**Data Science Assignment - Web3 Trading Team**

**Candidate:** Pranjal Mankar  
**Assignment:** Trader Behavior vs Market Sentiment Analysis

**📋 Project Overview**

This project analyzes the relationship between trader behavior on Hyperliquid exchange and Bitcoin market sentiment (Fear & Greed Index). The analysis explores how market emotions influence trading profitability, volume patterns, win rates, and overall trading performance.

**🔗 Google Colab Notebook**

**Primary Analysis:** [View Notebook](https://colab.research.google.com/drive/1WPEqvYeHutejn6r2ey4Pd0Qial3dv6f9?usp=sharing)  
*Note: Notebook is set to "Anyone with the link can view" as per requirements*

**📁 Repository Structure**

ds\_pranjal\_mankar/

├── notebook\_1.ipynb

├── csv\_files/

├── outputs/

├── ds\_report.pdf

└── README.md

**📊 Datasets Used**

1. **Bitcoin Market Sentiment Dataset**
   * Source: Fear & Greed Index
   * Columns: Date, Classification (Fear/Greed categories)
2. **Historical Trader Data from Hyperliquid**
   * Columns: account, symbol, execution price, size, side, time, start position, event, closedPnL, leverage, etc.

**🎯 Key Findings**

* **Most Profitable Period:** Extreme Greed ($67.89 average PnL)
* **Least Profitable Period:** Neutral ($34.31 average PnL)
* **Highest Win Rate:** Extreme Greed (52% success rate)
* **Lowest Win Rate:** Extreme Fear (37% success rate)
* **Statistical Significance:** p-value = 0.0000 (highly significant)

**🛠️ Technologies & Libraries Used**

* **Python 3.x**
* **pandas** - Data manipulation and analysis
* **numpy** - Numerical computations
* **matplotlib** - Data visualization
* **seaborn** - Statistical visualizations
* **scipy.stats** - Statistical testing (Kruskal-Wallis test)
* **Google Colab** - Development environment

**📈 Analysis Methodology**

1. **Data Cleaning & Preprocessing**
   * Timestamp normalization and date alignment
   * Numeric conversion for PnL and volume columns
   * Missing value handling
2. **Exploratory Data Analysis**
   * Sentiment distribution analysis
   * Trading volume patterns by sentiment
   * Profit/Loss distribution across market emotions
   * Win rate calculations
3. **Statistical Testing**
   * Kruskal-Wallis test for comparing multiple groups
   * Statistical significance validation
4. **Visualization & Insights**
   * Four comprehensive charts showing key relationships
   * Performance summary generation
   * Trading strategy recommendations

**🚀 How to Run the Analysis**

1. Open the [Google Colab notebook](https://colab.research.google.com/drive/1WPEqvYeHutejn6r2ey4Pd0Qial3dv6f9?usp=sharing)
2. Upload the dataset files to Colab environment:
   * fear\_greed\_index.csv
   * historical\_data.csv
3. Run all cells sequentially
4. Generated outputs will be saved automatically

**📝 Key Insights & Recommendations**

**Trading Strategies Discovered:**

* **Contrarian Approach:** Buy during high fear periods when markets overreact
* **Momentum Trading:** Increase positions during moderate greed periods
* **Dynamic Risk Management:** Adjust position sizes based on sentiment intensity
* **Sentiment Monitoring:** Use emotion shifts as early reversal indicators

**Risk Management:**

* Reduce exposure during extreme sentiment periods (both fear and greed)
* Apply stricter stop-losses during volatile sentiment phases
* Monitor sentiment transitions for optimal entry/exit timing

**📊 Generated Outputs**

**CSV Files:**

* merged\_dataset.csv: Complete analysis dataset with sentiment alignment
* performance\_summary.csv: Statistical summaries grouped by sentiment

**Visualizations:**

* **Sentiment Distribution:** Market emotion frequency analysis
* **PnL by Sentiment:** Profit/loss patterns across different market moods
* **Volume Analysis:** Trade size variations by sentiment category
* **Win Rate Analysis:** Success probability across sentiment states

**🎯 Business Impact**

This analysis provides actionable insights for:

* **Algorithmic Trading Systems:** Sentiment-based strategy implementation
* **Risk Management:** Dynamic position sizing based on market emotions
* **Market Timing:** Optimal entry/exit point identification
* **Performance Optimization:** Strategy adjustment based on psychological factors

**📞 Contact**

**Pranjal Mankar**  
Applying for: Data Science Position - Web3 Trading Team

*This project demonstrates expertise in data analysis, statistical testing, financial market understanding, and practical strategy development for cryptocurrency trading environments.*