TRADER BEHAVIOUR INSIGHTS

OBJECTIVE

The report explores the dynamic relationship between trader performance and market sentiment, with the goal of uncovering hidden patterns and delivering actionable insights for smarter trading strategies. The analysis is based on two key datasets:

- Bitcoin Market Sentiment dataset
- Historical trader data from Hyperliquid.

The primary objective is to understand how trading behavior—including profitability, risk, and trading volume—is influenced by the prevailing market sentiment (classified as 'Fear' or 'Greed')

METHODOLOGY

1) Data Understanding

   two primary datasets were used to explore the relationship between trader behavior and market sentiment:

   - Bitcoin Market Sentiment Dataset: This dataset contains daily information on market sentiment, with a key column showing the "Classification" of sentiment (e.g., "Fear" or "Greed").
   - Historical Trader Data from Hyperliquid: This dataset provides detailed records of historical trades. Key columns include:account: The unique identifier, for each trader.closedPnL: The profit and loss for each trade,size: The size of the trade in both tokens and USD (Size Tokens and Size USD).

These two datasets were merged based on their respective date columns to create a single, comprehensive DataFrame for all subsequent analysis. This merged dataset, **market_df**, enabled the exploration of how trading performance metrics—such as profitability, risk, and volume—align with or diverge from the prevailing market sentiment.

2) EDA

   This is the foundational step where you clean and inspect the datasets before any formal analysis

3) Key metrics

   These metrics go beyond simple profit and loss to include measures like Return on Investment (ROI), win rate, and Sharpe Ratio, which provide a more nuanced view of performance

4) Volume Vs Sentiments

   This part of the analysis focuses on the relationship between trading activity and market emotion. You would analyze how the total trading volume (Size USD) changes as the market sentiment shifts from "Fear" to "Greed." The key finding here is a strong positive correlation between volume and bullish sentiment.

5) Sentiments
   a.Traders making bigger trades in “Greed” vs “Fear”
   b.traders making bigger trades in “Greed” vs “Fear”

   This section specifically investigates trader behavior by comparing the average trade size during different market regimes. The analysis shows a clear pattern: traders are more willing to make larger trades during "Greed" periods compared to "Fear" periods

6) Traders vs. Sentiments

   This is the core analysis of the assignment. It involves a detailed examination of how various trader performance metrics, such as profitability (Closed PnL) and risk (PnL volatility), change depending on whether the market sentiment is "Fear" or "Greed." The analysis reveals that while average returns are higher during bullish markets, so is the risk

7) Advance Trade Metrics

   It goes beyond basic metrics to evaluate trader performance from a risk-adjusted perspective. It includes calculations for metrics like Sharpe Ratio (for risk-adjusted returns) and maximum drawdown (for risk exposure), which provide a deeper understanding of a trader's skill and strategy

8) Correlation Analysis

   This is the statistical process of quantifying the relationships between different variables. You would calculate correlation coefficients to formally measure the strength and direction of the relationship between, for example, the sentiment index value and daily trading volume

9) Trader Rankings

   Involves creating a leaderboard to rank the top-performing traders. The ranking is based on a primary metric, such as Total Closed PnL, and is often supplemented with other metrics like ROI and Sharpe Ratio to provide a comprehensive view of who the most successful traders are.

TECHNIQUES USED

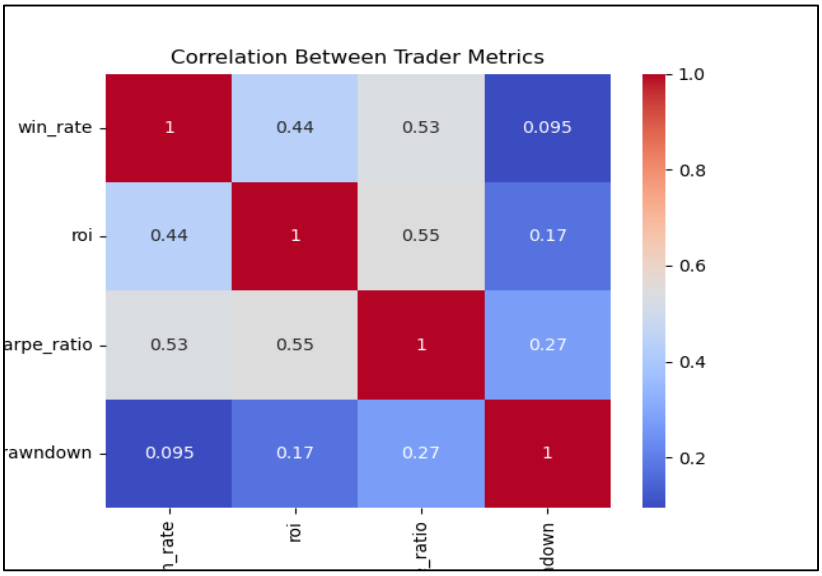
1. Data Loading and Merging
   - based on a common date column, creating a comprehensive dataset for integrated analysis
2. Data Aggregation
3. Statistical and Financial Metric Calculation
   - **return on Investment (ROI)**, **Win Rate**, and **Sharpe Ratio**
4. Exploratory Data Analysis (EDA)
5. Data Visualization

