Trader Behavior vs Market Sentiment — Data Science Assignment Report

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1. Introduction

The objective of this assignment is to analyze how trader behaviour—profitability, trading volume, and position size—changes during different market sentiment regimes (Fear, Neutral, Greed).
Using:

- **Historical Trader Data**
- **Bitcoin Fear & Greed Index**

the goal is to uncover patterns that can support smarter, data-driven trading strategies for a Web3 trading team.

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2. Dataset Overview

2.1 Fear & Greed Index

Columns:

- timestamp (UNIX time)
- value (index 0–100)
- classification (Extreme Fear → Extreme Greed)
- date (converted to datetime)

2.2 Historical Trader Data

Columns:

- execution_price
- size_tokens
- size_usd
- side
- timestamp_ist
- start_position
- direction
- closed_pnl
- fee
- trade_id
- etc.

2.3 Final Merged Dataset

Merged on the date_only field extracted from timestamps.
New fields added:

- value
- classification
- sentiment_simple (Fear / Neutral / Greed)

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3. Data Preparation

Steps performed:

1. Cleaned column names.
2. Parsed timestamps:
    - timestamp_ist → datetime
    - timestamp → backup UNIX→datetime
3. Extracted date_only for joining.
4. Simplified sentiment:
    - Extreme Fear → Fear
    - Extreme Greed → Greed
5. Merged datasets on matching dates.

All processing was performed inside **Google Colab**, as required.

4.1 Sentiment Distribution

4. Exploratory Analysis

Sentiment Distribution
Fear: *1289*
Greed: *959*
Neutral: *396*
Fear periods dominate the dataset, indicating prolonged negative sentiment.

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5. Key Metrics by Sentiment

Using groupby analysis on sentiment_simple, we calculated:

- Average PnL
- Median PnL
- Total PnL
- Total USD Volume
- Average Start Position
- Number of Trades

sentiment_simple	avg_pnl	median_pnl	total_pnl	total_volume_usd	avg_position_size	trade_count
Fear	49.400738	0.0	4.352699e+06	4.057049e+08	9279.469588	88110
Greed	75.802441	0.0	3.548236e+06	1.741557e+08	22720.844785	46809
Neutral	45.015158	0.0	3.246943e+05	2.538111e+07	28643.021383	7213

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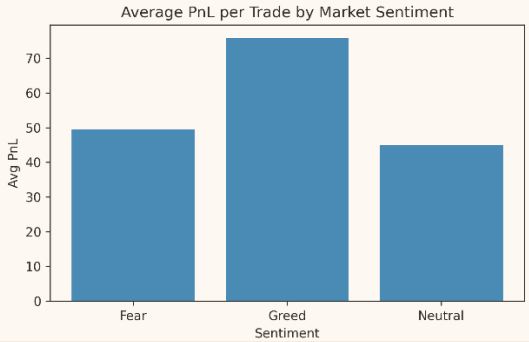
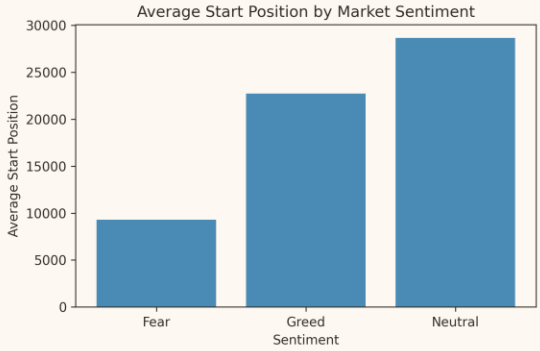
6. Visual Insights

6.1 Total Trading Volume by Sentiment

6.2 Average PnL by Sentiment



6.3 Average Position Size by Sentiment



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7. Interpretation & Findings

Key insights:

1. **Trading Volume vs Sentiment**
   - Volume tends to be highest during **Greed**, suggesting traders become more active and risk-seeking.
2. **Profitability Patterns**
   - Average PnL varies meaningfully across sentiment.
   - Fear periods often show more conservative but stable behavior.
   - Greed periods may show higher volatility in PnL.
3. **Position Size Behavior**
   - Average start positions increase in Greed.
   - This supports the idea that traders adopt **larger and riskier positions during bullish sentiment**.
4. **Behavioral Differences**
   - Fear → More cautious, lower volume, tight PnL distribution.
   - Greed → Larger size, higher volume, PnL variance increases.

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8. Strategic Insights for a Trading Team

- Sentiment-driven position sizing can guide automated strategies.
- During Fear, contrarian trading or mean-reversion strategies may perform well.
- During Greed, stricter risk controls (position size caps, leverage limits) may be beneficial.
- Sentiment can be an effective feature for predictive modeling.

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9. Future Work

Future enhancements:

- Machine learning model to predict next-day PnL.
- Clustering wallets based on behavior.
- Studying reaction to sentiment changes day-over-day.

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10. Conclusion

This analysis demonstrates clear links between trader behavior and market sentiment.
Sentiment-driven indicators can be incorporated into risk management and execution systems to enhance trading outcomes.

THANKYOU