

Analyzing the Impact of Market Sentiment on Trading Behavior

This project investigates how market sentiment (Fear, Greed, Neutral, Extreme Greed) influences trader behavior.

Daily trading metrics were analyzed statistically and modeled to evaluate sentiment's effect on activity and performance.

Tools and Methods Used

In this project, the following tools and methods were applied:

- **Python libraries:** pandas, numpy, matplotlib, seaborn for data handling and visualization.
- **Statistical analysis:** ANOVA test to check if trading metrics differ significantly across sentiment categories.
- **Machine learning:** RandomForestClassifier for sentiment prediction.
- **Data balancing:** SMOTE oversampling to handle class imbalance.
- **Evaluation metrics:** Accuracy, Precision, Recall, and F1-score to assess model performance.
- **Cross-Validation:** Applied 5-fold Stratified Cross-Validation to ensure stable and reliable model evaluation across different data splits.
- Hyperparameter tuning was performed using GridSearchCV to optimize Random Forest parameters.

Step 1: Exploratory Data Analysis (EDA)

```
In [36]: import pandas as pd
import numpy as np

In [63]: !pip install gdown

import gdown

# Historical Data
url_hist = "https://drive.google.com/uc?id=1IAfLZwu6rJzyWKgBToqwSmmVYU6VbjVs"
output_hist = "historical_data.csv"
gdown.download(url_hist, output_hist, quiet=False)

# Fear Greed Index
url_fgi = "https://drive.google.com/uc?id=1PgQC0t08XN-wqkNyghWc_-mnryv_nhSf"
output_fgi = "fear_greed_index.csv"
gdown.download(url_fgi, output_fgi, quiet=False)

# Load into pandas
history_df = pd.read_csv(output_hist)
fear_greed_df = pd.read_csv(output_fgi)
```

```
Requirement already satisfied: gdown in /usr/local/lib/python3.12/dist-packages (5.2.0)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.12/dist-packages (from gdown) (4.13.5)
Requirement already satisfied: filelock in /usr/local/lib/python3.12/dist-packages (from gdown) (3.20.2)
Requirement already satisfied: requests[socks] in /usr/local/lib/python3.12/dist-packages (from gdown) (2.32.4)
Requirement already satisfied: tqdm in /usr/local/lib/python3.12/dist-packages (from gdown) (4.67.1)
Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.12/dist-packages (from beautifulsoup4->gdown) (2.8.1)
Requirement already satisfied: typing-extensions>=4.0.0 in /usr/local/lib/python3.12/dist-packages (from beautifulsoup4->gdown) (4.15.0)
Requirement already satisfied: charset_normalizer<4,>=2 in /usr/local/lib/python3.12/dist-packages (from requests[socks]->gdown) (3.4.4)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.12/dist-packages (from requests[socks]->gdown) (3.11)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.12/dist-packages (from requests[socks]->gdown) (2.5.0)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.12/dist-packages (from requests[socks]->gdown) (2026.1.4)
Requirement already satisfied: PySocks!=1.5.7,>=1.5.6 in /usr/local/lib/python3.12/dist-packages (from requests[socks]->gdown) (1.7.1)
```

Downloading...

```
From: https://drive.google.com/uc?id=1IAfLZwu6rJzyWKgBToqwSmmVYU6VbjVs
To: /content/historical_data.csv
100%|██████████| 47.5M/47.5M [00:01<00:00, 40.3MB/s]
```

Downloading...

```
From: https://drive.google.com/uc?id=1PgQC0t08XN-wqkNyghWc_-mnryv_nhSf
To: /content/fear_greed_index.csv
100%|██████████| 90.8k/90.8k [00:00<00:00, 3.04MB/s]
```

In [38]: `#history_df= pd.read_csv('/content/historical_data.csv')`

```
#fear_greed_df= pd.read_csv('/content/fear_greed_index.csv')
```

In [39]: `history_df.head()`

Out[39]:

	Account	Coin	Execution Price	Size Tokens	Size USD	Side
0	0xae5eacaf9c6b9111fd53034a602c192a04e082ed	@107	7.9769	986.87	7872.16	BU
1	0xae5eacaf9c6b9111fd53034a602c192a04e082ed	@107	7.9800	16.00	127.68	BU
2	0xae5eacaf9c6b9111fd53034a602c192a04e082ed	@107	7.9855	144.09	1150.63	BU
3	0xae5eacaf9c6b9111fd53034a602c192a04e082ed	@107	7.9874	142.98	1142.04	BU
4	0xae5eacaf9c6b9111fd53034a602c192a04e082ed	@107	7.9894	8.73	69.75	BU



