In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sb
```

In [4]:

```
historical_data = pd.read_csv("C:/Users/SAHIL PARMAR/Downloads/historical_data.csv")
fear_greed_index = pd.read_csv("C:/Users/SAHIL PARMAR/Downloads/fear_greed_index.csv")
```

In [6]:

```
print(historical_data.head())
print(fear_greed_index.head())
```

```
                                      Account  Coin  Execution Price  \
0  0xae5eacaf9c6b9111fd53034a602c192a04e082ed  @107           7.9769
1  0xae5eacaf9c6b9111fd53034a602c192a04e082ed  @107           7.9800
2  0xae5eacaf9c6b9111fd53034a602c192a04e082ed  @107           7.9855
3  0xae5eacaf9c6b9111fd53034a602c192a04e082ed  @107           7.9874
4  0xae5eacaf9c6b9111fd53034a602c192a04e082ed  @107           7.9894

   Size Tokens  Size USD  Side    Timestamp IST  Start Position Direction  \
0       986.87   7872.16  BUY  02-12-2024 22:50        0.000000       Buy
1        16.00    127.68  BUY  02-12-2024 22:50      986.524596       Buy
2       144.09   1150.63  BUY  02-12-2024 22:50     1002.518996       Buy
3       142.98   1142.04  BUY  02-12-2024 22:50     1146.558564       Buy
4         8.73     69.75  BUY  02-12-2024 22:50     1289.488521       Buy

   Closed PnL                                   Transaction Hash     Order ID  \
0         0.0  0xec09451986a1874e3a980418412fcd0201f500c95bac...  52017706630
1         0.0  0xec09451986a1874e3a980418412fcd0201f500c95bac...  52017706630
2         0.0  0xec09451986a1874e3a980418412fcd0201f500c95bac...  52017706630
3         0.0  0xec09451986a1874e3a980418412fcd0201f500c95bac...  52017706630
4         0.0  0xec09451986a1874e3a980418412fcd0201f500c95bac...  52017706630

