Win Rate:** Percentage of profitable trades.
     + **Total Positions:** Total number of trades.
     + **Win Positions:** Count of profitable trades.
   * **Weighting System:** A weighted scoring system was applied to balance the metrics:
     + ROI: 30%
     + PnL: 25%
     + Sharpe Ratio: 20%
     + Win Rate: 15%
     + Maximum Drawdown: -10% (negative weight to penalize large drawdowns)
   * **Ranking:** Each account was assigned a Rank\_Score based on the weighted sum of the metrics, and accounts were ranked accordingly.
4. **Top 20 Accounts:** The top 20 accounts were selected based on their Rank\_Score in descending order.
5. **Visualization:** A bar chart was created to visually represent the top 20 accounts by their rank scores.

**Findings:**

* The top 20 accounts were ranked based on a combination of their overall profitability (PnL), risk-adjusted return (Sharpe Ratio), and consistency (Win Rate), with penalties for large drawdowns (MDD).
* **Profitability:** Accounts with the highest PnL and ROI were ranked higher.
* **Risk-adjusted Performance:** Accounts that managed risk well (as reflected by the Sharpe Ratio) scored better.
* **Win Rate and Drawdown:** Accounts that had a high percentage of profitable trades and low drawdowns ranked better, as these metrics suggest a more stable and consistent performance.
* **Top Accounts:** The top accounts demonstrated a balanced approach, combining good profitability with effective risk management and low drawdowns.

**Assumptions:**

* **Data Integrity:** It is assumed that the realizedProfit field accurately reflects the profits and losses from each trade.
* **Transaction Fees:** Fees are not explicitly factored into the ROI and PnL calculations, which may slightly affect the results if fees were significant.
* **Static Weights:** The weights assigned to each metric (e.g., 30% for ROI, 25% for PnL) are fixed and do not change dynamically based on the data. These weights were chosen based on a typical financial analysis approach but could be adjusted based on specific business needs.
* **Trade Frequency:** It is assumed that each trade is independent, and no special treatment is given to positions held for different durations (e.g., short-term versus long-term trades).
* **Timeframe Consistency:** The analysis was conducted over a 90-day period, assuming that this timeframe is representative of each account’s performance.

**Conclusion:**

This analysis provides a comprehensive evaluation of Binance accounts by calculating essential financial metrics and applying a ranking algorithm based on weighted scores. The top 20 accounts are identified based on their ability to achieve profitability while managing risk effectively. The methodology can be adjusted for different weightings or additional metrics to tailor it to specific performance evaluation needs.