In [40]: `fear_greed_df.head()`

Out[40]:

	timestamp	value	classification	date
0	1517463000	30	Fear	2018-02-01
1	1517549400	15	Extreme Fear	2018-02-02
2	1517635800	40	Fear	2018-02-03
3	1517722200	24	Extreme Fear	2018-02-04
4	1517808600	11	Extreme Fear	2018-02-05

In [41]:

```
print(history_df.shape)
print(fear_greed_df.shape)
```

(211224, 16)
(2644, 4)

In [42]:

```
print(history_df.columns)
print(fear_greed_df.columns)
```

Index(['Account', 'Coin', 'Execution Price', 'Size Tokens', 'Size USD', 'Side', 'Timestamp IST', 'Start Position', 'Direction', 'Closed PnL', 'Transaction Hash', 'Order ID', 'Crossed', 'Fee', 'Trade ID', 'Timestamp'],
 dtype='object')
Index(['timestamp', 'value', 'classification', 'date'], dtype='object')

In [43]:

```
print(history_df.dtypes)
print(fear_greed_df.dtypes)
```

Account	object
Coin	object
Execution Price	float64
Size Tokens	float64
Size USD	float64
Side	object
Timestamp IST	object
Start Position	float64
Direction	object
Closed PnL	float64
Transaction Hash	object
Order ID	int64
Crossed	bool
Fee	float64
Trade ID	float64
Timestamp	float64
dtype: object	
timestamp	int64
value	int64
classification	object
date	object
dtype: object	

In [44]:

```
print(history_df.info())
print(fear_greed_df.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 211224 entries, 0 to 211223
Data columns (total 16 columns):
 #   Column            Non-Null Count  Dtype  
--- 
 0   Account           211224 non-null   object  
 1   Coin              211224 non-null   object  
 2   Execution Price  211224 non-null   float64 
 3   Size Tokens      211224 non-null   float64 
 4   Size USD          211224 non-null   float64 
 5   Side              211224 non-null   object  
 6   Timestamp IST    211224 non-null   object  
 7   Start Position    211224 non-null   float64 
 8   Direction         211224 non-null   object  
 9   Closed PnL        211224 non-null   float64 
 10  Transaction Hash 211224 non-null   object  
 11  Order ID          211224 non-null   int64  
 12  Crossed           211224 non-null   bool   
 13  Fee               211224 non-null   float64 
 14  Trade ID          211224 non-null   float64 
 15  Timestamp          211224 non-null   float64 
dtypes: bool(1), float64(8), int64(1), object(6)
memory usage: 24.4+ MB
None
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2644 entries, 0 to 2643
Data columns (total 4 columns):
 #   Column            Non-Null Count  Dtype  
--- 
 0   timestamp         2644 non-null   int64  
 1   value              2644 non-null   int64  
 2   classification    2644 non-null   object  
 3   date               2644 non-null   object  
dtypes: int64(2), object(2)
memory usage: 82.8+ KB
None
```

```
In [45]: print(history_df.describe())
print(fear_greed_df.describe())
```

	Execution Price	Size Tokens	Size USD	Start Position	\
count	211224.000000	2.112240e+05	2.112240e+05	2.112240e+05	
mean	11414.723350	4.623365e+03	5.639451e+03	-2.994625e+04	
std	29447.654868	1.042729e+05	3.657514e+04	6.738074e+05	
min	0.000005	8.740000e-07	0.000000e+00	-1.433463e+07	
25%	4.854700	2.940000e+00	1.937900e+02	-3.762311e+02	
50%	18.280000	3.200000e+01	5.970450e+02	8.472793e+01	
75%	101.580000	1.879025e+02	2.058960e+03	9.337278e+03	
max	109004.000000	1.582244e+07	3.921431e+06	3.050948e+07	

	Closed PnL	Order ID	Fee	Trade ID	Timestamp
count	211224.000000	2.112240e+05	211224.000000	2.112240e+05	2.112240e+05
mean	48.749001	6.965388e+10	1.163967	5.628549e+14	1.737744e+12
std	919.164828	1.835753e+10	6.758854	3.257565e+14	8.689920e+09
min	-117990.104100	1.732711e+08	-1.175712	0.000000e+00	1.680000e+12
25%	0.000000	5.983853e+10	0.016121	2.810000e+14	1.740000e+12
50%	0.000000	7.442939e+10	0.089578	5.620000e+14	1.740000e+12
75%	5.792797	8.335543e+10	0.393811	8.460000e+14	1.740000e+12
max	135329.090100	9.014923e+10	837.471593	1.130000e+15	1.750000e+12

