Report of Assessment

Objective:

The goal of this analysis was to study how trader activity — in terms of profitability, leverage, risk-taking, and trading volume — connects with overall market sentiment (Fear vs. Greed). The focus was on uncovering patterns that could guide smarter and more disciplined trading strategies.

Executive Summary:

By combining **trader-level data** with the **Fear & Greed index**, we carried out exploratory data analysis, clustering, correlation studies, and regression modeling.
The results highlight that:

- Trading activity (volume) is strongly linked to shifts in sentiment.

- Profitability is higher during Fear periods compared to Greed.

- Lagged sentiment (yesterday's sentiment) is a useful predictor for short-term profitability.

- Traders often over-leverage during Greed phases, hurting performance

Dataset Overview & Cleaning:

- **Historical Trader Data**: contained information such as account, trade direction, execution price, PnL, leverage, and event timestamps.

- **Market Sentiment Data**: daily Fear & Greed index (0–100).

Steps taken:

- Removed duplicates and missing entries.

- Aggregated daily values for profitability, volume, and volatility (as a proxy for price risk)

Correlation Analysis:

A correlation heatmap revealed trading volume has the strongest link with sentiment — meaning traders become more active as emotions swing. Profitability showed a much weaker direct correlation with sentiment. Risk levels (volatility) often rise before sentiment turns, hinting that trader behavior sometimes leads shifts in market mood.


Correlation: Trader Behavior vs Market Sentiment
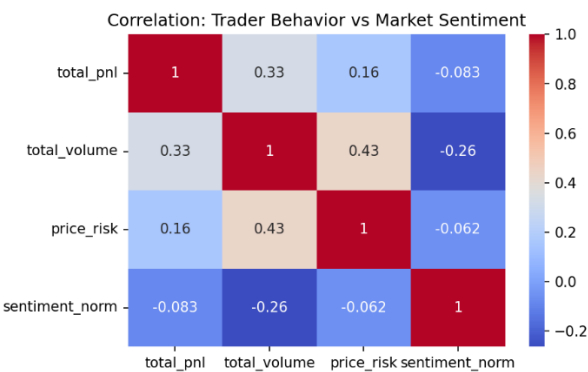
Clustering Analysis:

Using the Elbow method, 3 clusters were found to best represent market conditions.

**Cluster 0**: Quiet days → low volume, low PnL, low risk.

Cluster 1: Aggressive trading → very high volume and risk, linked to Greed surges, but profitability unstable.

Cluster 2: Fear-driven discipline → moderate volume, controlled risk, and surprisingly the **highest profitability**.
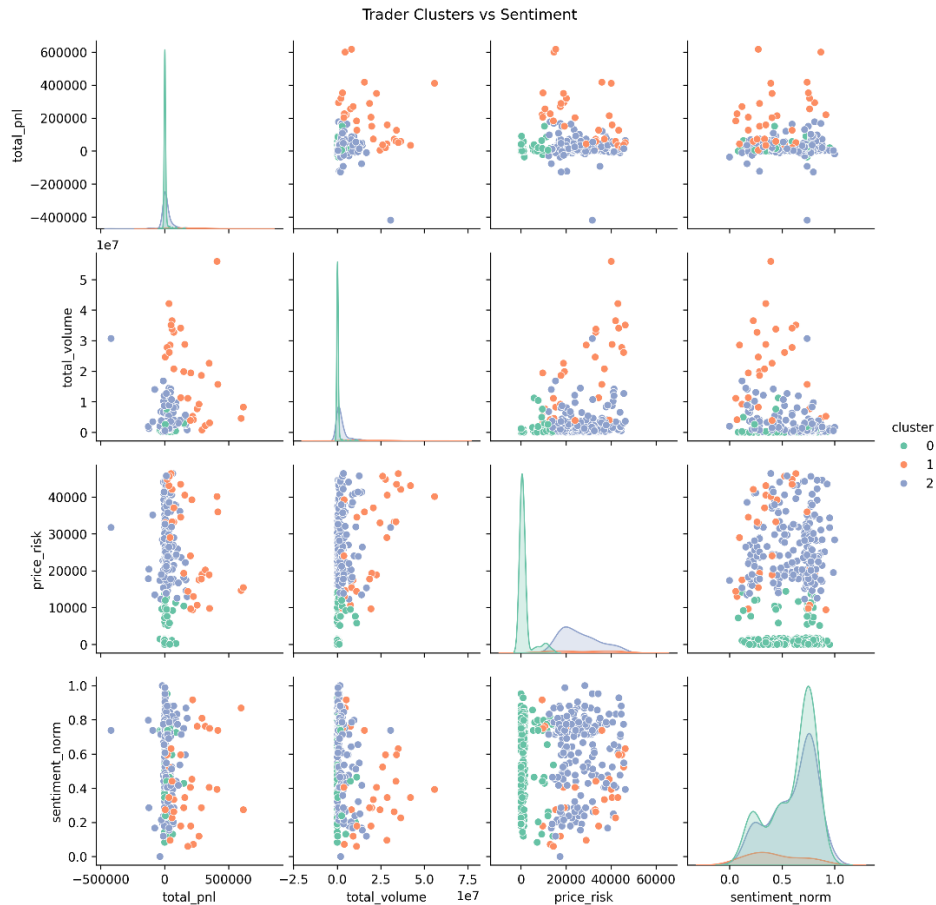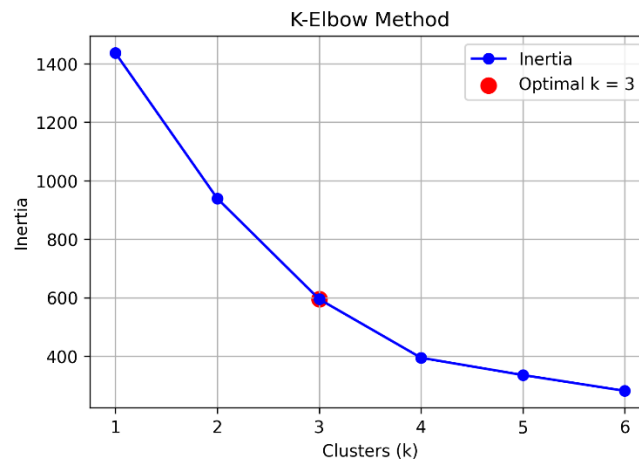
Cluster summary:

| cluster	total_pnl	total_volume	price_risk	sentiment_norm	days_in_cluster
0.0	4013.65	348144.22	1581.65	0.61	241.0
1.0	207382.41	19298640.45	27573.69	0.43	31.0
2.0	13808.41	2458638.46	26160.1	0.61	207.0
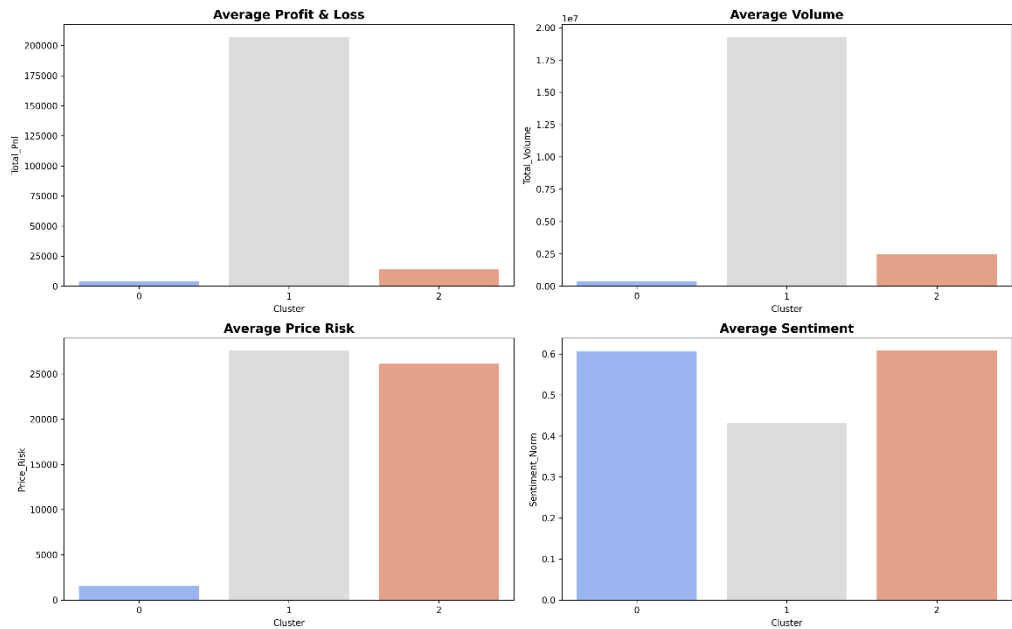
Time Series Trends:

During Fear (index <50), traders as a group earned higher average profits.

Greed phases triggered larger volumes but not necessarily better returns.

Profitability tends to lag changes in sentiment — traders adapt after mood swings rather than instantly profiting from them.

