Methodology for Wallet Scoring System

1. Introduction

This document outlines the methodology used to design and implement the Wallet Scoring System, which evaluates wallet behavior based on various financial metrics. The scoring system is part of an internship project where the goal is to analyze and rank wallets based on specific criteria to understand financial patterns and trends.

2. Objective

The main objective of this system is to assign a score to each wallet based on its behavior and activities. The scoring model aims to provide insights into the financial health and activity levels of different wallets, ultimately ranking them based on their performance.

3. Data Collection and Preprocessing

The system works on wallet data, which includes the following key metrics for each wallet:

- **Repay/Borrow Ratio**: The ratio of repayments made compared to the amount borrowed.
- **Deposit/Withdraw Ratio**: The ratio of deposits made compared to withdrawals.
- **Liquidation Ratio**: The ratio of the wallet's assets that have been liquidated.
- **Total Deposits**: The total amount of deposits made by the wallet.
- **Total Repays**: The total amount of repayments made by the wallet.
- **Number of Borrows**: The count of borrow actions taken by the wallet.
- **Number of Repays**: The count of repayment actions taken by the wallet.
- **Number of Liquidations**: The count of liquidation actions taken by the wallet.

These metrics are collected and stored in a structured format (such as a pandas DataFrame) for processing.

4. Normalization of Scores

Once the data is collected, it is essential to normalize the scores to ensure fairness in comparison across wallets. The following steps were used to normalize the data:

4.1. Normalization Formula

For each wallet, the **normalized score** is computed based on the metrics collected. The formula used for normalization involves scaling each metric to a common range. This helps in adjusting for different scales of the metrics.

- **Repay/Borrow Ratio** and **Deposit/Withdraw Ratio** are normalized using min-max scaling, ensuring that wallets with higher activity levels receive better scores.
- **Liquidation Ratio** is normalized similarly, but a lower liquidation ratio results in a higher score.
- **Total Deposits**, **Total Repays**, **Number of Borrows**, **Number of Repays**, and **Number of Liquidations** are normalized using the same approach.

Normalization formula used:

Normalized Score=X−XminXmax−Xmin\text{Normalized Score} = \frac{X - X_{\text{min}}}{X_{\text{max}} - X_{\text{min}}}Normalized Score=Xmax−XminX−Xmin

Where:

- XXX is the metric value for the wallet.
- XminX_{\text{min}}Xmin and XmaxX_{\text{max}}Xmax are the minimum and maximum values of the metric across all wallets.

4.2. Weighting the Metrics

Each metric is weighted based on its importance. For example:

- **Repay/Borrow Ratio**: High importance, given that repayment behavior is critical to scoring.
- **Deposit/Withdraw Ratio**: Moderate importance, as deposits and withdrawals reflect wallet activity.
- **Liquidation Ratio**: High importance, as a higher liquidation ratio signifies risk.
- **Total Deposits** and **Total Repays**: Moderate importance, as they reflect wallet behavior but need to be normalized for fairness.
- **Number of Borrows/Repays/Liquidations**: Low importance, as these metrics are merely counts.

The final **wallet score** is computed by applying the weights to each normalized metric and combining them into a single score.

Final Wallet Score=w1⋅Repay/Borrow Ratio+w2⋅Deposit/Withdraw Ratio+…\text{Final Wallet Score} = w_1 \cdot \text{Repay/Borrow Ratio} + w_2 \cdot \text{Deposit/Withdraw Ratio} + \dotsFinal Wallet Score=w1⋅Repay/Borrow Ratio+w2⋅Deposit/Withdraw Ratio+…

Where w1,w2,…w_1, w_2, \dotsw1,w2,… are the weights assigned to each metric.

5. Scoring System

The final score is calculated for each wallet after normalizing and weighting the relevant metrics. The score helps in ranking wallets on a scale from 0 to 1, where higher scores indicate more responsible financial behavior.

The wallets are divided into two groups:

- **Top 5 Wallets**: The wallets with the highest scores. These wallets demonstrate consistent, responsible financial behavior.
- **Bottom 5 Wallets**: The wallets with the lowest scores. These wallets may have erratic financial behavior, such as a lack of repayment or frequent liquidations.

6. Evaluation and Observations

6.1. Observations from the Analysis

- **Top Wallets**: These wallets maintain a balance between borrowing and repaying and exhibit low liquidation risk.

- **Bottom Wallets**: These wallets tend to have higher liquidation ratios and low repayment behavior, indicating poor financial management.

6.2. Insights

The analysis of the top and bottom wallets reveals patterns of responsible financial behavior and risks associated with high liquidation ratios. These insights are important for understanding user behavior and identifying high-risk wallets.

7. Conclusion

This Wallet Scoring System provides an automated and objective way to evaluate and rank wallets based on their financial activity. By using various metrics and normalization techniques, this system offers valuable insights into the behavior of wallet holders, helping to identify both reliable and risky users.

8. Future Work

Future work could involve enhancing the scoring system by incorporating more complex features, such as transaction frequency, user demographics, or external market factors that influence wallet behavior.