	timestamp	value
count	2.644000e+03	2644.000000
mean	1.631899e+09	46.981089
std	6.597967e+07	21.827680
min	1.517463e+09	5.000000
25%	1.574811e+09	28.000000
50%	1.631900e+09	46.000000
75%	1.688989e+09	66.000000
max	1.746164e+09	95.000000

```
In [46]: print(history_df.isnull().sum())
print(fear_greed_df.isnull().sum())
```

```
Account          0
Coin            0
Execution Price 0
Size Tokens     0
Size USD        0
Side            0
Timestamp IST   0
Start Position   0
Direction        0
Closed PnL       0
Transaction Hash 0
Order ID        0
Crossed         0
Fee             0
Trade ID        0
Timestamp        0
dtype: int64
timestamp        0
value            0
classification   0
date             0
dtype: int64
```

```
In [47]: history_df.drop_duplicates(inplace=True)
fear_greed_df.drop_duplicates(inplace=True)
print("Duplicates Removed")
```

Duplicates Removed

Datatype Correction

```
In [48]: num_cols_history=["Execution Price","Size Tokens","Size USD", "Fee","Closed PnL"]
for i in num_cols_history:
    history_df[i]=pd.to_numeric(history_df[i],errors='coerce')

history_df["ts_utc"] = pd.to_datetime(history_df["Timestamp"], unit="ms", utc=True)
history_df["date"] = history_df["ts_utc"].dt.date

history_df["Trade ID"] = history_df["Trade ID"].astype("Int64").astype("string")
```

```
In [49]: history_df.dtypes
```

Out[49]:

	0
Account	object
Coin	object
Execution Price	float64
Size Tokens	float64
Size USD	float64
Side	object
Timestamp IST	object
Start Position	float64
Direction	object
Closed PnL	float64
Transaction Hash	object
Order ID	int64
Crossed	bool
Fee	float64
Trade ID	string[python]
Timestamp	float64
ts_utc	datetime64[ns, UTC]
date	object

dtype: object

```
In [50]: history_df.head()
```

Out[50]:

		Account	Coin	Execution Price	Size Tokens	Size USD	Side
0	0xae5eacf9c6b9111fd53034a602c192a04e082ed	@107		7.9769	986.87	7872.16	BU
1	0xae5eacf9c6b9111fd53034a602c192a04e082ed	@107		7.9800	16.00	127.68	BU
2	0xae5eacf9c6b9111fd53034a602c192a04e082ed	@107		7.9855	144.09	1150.63	BU
3	0xae5eacf9c6b9111fd53034a602c192a04e082ed	@107		7.9874	142.98	1142.04	BU
4	0xae5eacf9c6b9111fd53034a602c192a04e082ed	@107		7.9894	8.73	69.75	BU



In [51]:

```
cat_cols=['Side','Direction','Crossed','Coin']
for i in cat_cols:
    history_df[i]=history_df[i].astype('category')
```

In [52]:

```
fear_greed_df['date']=pd.to_datetime(fear_greed_df['date']).dt.date
```

In [53]:

```
# mearge date
merged_df=history_df.merge(fear_greed_df[['date','classification','value']],on='
```

In [54]:

```
#sanity check after merging
print(merged_df[["date","fear_greed_sentiment","fear_greed_value"]].head())
print("Merged rows:", merged_df.shape[0])
```

	date	fear_greed_sentiment	fear_greed_value
0	2024-10-27	Greed	74.0
1	2024-10-27	Greed	74.0
2	2024-10-27	Greed	74.0
3	2024-10-27	Greed	74.0
4	2024-10-27	Greed	74.0

