Prime Trade AI – Data Science Assignment Report

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Date: 2025-10-24

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1. Executive Summary

- Briefly state the goal: *analyze trader behavior vs market sentiment*.

- Highlight **top insights**: e.g., traders tend to take higher risk during Greed periods, Fear periods correlate with conservative trading but lower PnL.

- Keep it short: 3–5 sentences.

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2. Datasets Overview

2.1 Bitcoin Market Sentiment

- Columns: Date, Classification (Fear/Greed)

2.2 Historical Trader Data (Hyperliquid)

- Key columns: account, symbol, execution price, size, side, time, start position, event, closedPnL, leverage

- Mention number of rows and any preprocessing summary.

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3. Data Cleaning & Feature Engineering

- Steps taken to clean data: remove duplicates, handle missing values.

- Feature engineering:

    o sentiment_num (Fear=0, Greed=1)

    o Daily aggregated metrics: total trades, total PnL, avg leverage, etc.

- Reference: all cleaned CSVs in csv_files/.

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4. Exploratory Data Analysis (EDA)

- Visualizations (store in outputs/):

   1. total_trades_vs_sentiment.png

2. avg_pnl_vs_sentiment.png

3. total_pnl_vs_sentiment.png

4. correlation_matrix.png

- Brief insights for each plot. Example: *"Average PnL is higher during Greed periods, indicating traders take advantage of bullish sentiment."*

Example for EDA Section:
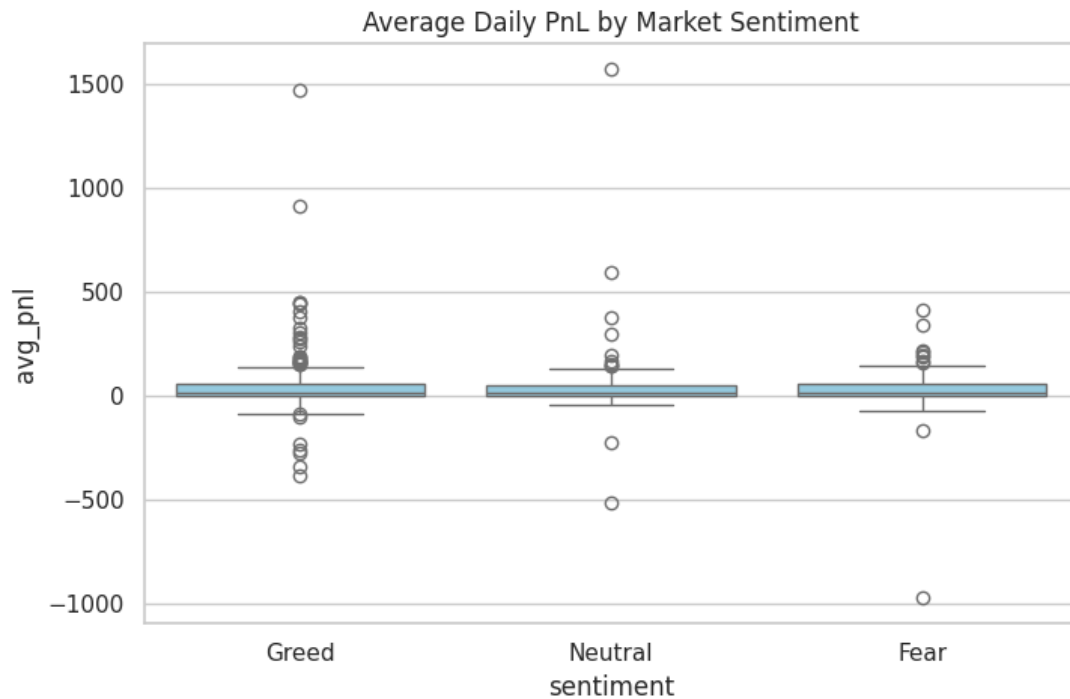
4. Exploratory Data Analysis (EDA)

4.1 Total Trades vs Sentiment

- Insight: Traders execute more trades during Greed periods.