   Crossed       Fee      Trade ID     Timestamp
0     True  0.345404  8.950000e+14  1.730000e+12
1     True  0.005600  4.430000e+14  1.730000e+12
2     True  0.050431  6.600000e+14  1.730000e+12
3     True  0.050043  1.080000e+15  1.730000e+12
4     True  0.003055  1.050000e+15  1.730000e+12
    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 [8]:

```python
# Convert trade timestamp
historical_data['trade_time'] = pd.to_datetime(historical_data['Timestamp'], unit='ms')

# Convert sentiment timestamp
fear_greed_index['sentiment_time'] = pd.to_datetime(fear_greed_index['timestamp'], unit='s')

# Sort before merge
historical_data = historical_data.sort_values('trade_time')
```

```
fear_greed_index = fear_greed_index.sort_values('sentiment_time')

# Merge sentiment into trades (last known sentiment)
merged_df = pd.merge_asof(
    historical_data,
    fear_greed_index,
    left_on='trade_time',
    right_on='sentiment_time',
    direction='backward'
)
print(merged_df)
```

```
                                           Account      Coin  Execution Price  \
0       0x3998f134d6aaa2b6a5f723806d00fd2bbbbce891       ETH        1898.6000   
1       0x3998f134d6aaa2b6a5f723806d00fd2bbbbce891       ETH        1897.9000   
2       0x3998f134d6aaa2b6a5f723806d00fd2bbbbce891       ETH        1897.9000   
3       0xb1231a4a2dd02f2276fa3c5e2a2f3436e6bfed23       ETH        2298.4000   
4       0xb1231a4a2dd02f2276fa3c5e2a2f3436e6bfed23      LINK          14.9400   
...                                            ...       ...              ...   
211219  0x271b280974205ca63b716753467d5a371de622ab      PAXG        3446.0000   
211220  0x271b280974205ca63b716753467d5a371de622ab      PAXG        3446.0000   
211221  0x271b280974205ca63b716753467d5a371de622ab      PAXG        3446.3000   
211222  0x271b280974205ca63b716753467d5a371de622ab  FARTCOIN           1.0514   
211223  0x72743ae2822edd658c0c50608fd7c5c501b2afbd  FARTCOIN           1.1010   

        Size Tokens  Size USD  Side     Timestamp IST  Start Position  \
0            0.0722    137.08   BUY  01-05-2023 01:06          0.1791   
1            0.0824    156.39   BUY  01-05-2023 01:06          0.0967   
2            0.0967    183.53   BUY  01-05-2023 01:06          0.0000   
3           21.7523  49995.49   BUY  30-12-2023 05:35        -21.7523   
4          749.3000  11194.54  SELL  01-01-2024 09:10        749.3000   
...             ...       ...   ...               ...             ...   
211219       0.0210     72.37   BUY  22-04-2025 21:21       -149.5940   
211220       0.0210     72.37   BUY  22-04-2025 21:21       -149.5730   
211221       0.2110    727.17   BUY  22-04-2025 21:21       -149.5520   
211222     475.6000    500.05  SELL  22-04-2025 21:21     -24927.5000   
211223    1017.1000   1119.83  SELL  25-04-2025 15:35       1017.1000   

          Direction  Closed PnL  ... Crossed        Fee      Trade ID  \
0         Open Long    0.000000  ...    True   0.000000  0.000000e+00   
1         Open Long    0.000000  ...    True   0.000000  0.000000e+00   
2         Open Long    0.000000  ...    True   0.000000  0.000000e+00   
3       Close Short -264.507968  ...    True  12.498871  2.850000e+14   
4        Close Long  -87.728044  ...    True   2.798635  2.080000e+14   
...             ...         ...  ...     ...        ...           ...   
211219  Close Short   -1.740123  ...    True   0.020840  6.650000e+14   
211220  Close Short   -1.740123  ...    True   0.020840  5.220000e+14   
211221  Close Short  -17.547393  ...    True   0.209424  4.400000e+14   
211222   Open Short    0.000000  ...    True   0.144012  1.750000e+14   
211223   Close Long  -53.906300  ...   False   0.111982  3.270000e+14   

           Timestamp          trade_time   timestamp value  classification  \
0       1.680000e+12 2023-03-28 10:40:00  1679981400    59           Greed   
1       1.680000e+12 2023-03-28 10:40:00  1679981400    59           Greed   
```

```
2       1.680000e+12 2023-03-28 10:40:00  1679981400    59            Greed
3       1.700000e+12 2023-11-14 22:13:20  1699939800    69            Greed
4       1.700000e+12 2023-11-14 22:13:20  1699939800    69            Greed
...              ...                 ...         ...   ...              ...
211219  1.750000e+12 2025-06-15 15:06:40  1746163800    67            Greed
211220  1.750000e+12 2025-06-15 15:06:40  1746163800    67            Greed
211221  1.750000e+12 2025-06-15 15:06:40  1746163800    67            Greed
211222  1.750000e+12 2025-06-15 15:06:40  1746163800    67            Greed
211223  1.750000e+12 2025-06-15 15:06:40  1746163800    67            Greed

              date      sentiment_time
0       2023-03-28 2023-03-28 05:30:00
1       2023-03-28 2023-03-28 05:30:00
2       2023-03-28 2023-03-28 05:30:00
3       2023-11-14 2023-11-14 05:30:00
4       2023-11-14 2023-11-14 05:30:00
...            ...                 ...
211219  2025-05-02 2025-05-02 05:30:00
211220  2025-05-02 2025-05-02 05:30:00
211221  2025-05-02 2025-05-02 05:30:00
211222  2025-05-02 2025-05-02 05:30:00
211223  2025-05-02 2025-05-02 05:30:00

[211224 rows x 22 columns]
```

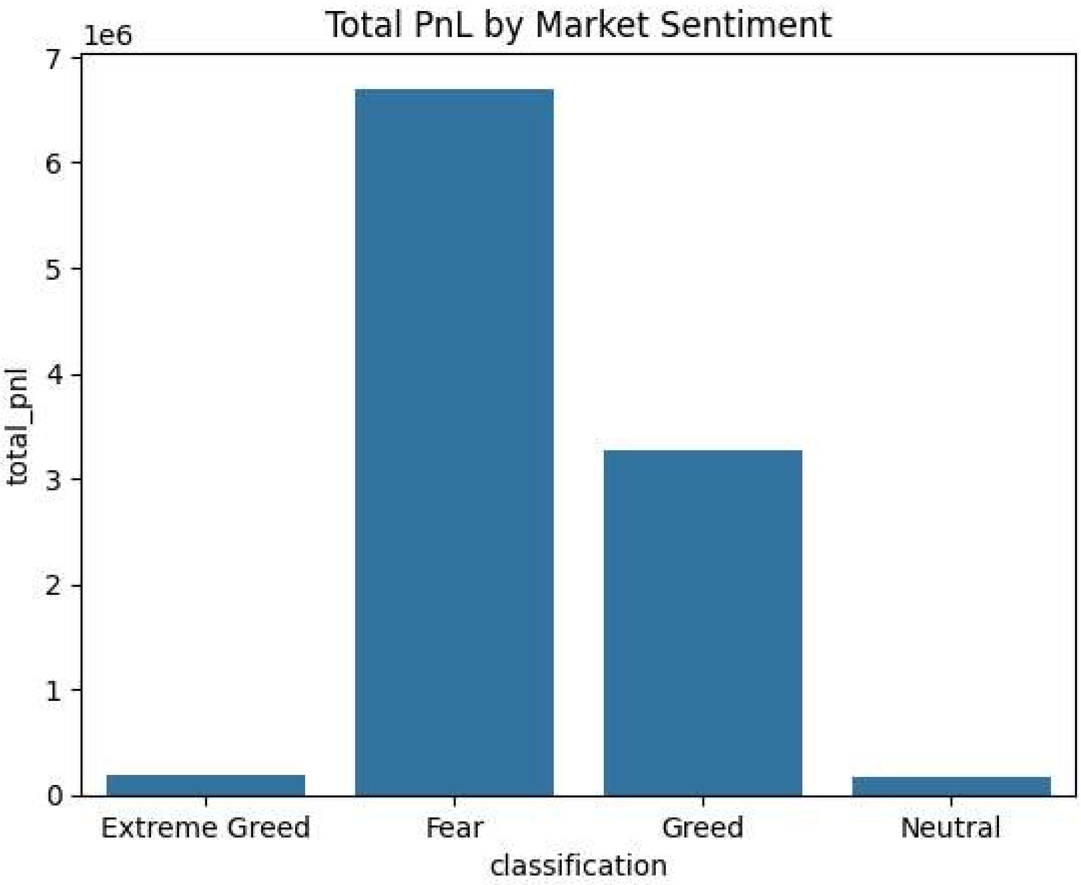
In [9]:

```
performance_by_sentiment = (
    merged_df
    .groupby('classification')
    .agg(
        total_pnl=('Closed PnL', 'sum'),
        avg_pnl=('Closed PnL', 'mean'),
        win_rate=('Closed PnL', lambda x: (x > 0).mean()),
        trades=('Closed PnL', 'count')
    )
)

print(performance_by_sentiment)
```

```
                   total_pnl    avg_pnl  win_rate  trades
classification
Extreme Greed   1.769655e+05  25.418772  0.490089    6962
Fear            6.699925e+06  50.047622  0.415146  133871
Greed           3.261326e+06  51.562465  0.404996   63250
Neutral         1.587424e+05  22.229713  0.317182    7141
```

In [10]:

```
import seaborn as sns
import matplotlib.pyplot as plt

sns.barplot(
    data=performance_by_sentiment.reset_index(),
    x='classification',
    y='total_pnl'
)
plt.title("Total PnL by Market Sentiment")
plt.show()
```



In [11]:

```
contrarian_traders = (
    merged_df[merged_df['classification'].isin(['Fear', 'Extreme Fear'])]
    .groupby('Account')
    .agg(
        pnl=('Closed PnL', 'sum'),
        win_rate=('Closed PnL', lambda x: (x > 0).mean()),
        trades=('Closed PnL', 'count')
    )
    .query("trades > 20")
    .sort_values('pnl', ascending=False)
)

contrarian_traders.head(10)
```

Out[11]:

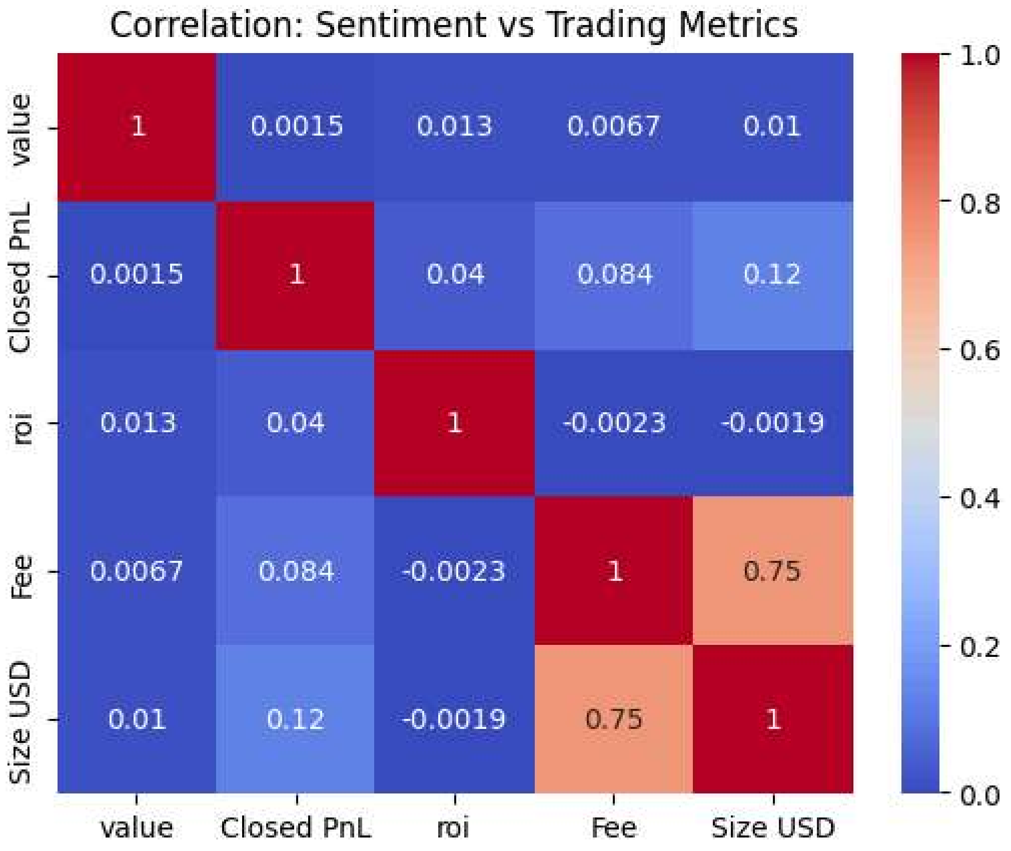
	pnl	win_rate	trades
Account			
0x083384f897ee0f19899168e3b1bec365f52a9012	1.927736e+06	0.405542	3356
0xbaaaf6571ab7d571043ff1e313a9609a10637864	9.401572e+05	0.467532	21190
0x4acb90e786d897ecffb614dc822eb231b4ffb9f4	6.133278e+05	0.495271	3806
0xb1231a4a2dd02f2276fa3c5e2a2f3436e6bfed23	5.538180e+05	0.391057	7380
0x513b8629fe877bb581bf244e326a047b249c4ff1	4.035016e+05	0.415614	5777
0x72c6a4624e1dffa724e6d00d64ceae698af892a0	3.419454e+05	0.396166	939
0xbd5fead7180a9c139fa51a103cb6a2ce86ddb5c3	3.254420e+05	0.372230	2211
0x4f93fead39b70a1824f981a54d4e55b278e9f760	2.239684e+05	0.391758	3737
0x8170715b3b381dffb7062c0298972d4727a0a63b	1.963038e+05	0.287631	3056
0x420ab45e0bd8863569a5efbb9c05d91f40624641	1.834030e+05	0.244186	258

In [12]:

```
merged_df['win'] = (merged_df['Closed PnL'] > 0).astype(int)
merged_df['roi'] = merged_df['Closed PnL'] / merged_df['Size USD']
```

In [13]:

```
corr_df = merged_df[['value', 'Closed PnL', 'roi', 'Fee', 'Size USD']].corr()

sns.heatmap(corr_df, annot=True, cmap='coolwarm')
plt.title("Correlation: Sentiment vs Trading Metrics")
plt.show()
```



In [14]:

```
def sharpe(x):
    return np.mean(x) / np.std(x) if np.std(x) != 0 else 0

sharpe_by_trader = (
    merged_df.groupby('Account')['Closed PnL']
    .apply(sharpe)
    .sort_values(ascending=False)
)
```

In [15]:

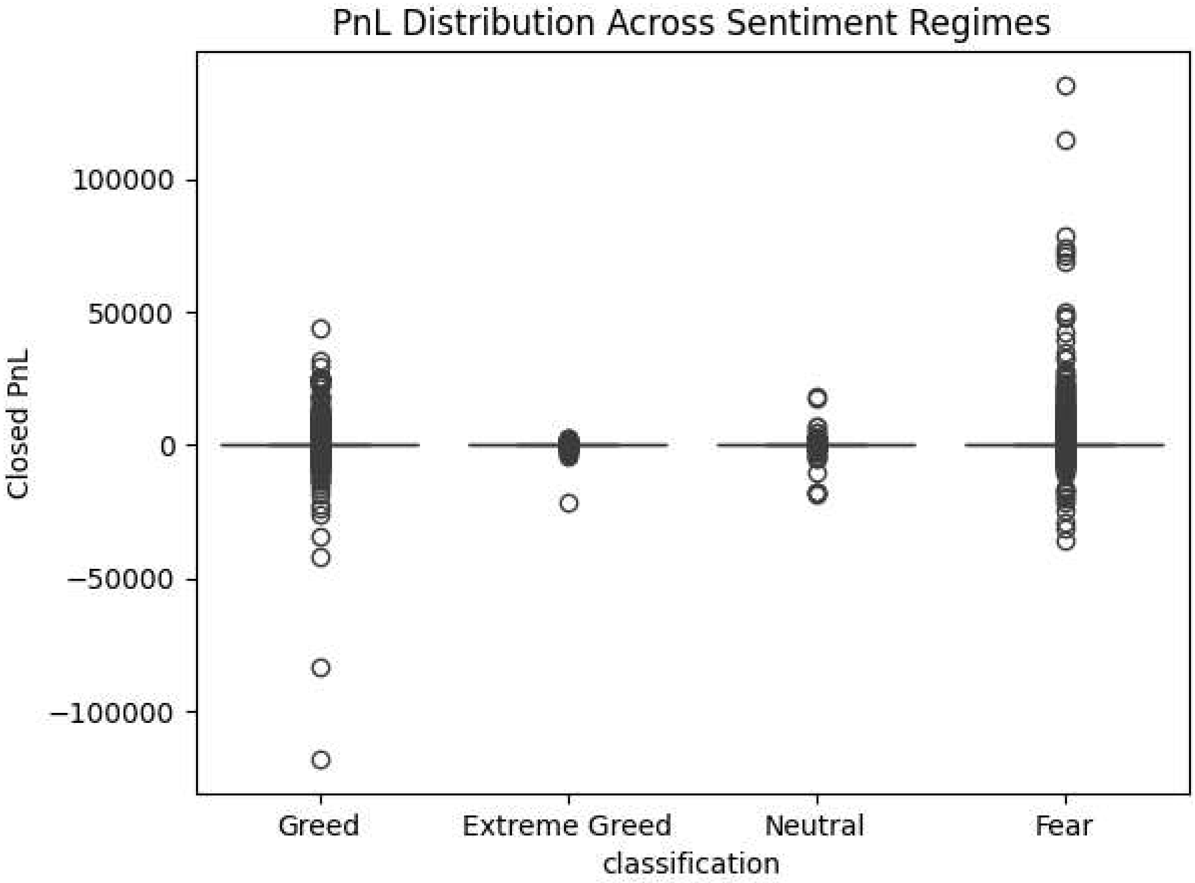
```
ranked_traders = (
    merged_df
    .groupby(['classification', 'Account'])
    .agg(
        total_pnl=('Closed PnL', 'sum'),
        win_rate=('win', 'mean'),
        roi=('roi', 'mean')
    )
    .reset_index()
    .sort_values(['classification', 'total_pnl'], ascending=[True, False])
)

ranked_traders.head(10)
```

Out[15]:

	classification	Account	total_pnl	win_rate	roi
3	Extreme Greed	0x75f7eeb85dc639d5e99c78f95393aa9a5f1170d4	1.878421e+05	0.824071	0.028063
4	Extreme Greed	0xb1231a4a2dd02f2276fa3c5e2a2f3436e6bfed23	2.606895e+03	0.218791	0.003540
1	Extreme Greed	0x430f09841d65beb3f27765503d0f850b8bce7713	0.000000e+00	0.000000	0.000000
0	Extreme Greed	0x3998f134d6aaa2b6a5f723806d00fd2bbbbce891	-5.564016e+03	0.333333	0.019561
2	Extreme Greed	0x4f93fead39b70a1824f981a54d4e55b278e9f760	-7.919471e+03	0.306849	-0.001548
5	Fear	0x083384f897ee0f19899168e3b1bec365f52a9012	1.927736e+06	0.405542	0.040934
34	Fear	0xbaaaf6571ab7d571043ff1e313a9609a10637864	9.401572e+05	0.467532	0.013392
16	Fear	0x4acb90e786d897ecffb614dc822eb231b4ffb9f4	6.133278e+05	0.495271	0.016506
32	Fear	0xb1231a4a2dd02f2276fa3c5e2a2f3436e6bfed23	5.538180e+05	0.391057	0.027529
18	Fear	0x513b8629fe877bb581bf244e326a047b249c4ff1	4.035016e+05	0.415614	0.018529

In [16]:

```
sns.boxplot(
    data=merged_df,
    x='classification',
    y='Closed PnL'
)
plt.title("PnL Distribution Across Sentiment Regimes")
plt.show()
```


PnL Distribution Across Sentiment Regimes
Closed PnL
100000
50000
0
−50000
−100000
Greed
Extreme Greed
Neutral
Fear
classification

In [ ]: