Data Science Report – Traders Behavior Insights

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Assignment: Web3 Trading Team – Junior Data Scientist

1. Objective

The primary objective of this project is to explore and analyze how Bitcoin market sentiment influences trader behavior and performance. By leveraging two datasets — one providing market sentiment data (Fear or Greed) and the other containing historical trading records — this study aims to uncover hidden patterns, correlations, and actionable insights that can guide smarter trading strategies in the rapidly evolving Web3 trading landscape.

2. Datasets Used

1. Bitcoin Market Sentiment Dataset

Columns: Date, Classification (Fear / Greed)

Provides daily sentiment classification for Bitcoin's market based on prevailing psychological factors

2. Historical Trading Dataset from Hyperliquid

Columns: account, symbol, execution price, size, side, time, start position, event, closedPnL, leverage, etc.

Contains detailed trade-level data that captures trader activity, risk-taking behavior, and profitability.

Both datasets were cleaned, processed, and merged by date to enable comprehensive analysis.

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3. Data Preprocessing

To ensure data quality and integrity, the following steps were taken:

Missing Data: Rows with incomplete or invalid entries were removed.

Data Alignment: Dates from both datasets were converted to consistent datetime format and merged to associate trades with market sentiment.

Feature Engineering: Aggregated metrics such as total PnL, average leverage, and trade volume were computed for daily insights.Additional columns were created to classify trades based on sentiment.

Data Standardization: Units and formats were aligned for consistency.

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4. Exploratory Data Analysis

PnL by Market Sentiment

A boxplot analysis revealed that: Trader profits are generally higher during Greed phases.Fear periods exhibit greater variability and a higher number of negative trades

Insight: Market sentiment impacts trader confidence and profitability.

Trade Volume Trends

Analysis of trade volume showed:A higher number of trades during Greed phases.Reduced activity during Fear periods.

Insight: Traders are more active when market sentiment is optimistic.

Leverage vs Profitability

A scatter plot comparing average leverage with total PnL indicated:Higher leverage trades are riskier and often correlate with larger swings in profits and losses.Traders tend to leverage more during positive sentiment but at the cost of increased volatility.

Insight: Managing leverage is critical to reducing exposure during sentiment-driven trades.

Correlation Analysis

A heatmap of key metrics showed:A positive correlation between trade size and profitability.Negative correlations between high leverage and consistent profits.

Insight: Balanced trade sizes and controlled leverage can improve risk-adjusted returns.

5. Key Insights

Sentiment-Driven Behavior:
Fear and Greed strongly influence trade volume, risk-taking, and profitability.

Higher Risks in Positive Sentiment:
Traders are more willing to take large, leveraged positions during periods of optimism, potentially leading to higher losses.

Actionable Metrics:
Aggregated metrics like total PnL, leverage, and volume can be used to monitor trader behavior in real time.

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6. Recommendations

Integrate Sentiment Signals:
Real-time sentiment tracking can enhance risk management and decision-making

Risk Control Frameworks:
Implement automatic stop-losses or leverage caps during volatile sentiment shifts.

Predictive Models:
Use historical patterns to develop machine learning models that forecast trader behavior and adjust strategies.

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7. Future Scope

Advanced Sentiment Forecasting:
Applying time-series models like ARIMA or LSTM networks to predict future sentiment trends.

Algorithmic Trading Enhancements:
Incorporating sentiment-driven signals into automated trading algorithms for dynamic adjustments.

Behavioral Analysis:
Segmenting traders based on risk appetite and designing tailored strategies.

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8. Conclusion

This analysis confirms that market sentiment plays a significant role in shaping trader decisions and outcomes in Web3 trading. By combining sentiment data with quantitative trade metrics, traders and analysts can gain deeper insights, manage risks more effectively, and develop smarter strategies to navigate market uncertainty. The findings of this report lay the groundwork for further research and the development of predictive tools to enhance trading performance.