- Screenshot:

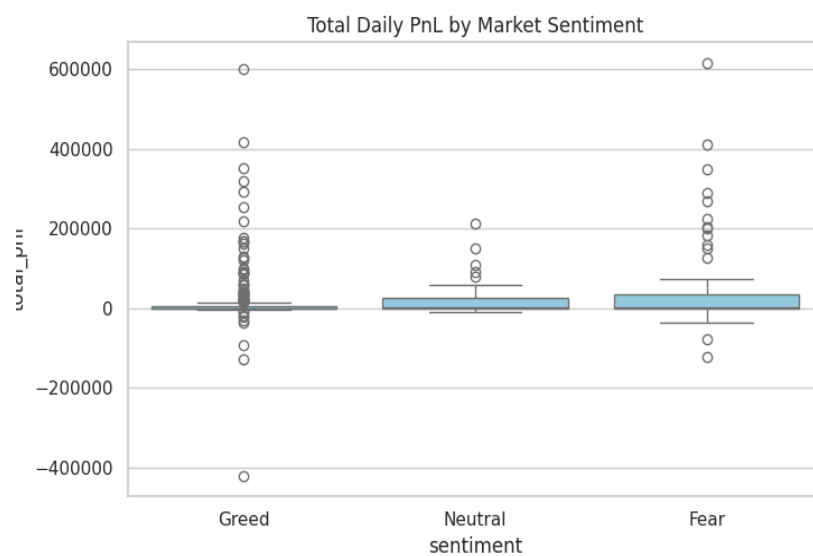
Daily Trade Count by Market Sentiment
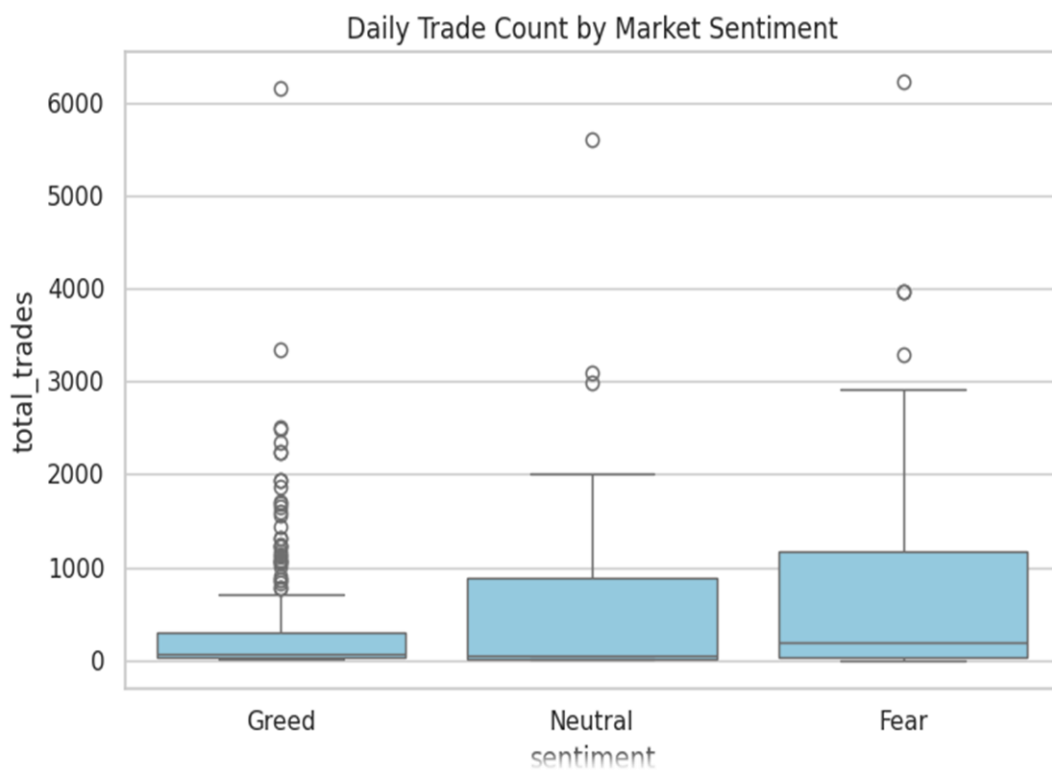
4.2 Average PnL vs Sentiment