Volume vs Market Sentiment
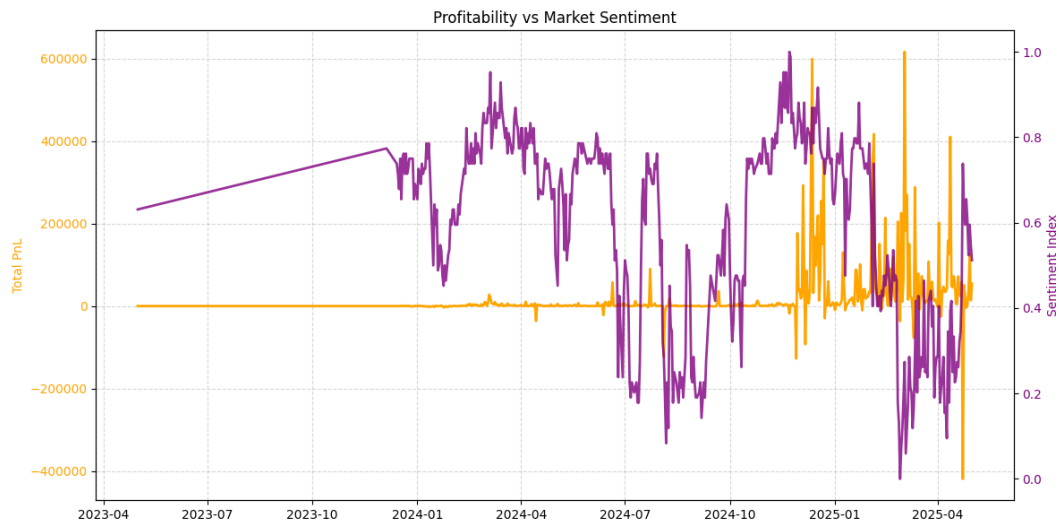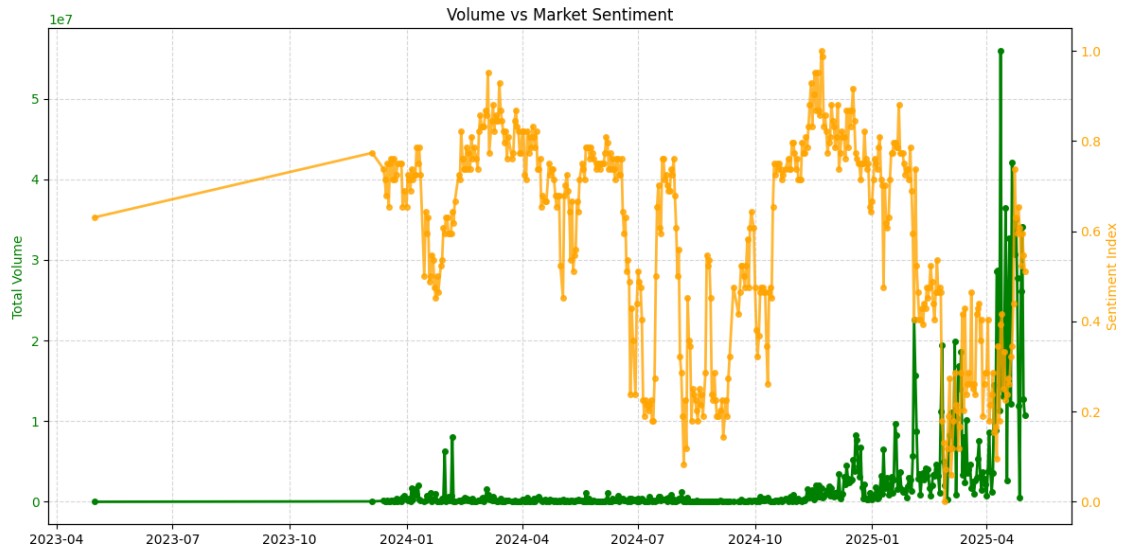
Regression Analysis:

An OLS regression tested how PnL depends on sentiment, lagged sentiment, volume, and risk.

Lagged sentiment stood out as statistically significant → yesterday's sentiment helps predict today's profits.

High volatility showed a negative impact on PnL, especially during Greed, suggesting that risk management is critical.

Model performance: MSE ≈ 4.6B, R^2 ≈ 0.11 (moderate explanatory power).

Actual vs Predicted Total PnL (Regression Model)

