

# # Sentiment-Driven Trading Analysis: Insights from Bitcoin Market Fear & Greed Index

## ## 📌 Introduction

This report explores the intricate relationship between trader behavior and overall market sentiment in the cryptocurrency space, specifically focusing on Bitcoin. The analysis leverages two datasets: historical trader performance from the Hyperliquid exchange and the Fear & Greed Index for Bitcoin. The goal is to identify actionable insights and signals that can inform smarter trading strategies.

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## ## 📊 Data Sources

1. **Bitcoin Market Sentiment Dataset** – Includes daily sentiment classifications: Fear, Greed, Neutral, etc.
2. **Hyperliquid Historical Trader Data** – Captures trades with details such as account, size, leverage, PnL, fees, and timestamps.

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## ## 🛠️ Methodology

- \* Merged datasets by date using `Timestamp` (converted from ms) and `date` field.
- \* Conducted EDA using pandas, seaborn, and matplotlib.
- \* Built statistical visualizations to highlight behavior trends under different sentiment conditions.
- \* Extracted signals such as volume spikes and leverage anomalies.

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## ## 🔍 Key Findings

### ### 1. **Market Sentiment Distribution**

- \* Greed and Extreme Greed dominated 60% of the time window.
- \* Fear-based sentiment (Fear + Extreme Fear) accounted for ~30%.

### ### 2. **Trading Volume Trends**

- \* Spikes in daily trading volume are often aligned with shifts from Fear to Greed.
- \* Average trade size was highest during Greed conditions.

### ### 3. **PnL and Profitability**

- \* Traders exhibited higher average PnL during periods of Greed.
- \* Volatility in returns was noticeably higher during Extreme Fear.

### ### 4. **Leverage Usage**

- \* High leverage trades (>20x) were more common during Greed, indicating increased risk appetite.

### ### 5. **Fees and Risk Behavior**

- \* Fee distribution remained relatively stable, but higher leverage correlated with slightly higher average fees.

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## ## 📊 Visual Outputs (See `outputs/` Folder)

- \* Pie chart of sentiment distribution
- \* Time series of trade volume and PnL
- \* Box and violin plots comparing behavior across sentiment types
- \* Correlation heatmaps and weekday trade patterns

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## ## 📈 Trading Signals

- \* **Volume Surge Signal**: Trade volume spikes (mean + 2 std) correlate with emotional sentiment transitions.
- \* **High Leverage Clusters**: Detected in Greed periods, signaling potential overconfidence.
- \* **PnL Inflection Points**: Identified through average PnL change tracking by date.

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## ## ✅ Conclusion

This analysis highlights how trader behavior in crypto is tightly linked to market sentiment. Recognizing patterns like high-leverage clusters and PnL fluctuations under different emotions offers an edge in building predictive or reactive strategies. Future work could involve deploying these insights in real-time dashboards or signal-based automated strategies.

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## ## 📁 Repository Structure Summary

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```
ds_<your_name>/
├── notebook_1.ipynb      # EDA
├── csv_files/            # Datasets
├── outputs/              # Visualizations
├── ds_report.pdf         # This file
└── README.md             # Project notes
```

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