

## **Data Science Project Report:**

### **Analysis of Trader Behavior and Market Sentiment in the Bitcoin Ecosystem**

#### **I. Executive Summary**

This project explores how Bitcoin traders respond to shifts in overall market sentiment. Using a dataset of 167,857 Hyperliquid transactions matched with daily Fear & Greed Index (FGI) scores, the report identifies pronounced patterns: the most successful and aggressive trading tends to happen during market sentiment extremes (Extreme Fear or Extreme Greed), not during neutral conditions. Key Insight: The highest average profit per trade (\$73.14) occurs during Extreme Greed. Liquidity Signal: The greatest total capital traded (\$338M) and largest average bet size (\$7,153) are found during times of market Fear, suggesting that major players act with confidence against crowd sentiment.

#### **II. Methodology and Data Preparation**

##### **Step 1:**

**Data Cleaning & Preparation:** Raw transaction records and FGI data were imported and all date-based columns standardized for merging. This ensured every trade is mapped correctly to the sentiment of its trading day.

##### **Step 2:**

**Data Integration:** An inner join was performed on the Date column, yielding a unified daily record of 167,857 transactions with corresponding FGI sentiment.

##### **Step 3:**

##### **Key Performance Metrics:**

Analysis focused on three primary indicators across the five FGI categories:

- Profitability: Average Closed PnL per trade.
- Activity/Liquidity: Daily total trading volume and trade count.
- Aggressiveness: Average trade size, as a proxy for risk.

III. Exploratory Data Analysis (EDA) & Findings

A. Trader Profitability by Sentiment

FGI Classification	Average Closed PnL	Strategic Insight
Extreme Greed	\$73.14 (Highest)	Maximize trading here. Highest individual trade profitability—successful at highs.
Neutral	\$31.75 (Lowest)	Avoid trading. Profitability is worst in directionless markets.

B. Market Activity & Risk Appetite

FGI Classification	Total Volume USD	Average Trade Size	Conclusion
Fear	\$338 Million	\$7,153 (Highest)	Highest Liquidity and Aggression. Big bets during panic ("buy the dip").
Greed	\$284 Million	\$5,848	High volume. Strong participation during rallies.

IV. Conclusion and Strategic Recommendations

Highly successful trading is associated with volatility and conviction—extreme sentiment triggers bigger profits and more capital. Neutral periods do not offer compelling risk-reward opportunities.

Trading Strategy Advice: -

Prioritize trading during Extreme Greed—these are conditions for maximum profitability.

Capitalize on Fear—deploy larger trades when liquidity spikes and market participants are nervous. -

Reduce risk in Neutral periods—avoid over-trading when returns are low and the market lacks direction.

V. References to Outputs

See outputs/avg\_pnl\_by\_sentiment.png for profitability breakdown.

See outputs/total\_volume\_by\_sentiment.png for trading activity and risk analysis.