Residuals vs Predicted PnL
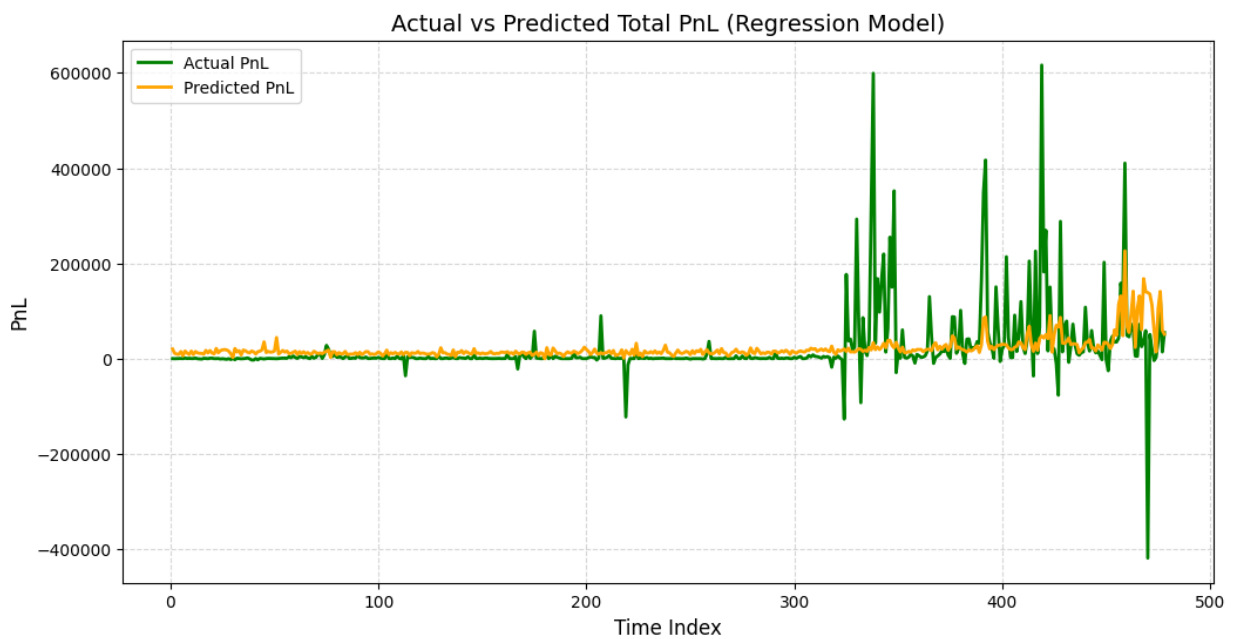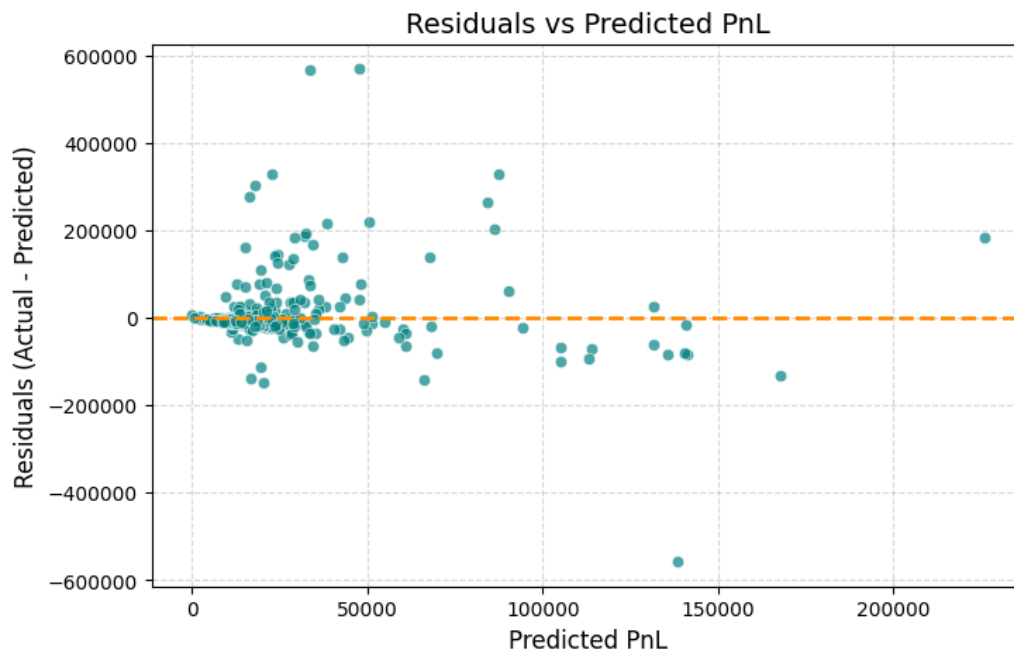
Insights:

Fear vs Greed: Average PnL was ~2.5x higher in Fear (37.6k) than in Greed (15k).

Volume vs Profitability: Greed phases saw heavy activity (avg vol ~19.3M) but inconsistent profits.

Volatility: High risk levels (~27k) often preceded sentiment shifts, acting as an early warning.

Lagged Sentiment: Yesterday's sentiment was statistically significant for predicting today's PnL.

Cluster Analysis: Controlled trading (Cluster 2) delivered steady profits with moderate volume and risk.

Recommendations:

● Strongest correlation with market sentiment: price_risk (corr=-0.06).

● Traders are more profitable during FEAR (Avg PnL 37597.94) vs GREED (14988.82).