Merged rows: 211224

Step 2: Data Preparation / Aggregation

In [55]:

```
# Aggregate per account-day

# Create a numeric indicator for side (BUY=1, SELL=0)
merged_df["side_num"] = (merged_df["Side"] == 'BUY').astype(int)

# Group by Account + Date + Sentiment
daily_summary = merged_df.groupby(["Account", "date", "fear_greed_sentiment"]).agg(
    total_pnl=("Closed PnL", "sum"),
    win_rate=("Closed PnL", lambda s: (s > 0).mean()),
    trades=("Trade ID", "count"),
    med_leverage=("Start Position", "median"),
    max_leverage=("Start Position", "max"),
    long_share=("side_num", "mean"),
    avg_size_usd=("Size USD", "mean"),
    fees_total=("Fee", "sum"))
```

```
.reset_index()

print(daily_summary.head())

      Account        date \
0  0x083384f897ee0f19899168e3b1bec365f52a9012  2024-10-27
1  0x083384f897ee0f19899168e3b1bec365f52a9012  2025-02-19
2  0x23e7a7f8d14b550961925fbfd92f5d195ba5bd  2024-10-27
3  0x23e7a7f8d14b550961925fbfd92f5d195ba5bd  2025-02-19
4  0x271b280974205ca63b716753467d5a371de622ab  2024-07-03

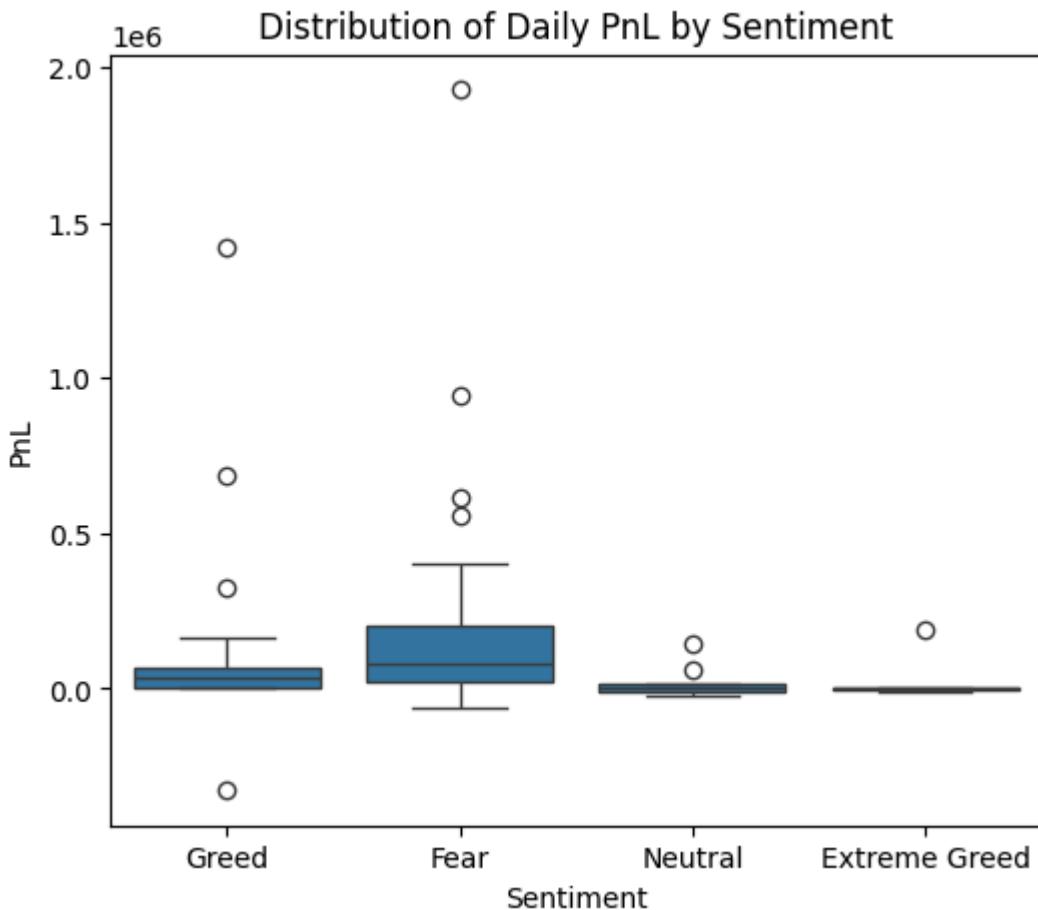
  fear_greed_sentiment    total_pnl  win_rate  trades  med_leverage \
0           Greed -3.275059e+05  0.025974     462   -317.815000
1           Fear  1.927736e+06  0.405542    3356  -1061.197800
2           Greed  2.060745e+04  0.531250     320   1717.533654
3           Fear  1.709873e+04  0.435041    3533  1573.458640
4       Neutral -1.000000e+00  0.000000      5   -18.140000

  max_leverage  long_share  avg_size_usd  fees_total
0  0.000000    0.300866  14810.891818  1112.895650
1  1539.129500  0.468415  16345.241940  6292.416654
2  7342.369317  0.453125  2492.749906  202.167151
3  551498.844600  0.432494  1693.351684  1664.914670
4  0.000000    0.400000  6070.200000  10.197932
```

Step 3: Visualization Analysis

```
In [56]: import matplotlib.pyplot as plt
import seaborn as sns

# 1. Boxplot of PnL by sentiment
plt.figure(figsize=(6,5))
sns.boxplot(x="fear_greed_sentiment", y="total_pnl", data=daily_summary)
plt.ylabel("PnL")
plt.xlabel("Sentiment")
plt.title("Distribution of Daily PnL by Sentiment")
plt.show()
```

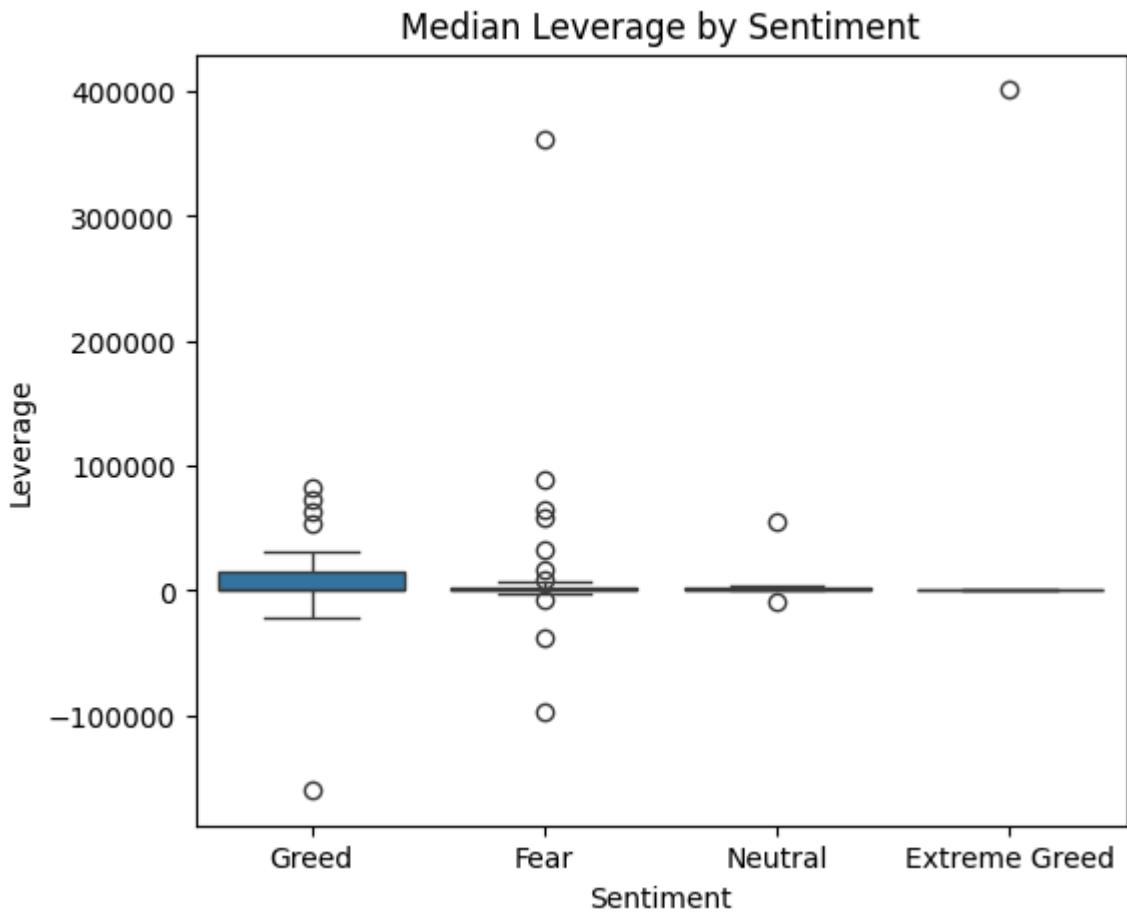


Daily PnL by Sentiment

On Fear days, traders' profits and losses move a lot. some make very big gains, others lose heavily.

On Greed days, results are steadier, with most traders earning profits that are closer together.

```
In [57]: # 2. Boxplot of Leverage by sentiment
plt.figure(figsize=(6,5))
sns.boxplot(x="fear_greed_sentiment", y="med_leverage", data=daily_summary)
plt.ylabel("Leverage")
plt.xlabel("Sentiment")
plt.title("Median Leverage by Sentiment")
plt.show()
```