- Insight: Average PnL is higher in Greed periods.
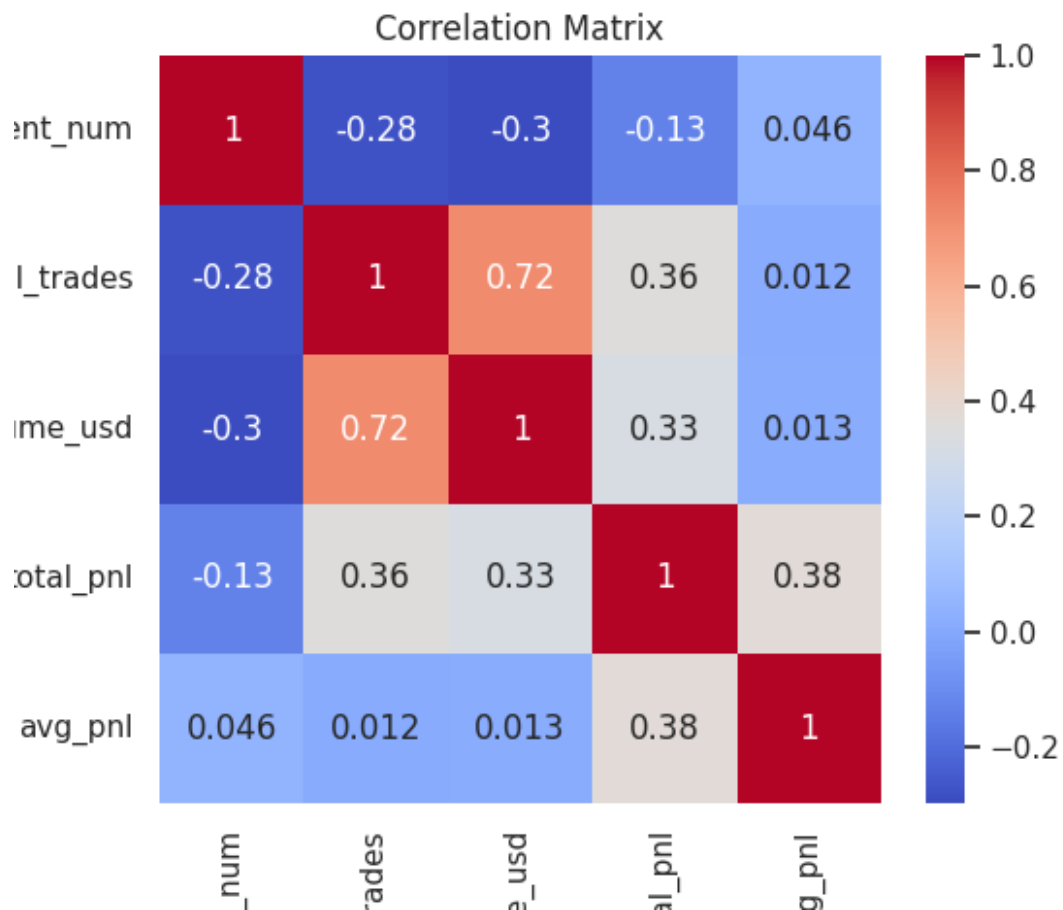
- Screenshot:

Average Daily PnL by Market Sentiment

4.3 Total PnL vs Sentiment

- Insight: Extreme Fear periods show negative total PnL for most traders.

- Screenshot:

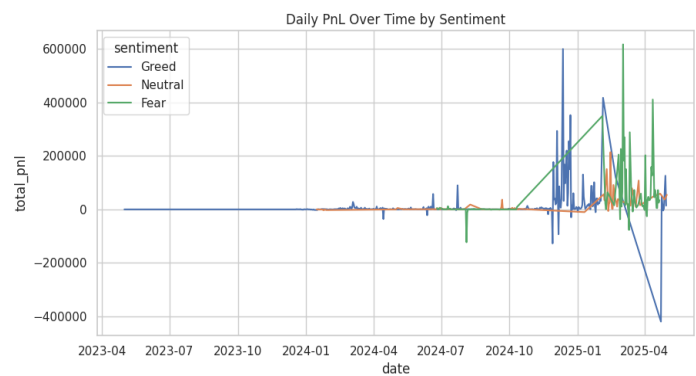

Total Daily PnL by Market Sentiment

4.4 Correlation Matrix

- Insight: Leverage is moderately correlated with closed PnL.
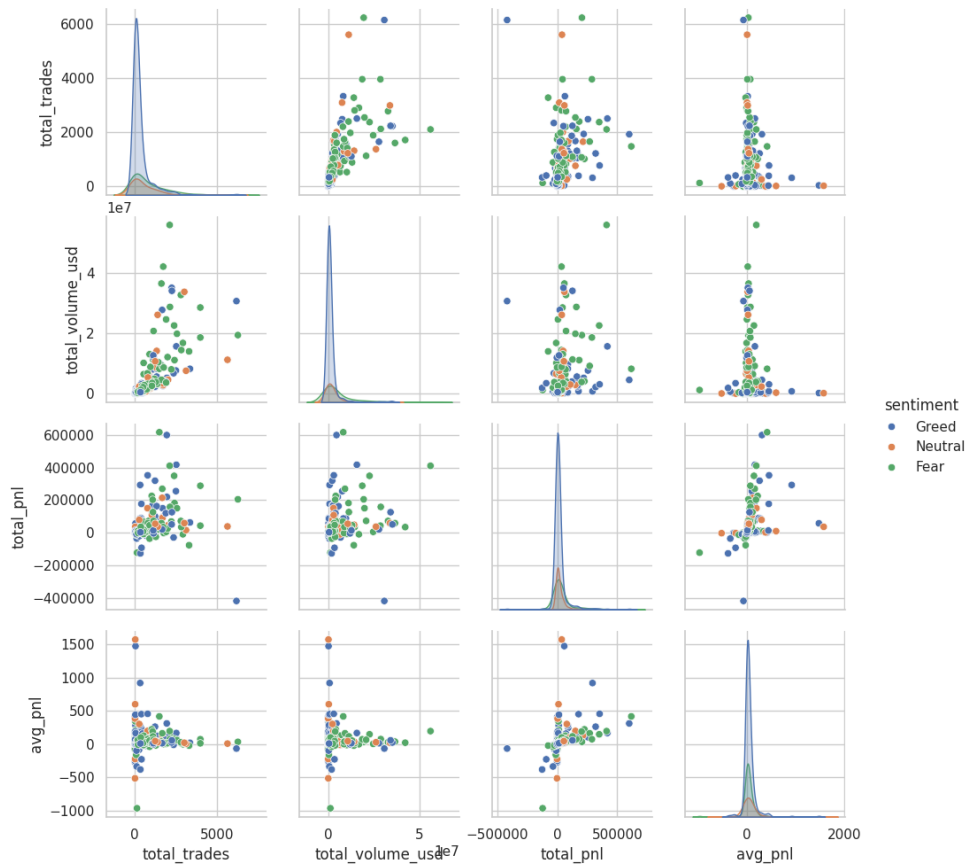
- Screenshot:

4.5 PnL Over Time

- Insight: Shows the trend of trader profitability over time.

- Screenshot:

4.6 Pairplot Metrics

- Insight: Visualizes relationships between key metrics: total_trades, total_volume_usd, avg_leverage, closedPnL, sentiment_num.

- Screenshot:

4.7 Pairplot Metrics

- Insight: Displays which factors contribute most to predicting daily PnL.

- Screenshots:

5. Analysis & Key Insights

- How trader behavior aligns/diverges from market sentiment.

- Risk-taking patterns with leverage vs sentiment.

- Profitability trends in Fear vs Greed.

- Highlight any hidden patterns: e.g., certain accounts consistently profit in Fear periods, suggesting contrarian strategy.

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6. Predictive/Quantitative Analysis (Optional but Strong)

- Example: Predicting daily PnL using sentiment_num, total_trades, total_volume_usd via RandomForestRegressor.

- Include metrics (MSE, R^2) and top features contributing to predictions.

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7. Conclusions & Recommendations

- Summarize actionable insights:

- Traders could adjust trade size and leverage depending on market sentiment.

- Identify signals to improve trading strategies.

- Keep concise, professional, and relevant to Web3 trading strategy.

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8. Appendices / References

- Colab notebooks: notebook_1.ipynb (main)

- Outputs folder with visualizations

- Cleaned CSVs in csv_files/

- Dataset links:

  - [Historical Trader Data](#)

  - [Fear & Greed Index](#)