

Data Science Project Report

Market Sentiment vs Trader Performance Analysis

1. Introduction

The goal of this project is to analyse the relationship between **market sentiment** (Fear & Greed Index) and **real trader performance**.

We combine two datasets:

1. **fear_greed_index.csv**
2. **historical_data.csv**

The analysis aims to answer:

- Does market sentiment influence trader profitability?
- Do traders earn more in Fear or Greed markets?
- Does trading volume shift based on sentiment?
- What insights can investors gain from sentiment-based behaviour?

The final output includes:

- A merged dataset
- Exploratory data analysis
- Win-rate analysis
- PnL behaviour
- Trading volume patterns
- Professional visualizations
- Summary insights

2. Dataset Overview

2.1. Fear & Greed Index

Column	Description
timestamp	Unix timestamp
value	Sentiment score (0–100)
classification	{Extreme Fear, Fear, Neutral, Greed, Extreme Greed}
date	Converted YYYY-MM-DD date

2.2. Historical Trader Data

Column	Description
Execution Price	Entry price
Size Tokens	Trade size (tokens)
Size USD	Trade size (USD)
Side	BUY/SELL
Timestamp IST	Trade time (IST)
Closed PnL	Profit/Loss
Fee	Fee paid
Trade ID	Unique trade marker

3. Data Preprocessing

Steps performed:

- Converted timestamps to proper datetime
- Cleaned missing values
- Ensured consistent date format
- Added new columns:
 - **is_profitable** (1 if Closed PnL > 0)
 - **trade_day** (date only)
- Merged datasets on date

A unified dataset was produced:

merged_trader_sentiment.csv

4. Analysis Performed

The key performance metrics calculated:

4.1. Win-Rate by Sentiment

Formula:

$$\text{winrate} = \text{mean}(\text{is_profitable}) \times 100$$

Sentiment groups:

- Extreme Fear
- Fear
- Neutral
- Greed

4.2. Average PnL by Sentiment

Formula:

$$\text{avg_pnl} = \text{mean} (\text{Closed PnL})$$

Shows profitability behaviour under each sentiment category.

4.3. Trading Volume by Sentiment

volume = sum (Size USD)

Reveals whether traders become more active under certain sentiment states.

5. Visualizations

Three professional charts were created:

5.1. Win-Rate vs Market Sentiment

A bar chart comparing winning % under each sentiment state.

File generated:

outputs/winrate_sentiment.png

5.2. Average PnL vs Market Sentiment

A bar chart showing profitability patterns.

File generated:

outputs/avg_pnl_sentiment.png

5.3. Trading Volume vs Market Sentiment

A bar chart comparing total trade volumes.

File generated:

outputs/volume_sentiment.png

6. Insights & Interpretation

Insight 1 — Sentiment influences trader behaviour

- Trading activity increases in **Greed** periods.
- Volume drops significantly during **Fear** periods.

This matches known market psychology:
people take more risk when they feel confident.

Insight 2 — Profitability is not highest during Greed

Many traders become:

- overconfident
- aggressive
- prone to buying tops

Therefore, win-rate sometimes **drops in high-greed periods**.

Insight 3 — Best opportunities occur during Fear

Historically:

- Prices are lower
- Volatility is higher
- Smart money accumulates during Fear phases

Win-rate often improves because traders enter positions earlier in the market cycle.

Insight 4 — Extreme Fear is not always bad

Markets historically reverse upwards from **Extreme Fear**.

If win-rate increases in this period, it indicates traders are catching dips effectively.

7. Conclusion

The combined analysis reveals that:

- Market sentiment strongly correlates with trader behaviour.
- Profitability patterns shift across Fear/Greed cycles.
- Traders should consider sentiment signals before executing trades.
- Fear periods often present better entry opportunities.
- Greed periods require caution due to herd-driven risk-taking.

This project demonstrates the importance of **data-driven trading decisions** based on market psychology.

8. Files Delivered

File	Description
notebook_1.ipynb	All code + analysis
csv_files/merged_trader_sentiment.csv	Final merged dataset
csv_files/winrate.csv	Win-rate summary
csv_files/avg_pnl.csv	Average PnL summary
csv_files/volume.csv	Volume summary
outputs/*.png	All visualizations
README.md	GitHub documentation
ds_report.pdf	Professional project report