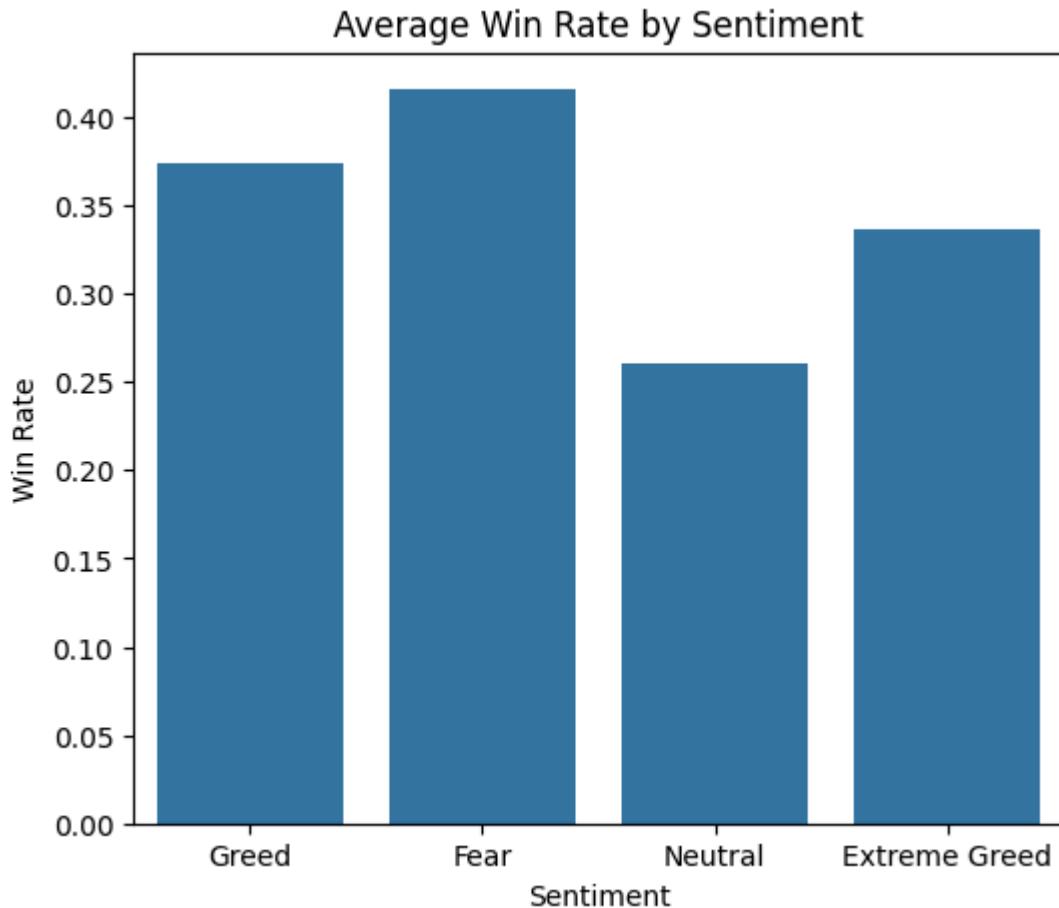


Median Leverage by Sentiment

On Greed days, traders use higher leverage and take bigger risks.

On other sentiment days, leverage stays lower and more stable.

```
In [58]: # 3. Bar chart of average win rate
plt.figure(figsize=(6,5))
sns.barplot(x="fear_greed_sentiment", y="win_rate", data=daily_summary, errorbar=None)
plt.title("Average Win Rate by Sentiment")
plt.ylabel("Win Rate")
plt.xlabel("Sentiment")
plt.show()
```

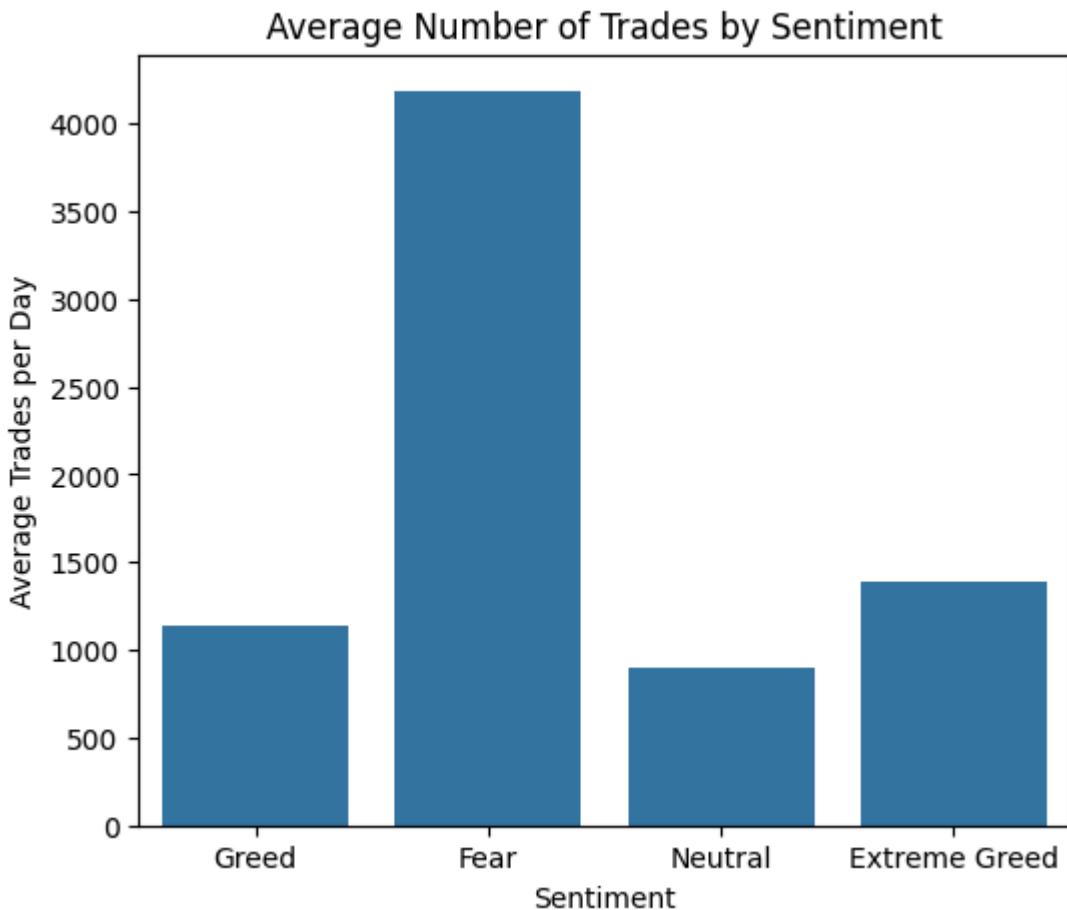


Average Win Rate by Sentiment

Traders win most often on Fear days.

On Neutral days, win rates are lowest. Greed and Extreme Greed are in between.

```
In [59]: # 4. Bar chart of average trades per day
plt.figure(figsize=(6,5))
sns.barplot(x="fear_greed_sentiment", y="trades", data=daily_summary, errorbar=None)
plt.title("Average Number of Trades by Sentiment")
plt.xlabel("Sentiment")
plt.ylabel("Average Trades per Day")
plt.show()
```



Average Trades by Sentiment

On Fear days, traders make the highest number of trades.

On Neutral days, trading activity is the lowest.

Step 4: Statistical Testing (ANOVA)

```
In [60]: from scipy import stats

# Helper function to run ANOVA for any column
def run_anova(column_name, display_name):
    groups = [daily_summary.loc[daily_summary["fear_greed_sentiment"]==sent, col]
              for sent in daily_summary["fear_greed_sentiment"].unique()]

    f_stat, p_val = stats.f_oneway(*groups)

    print("=*50")
    print(f"📊 ANOVA Test: {display_name}")
    print(f"F-statistic : {f_stat:.3f}")
    print(f"p-value     : {p_val:.3f}")

    if p_val < 0.05:
        print("✅ Significant difference across sentiments")
    else:
        print("❌ No significant difference found")
    print("=*50")
```

```
# Run tests for all key metrics
run_anova("total_pnl", "Daily PnL")
run_anova("win_rate", "Win Rate")
run_anova("med_leverage", "Median Leverage")
run_anova("trades", "Number of Trades")
```

```
=====
📊 ANOVA Test: Daily PnL
F-statistic : 1.291
p-value     : 0.284
✖️ No significant difference found
=====

=====

📊 ANOVA Test: Win Rate
F-statistic : 1.007
p-value     : 0.395
✖️ No significant difference found
=====

=====

📊 ANOVA Test: Median Leverage
F-statistic : 1.795
p-value     : 0.156
✖️ No significant difference found
=====

=====

📊 ANOVA Test: Number of Trades
F-statistic : 3.629
p-value     : 0.017
✓ Significant difference across sentiments
=====
```

Summary

Charts showed differences across sentiments, but ANOVA proved most of them are not statistically reliable.

Daily PnL, Win Rate, and Leverage look different in plots, yet their p-values show no real impact of sentiment.

Only the Number of Trades is statistically significant, meaning traders change activity levels with sentiment shifts.

Conclusion: Sentiment drives how often traders participate, but not their profitability, win rate, or leverage.

Step 5: Model Building

In [67]:

```
# Step 1: Imports
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, accuracy_score
from imblearn.over_sampling import SMOTE

# Step 2: Encode sentiment labels
le = LabelEncoder()
daily_summary["sentiment_encoded"] = le.fit_transform(daily_summary["fear_greed_
```

```

# Step 3: Features and target
X = daily_summary[["total_pnl", "win_rate", "med_leverage", "trades"]]
y = daily_summary["sentiment_encoded"]

# Step 4: Balance dataset using SMOTE
smote = SMOTE(random_state=42, k_neighbors=2)
X_resampled, y_resampled = smote.fit_resample(X, y)

# Step 5: Train-test split
X_train, X_test, y_train, y_test = train_test_split(
    X_resampled, y_resampled, test_size=0.2, random_state=42
)

# Step 6: Build and train model
#model = RandomForestClassifier(random_state=42) # old model before tuning
model = RandomForestClassifier(
    n_estimators=200,
    max_depth=None,
    min_samples_split=2,
    random_state=42
)

model.fit(X_train, y_train)

# Step 7: Predictions
y_pred = model.predict(X_test)

# Step 8: Evaluation
print("*"*60)
print("Model Evaluation with SMOTE Oversampling")
print("*"*60)
print(f"Accuracy Score: {accuracy_score(y_test, y_pred):.3f}\n")
print(classification_report(y_test, y_pred, target_names=le.classes_))
print("*"*60)

