# Report on Trade Data Processing and Account Performance Analysis

## 1. Introduction

This report outlines the methodology used to process trade data, calculate financial performance metrics, and rank trading accounts based on performance indicators. The data originates from Binance trade history and undergoes several transformations to extract meaningful insights.

## 2. Data Preprocessing

The data preprocessing steps include:

- The raw data is loaded from `TRADES\_CopyTr\_90D\_ROI.csv`.

- Missing values in the `Trade\_History` column are removed.

- The `Trade\_History` column, originally stored as a string representation of lists, is converted into a list format.

- The dataset is then exploded, ensuring each trade is represented as a separate row.

- If the `Trade\_History` data consists of dictionaries, they are normalized using `pd.json\_normalize()`.

- The processed data is saved in `processed\_trades.csv` for further analysis.

## 3. Financial Metrics Calculation

The processed trade data is used to compute key financial metrics for each trading account, assumed to be represented by the `Port\_IDs` column. The following metrics are calculated:

### Return on Investment (ROI)

Formula: ROI = (Total Profit & Loss / Initial Investment) \* 100

Initial investment is approximated using the sum of the `quantity` column.

### Sharpe Ratio

Measures risk-adjusted returns.

Formula: Sharpe Ratio = (Mean Excess Returns / Standard Deviation of Returns)

A risk-free rate of 2% is assumed.

### Maximum Drawdown (MDD)

Measures the largest peak-to-trough decline in cumulative PnL.

Formula: MDD = min( (Cumulative PnL - Peak) / Peak )

### Win Rate

Percentage of profitable trades.

Formula: Win Rate = (Winning Trades / Total Trades) \* 100

### Total Profit & Loss (PnL)

Sum of `realizedProfit` for each account.

The computed metrics are saved in `account\_performance\_metrics.csv`.

## 4. Ranking and Normalization

To ensure fair ranking, all metrics (except MDD) are normalized using Min-Max scaling.

A weighted scoring system is applied with the following weights:

- ROI: 30%

- PnL: 20%

- Sharpe Ratio: 20%

- Win Rate: 20%

- MDD: -10% (negative weight as lower drawdowns are preferable)

A final score is computed for each account based on the weighted sum of normalized metrics.

Accounts are ranked in descending order of the final score.

The top 20 accounts are saved in `top\_20\_accounts.csv`.

## 5. Conclusion

This analysis provides an objective ranking of trading accounts based on their historical performance. The methodology ensures that accounts are evaluated on multiple factors, balancing returns, risk, and consistency. The results can be used to identify top-performing traders or optimize trading strategies.