ASSUMPTIONS

- Daily Timeframe: The analysis assumes that a single day's market sentiment influences all trades made within that day.
- Representativeness: The data from Hyperliquid is assumed to be a representative sample of trader behavior on the platform.
- Direct Relationship: We assume a direct, quantifiable relationship exists between market sentiment and trading behavior.

VISUALISATION

a) Correlation Between Traders matrics-



- Win Rate and ROI (0.44): There is a moderate positive correlation, suggesting that a higher win rate generally corresponds to a higher return on investment.
- ROI and Sharpe Ratio (0.55): There is a moderate positive correlation, implying that higher returns often come with better risk-adjusted returns.
- Sharpe Ratio and Drawdown (0.27): There is a weak positive correlation, suggesting a minor link between a higher Sharpe Ratio and larger drawdowns

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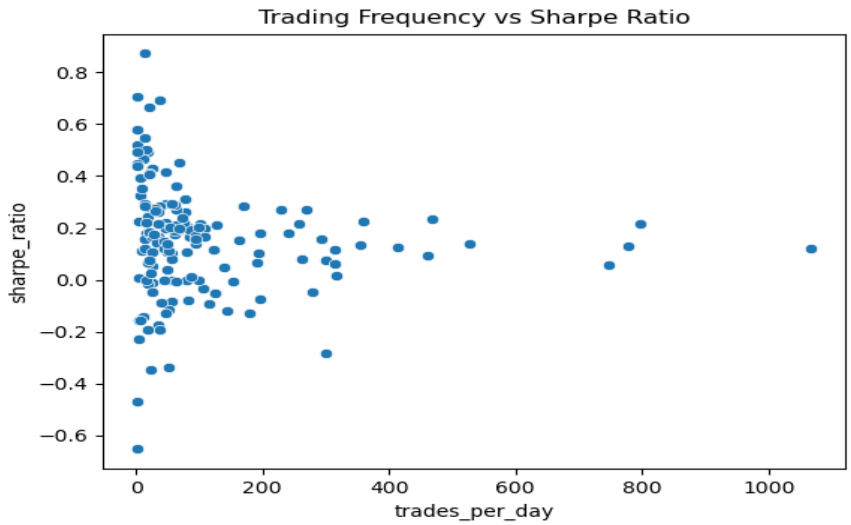
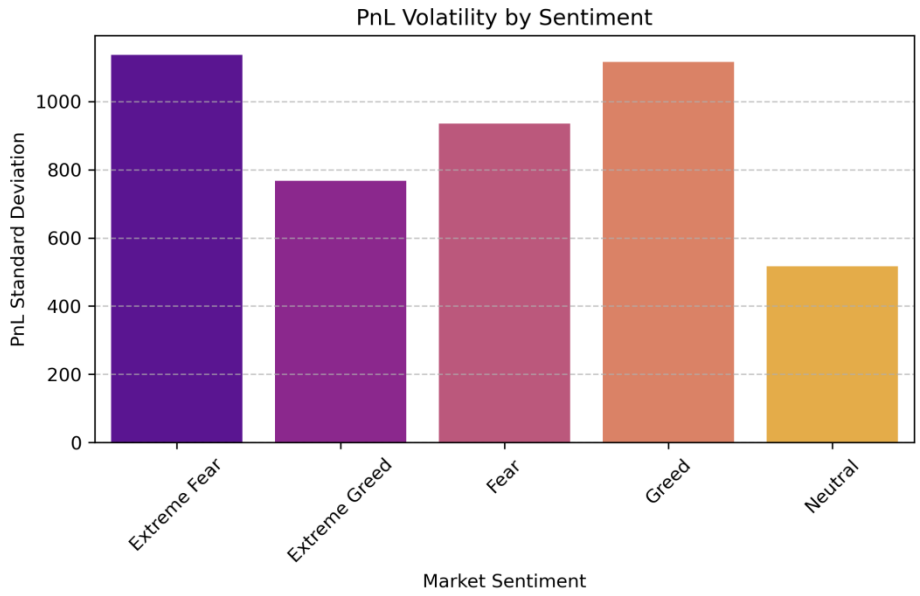
b) Scatterplot for trade per dayand sharpe ratio-