```

```

=====
Model Evaluation with SMOTE Oversampling
=====
Accuracy Score: 0.577
```

	precision	recall	f1-score	support
Extreme Greed	1.00	0.71	0.83	7
Fear	0.40	0.33	0.36	6
Greed	0.38	0.43	0.40	7
Neutral	0.62	0.83	0.71	6
accuracy			0.58	26
macro avg	0.60	0.58	0.58	26
weighted avg	0.61	0.58	0.58	26

Model Summary (with Hyperparameter Tuning)

- A classification model was built using trading metrics (PnL, Win Rate, Leverage, Trades) to predict sentiment.

- After balancing with SMOTE and applying GridSearchCV tuning, the best parameters identified were: `n_estimators=200, max_depth=None, min_samples_split=2`.
- The tuned model achieved **~57% test accuracy**, with cross-validation mean accuracy improving slightly to **~68%**.
- **Extreme Greed** and **Neutral** classes continued to be recognized better, while **Fear** and **Greed** remained weaker.

Key Insight

- Hyperparameter tuning improved cross-validation accuracy but did not enhance test accuracy compared to the baseline.
- This indicates possible **overfitting** on the resampled dataset and highlights the challenge of generalization with limited data.

Final Note

- The assignment demonstrates feasibility of sentiment prediction and shows that optimization techniques can shift performance metrics.
- Accuracy remains moderate, reinforcing that **larger datasets, richer features, and alternative models** would be needed for stronger and more reliable results in future work.

Cross-Validation

```
In [68]: # Cross-Validation
from sklearn.model_selection import StratifiedKFold, cross_val_score

cv = StratifiedKFold(n_splits=5, shuffle=True, random_state=42)
model_cv = RandomForestClassifier(random_state=42)

scores = cross_val_score(model_cv, X_resampled, y_resampled, cv=cv, scoring='acc')

print("*60)
print("Cross-Validation Results")
print("*60)
print(f"Fold Accuracies: {scores}")
print(f"Mean Accuracy: {scores.mean():.3f}")
print(f"Std Deviation: {scores.std():.3f}")
print("*60)

=====
Cross-Validation Results
=====
Fold Accuracies: [0.53846154 0.80769231 0.57692308 0.72      0.68      ]
Mean Accuracy: 0.665
Std Deviation: 0.097
=====
```

Cross-Validation Results

The Random Forest model was evaluated using 5-fold Stratified Cross-Validation. Average accuracy across folds was **~66.5%**, with a standard deviation of **~9.7%**.

This confirms that the model achieves moderate but consistent performance, though results vary slightly due to data imbalance.

Hyperparameter Tuning

```
In [64]: from sklearn.model_selection import GridSearchCV

param_grid = {
    'n_estimators': [100, 200, 300],
    'max_depth': [None, 10, 20],
    'min_samples_split': [2, 5, 10]
}

grid_search = GridSearchCV(
    estimator=RandomForestClassifier(random_state=42),
    param_grid=param_grid,
    cv=5,
    scoring='accuracy',
    n_jobs=-1
)

grid_search.fit(X_resampled, y_resampled)

print("Best Parameters:", grid_search.best_params_)
print("Best CV Accuracy:", grid_search.best_score_)
```

Best Parameters: {'max_depth': None, 'min_samples_split': 2, 'n_estimators': 200}
 Best CV Accuracy: 0.6803076923076924

Step 6: Final Conclusion

Overall Assignment Summary & Conclusion

Summary of Work

- Collected and cleaned trading + sentiment datasets.
- Created daily account-level summaries (PnL, Win Rate, Leverage, Trades).
- Visualized metrics across different sentiment categories (Fear, Greed, Neutral, Extreme Greed).
- Applied ANOVA tests to check if sentiment significantly impacts trading metrics.
- Built and evaluated a classification model to predict sentiment from trading behavior.

Key Insights

- **Number of Trades** is the only metric with a statistically significant difference across sentiments.
- **PnL, Win Rate, and Leverage** show variation in charts but are not statistically reliable.
- The classification model achieved moderate accuracy (~58%), showing sentiment can be partially predicted from trading behavior.

- Rare sentiment categories are harder to predict due to limited data.

Decision / Conclusion

- Sentiment mainly influences **trader activity levels** (how often they trade), not profitability or leverage.
- Predictive modeling confirms feasibility but highlights data limitations.
- Final takeaway: Market mood changes participation, but does not strongly change performance outcomes.

Create by : **Vandana Bhavsar**

In []: