Data Science Assignment Report

Candidate Name: *Vaishnavi Sahu*
Project Title: *Analysis of Trader Behavior vs Market Sentiment*
Notebook: `notebook_1.ipynb`

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1. 🎯 Objective Summary

The goal of this project is to explore the relationship between trader behavior and overall market sentiment.
We used historical trader data and a fear-greed index to analyze how metrics like profit, trade volume, and leverage vary under different market emotions.

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2. 📊 Dataset Overview

a) Bitcoin Market Sentiment Dataset

- **Columns:** `Date`, `Classification` (Fear or Greed)
- Represents the emotional state of the market on each date based on external sentiment data.

b) Historical Trader Data (from Hyperliquid)

- **Columns include:** `Account`, `Symbol`, `Execution Price`, `Size`, `Side`, `Time`, `Event`, `Closed PnL`, `Leverage`, etc.
- Contains detailed information about individual trades.

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3. 🛠️ Methodology

a) Data Cleaning

- Converted date columns to datetime format.
- Checked and handled missing or incorrect values.

b) Aggregation

- Grouped trader data by date.
- Calculated total volume, total PnL, average execution price, and total fees per day.

c) Merging

- Merged aggregated trader data with sentiment data on the date column.

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4. 📌 Key Insights

a) Trade Behavior in 'Fear' vs 'Greed'

Metric	Fear	Greed
Trade Count	Lower	Higher
Avg Trade Size	Slightly Lower	Slightly Higher
Avg Closed PnL	Lower	Higher

b) Patterns Observed

- Traders tend to be **more active** during *Greed* periods.
- Average **profit per trade is higher** during *Greed*, suggesting better market conditions.
- **Losses or lower PnL** are more common in *Fear* periods.

c) Anomalies

- A few “Fear” days showed **unexpectedly high volumes**, possibly due to:
    - Forced liquidations

    - Shorting opportunities
    - Volatile news

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5. 📈 Visualizations

a) Trade Counts by Sentiment

- A bar chart comparing number of trades on *Fear* vs *Greed* days.
  📁 **Saved as:** `outputs/trade_counts_by_sentiment.png`

b) Average Profit/Loss by Sentiment

- A bar chart comparing average profit per trade across *Fear* and *Greed* days.
  📁 **Saved as:** `outputs/avg_pnl_by_sentiment.png`

(Other visualizations can be added in the same format if applicable.)

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6. ✅ Conclusion & Recommendations

- **Greedy markets** attract more trading activity and yield **higher profits**.
- **Fearful markets** show **cautious trading** with lower performance.
- Trading strategies can be improved by:
    - Adjusting **leverage** based on market sentiment
    - **Reducing risk exposure** during fearful periods
- Further exploration with features like **leverage, position direction**, or **real-time sentiment** could help in predictive modeling.