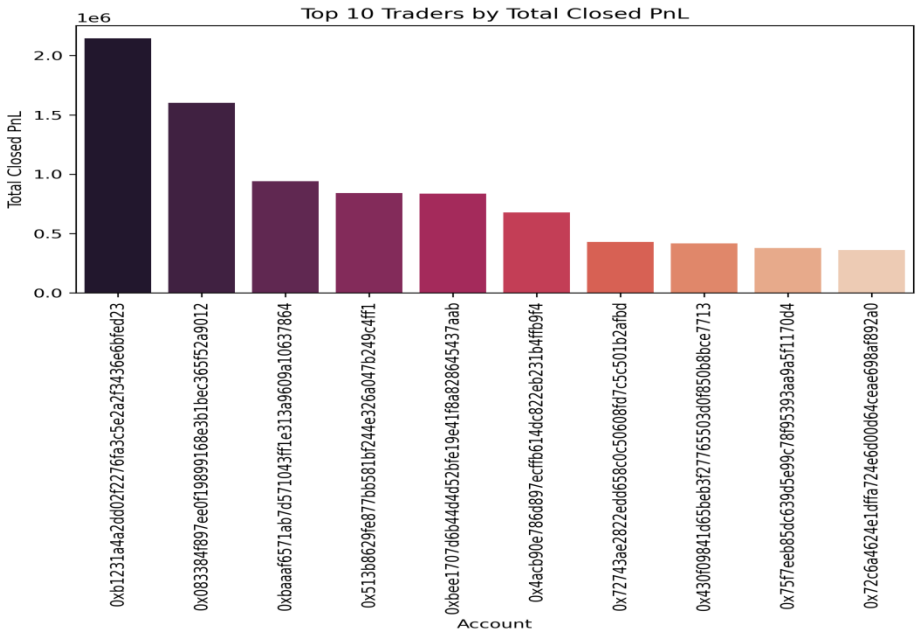
- As the trading frequency increases, the spread of Sharpe Ratios appears to narrow, and the highest Sharpe Ratios observed are generally lower compared to those at very low trading frequencies.

c) Bar graph for Market Sentiment and PnL (Profit and Loss) Volatility



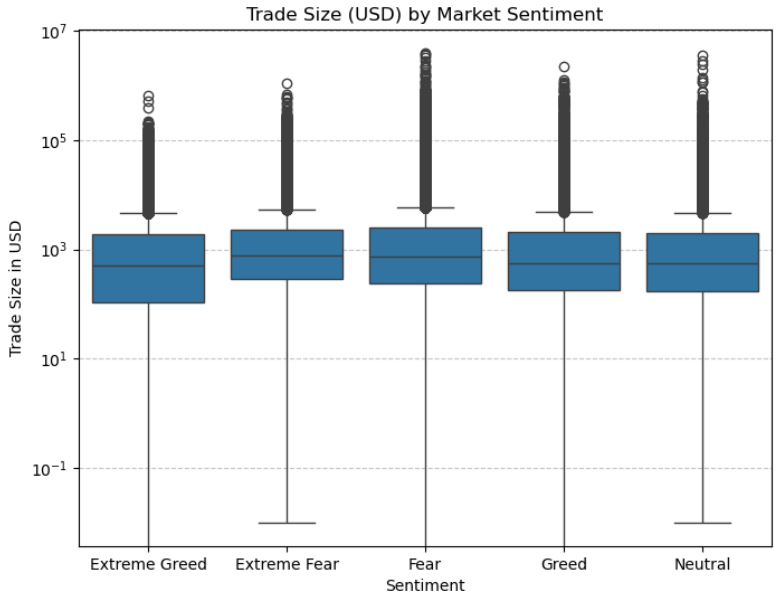
- Market sentiments of **Greed** and **Extreme Fear** are correlated with the highest levels of PnL volatility, while a **Neutral** market sentiment is associated with the lowest PnL volatility.
- This implies that emotional extremes in the market can lead to greater fluctuations and unpredictability in profits and losses.

d) Bar chart titled "Top 10 Traders by Total Closed PnL"



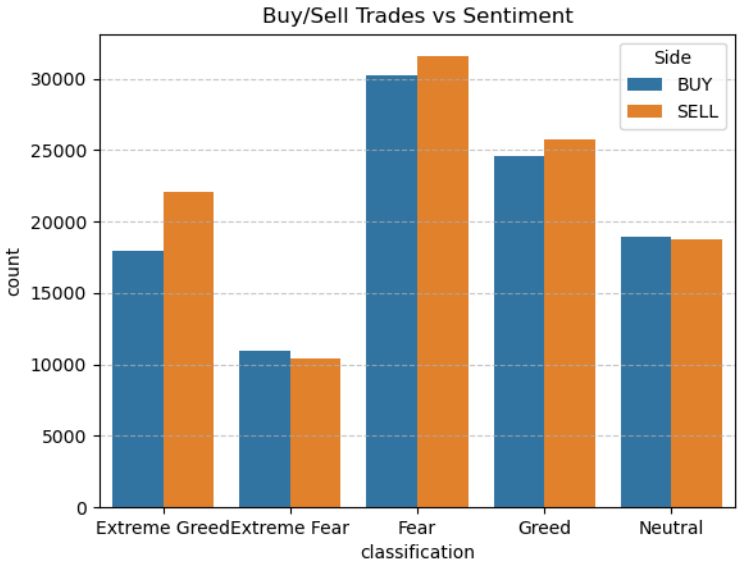
- Top 10 Traders by Total Closed PnL is a way to rank traders based on their overall profitability
- Total Closed PnL provides a clear, single number that summarizes a trader's overall financial performance

e) Boxplot for Trade Size (USD) by Market Sentiment



- Trade size does not change much between Fear and Greed.
- Both small and large trades exist in all sentiment regimes

f) Countplot for Traders Vs sentiments



- Fear drives the most trading activity, showing markets are most reactive when sentiment is negative.
- Extreme Greed → More selling than buying, indicating profit-taking after strong rallies

KEY FINDINGS AND PATTERNS

The analysis revealed several significant relationships between trader behavior and market sentiment:

1. Trading Volume and Sentiment-There is a strong positive correlation between trading volume and market sentiment. As the market becomes more bullish, indicated by a "Greed" sentiment classification, trading activity and total volume increase significantly. This suggests that traders are more active during favorable market conditions.
2. Trader Behavior-The data shows a clear shift in behavior based on market sentiment:

- **During "Greed":** Traders exhibit more aggressive behavior, making **significantly larger trades** and showing a higher willingness to take on risk.
- **During "Fear":** Traders become more cautious, reducing their exposure and making **smaller trades**.

3. Performance and Volatility

- **Higher Returns:** On average, traders achieve a **higher ROI** during "Greed" periods.

- **Increased Volatility:** While returns are higher, the **volatility of PnL** is also at its peak during "Greed" periods, highlighting that higher potential profits come with a higher risk of significant losses. Conversely, PnL volatility is lowest during "Fear."

4. Top Trader Performance-A closer look at the top traders shows they are not immune to these patterns. However, their success is defined by their ability to manage risk and maintain a positive win rate across various sentiment regimes, distinguishing them from the average trader.

STRATEGIC INSIGHTS FOR TRADING

The insights derived from this analysis can be used to develop smarter, sentiment-aware trading strategies:

- **Adopt a Sentiment-Based Strategy:** Use market sentiment as a key indicator for adjusting risk. Consider scaling up or down trade sizes based on the prevailing sentiment.
- **Risk Management:** Be prepared for higher PnL volatility during Greed periods. While these times offer higher potential returns, implementing strict risk management protocols—such as tighter stop-losses—is crucial to protect capital.
- **Focus on Consistency:** The data suggests that consistently profitable traders do not solely rely on bull markets. Their success is also a function of their ability to manage risk and generate positive returns during less favorable market conditions.

CONCLUSION

- The analysis confirms a strong relationship between market sentiment and trading behavior. During periods of "Greed," traders engage in more aggressive, higher-volume trading, which leads to higher average returns but also significantly increased volatility. Conversely, "Fear" periods are characterized by reduced activity and lower risk.
- This finding provides a clear foundation for a company's trading team to build more informed, sentiment-aware strategies to better manage risk and capitalize on market opportunities.