Sefirot

Financial Research

Trading Bot System

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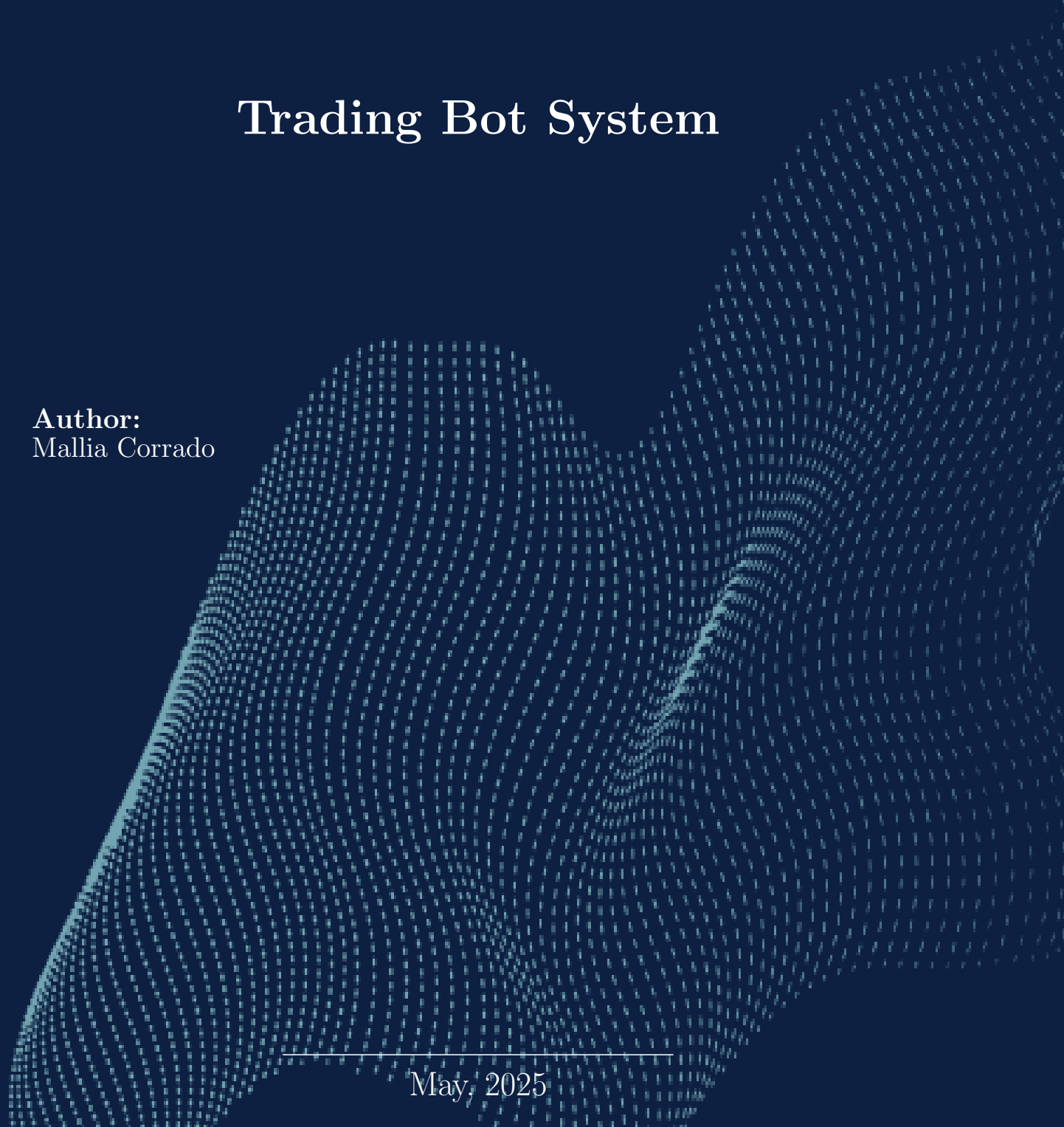

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Disclaimer

This document and the accompanying code are intended for backtesting and educational purposes only. The information provided does not constitute investment advice. Past performance is not indicative of future results, and real-world trading involves significant risk. Users should exercise caution and conduct their own research before making any financial decisions. The authors and distributors of this document are not responsible for any gains or losses resulting from the use of the presented strategy.

1 Fat Tails of a Normal Distribution

The normal, or Gaussian, distribution is characterized by a symmetric bell-shaped curve, defined by its mean and standard deviation, with most data concentrated in the center. Although the standard normal distribution has thin tails (low probability of extreme events), a distribution with "fat tails" (or heavy tails) shows a higher probability of extreme values (outliers) compared with the Gaussian curve.
When studying stock returns, it is often possible to encounter distributions similar to the normal one but with more pronounced tails. This means that very positive or very negative events occur more frequently than expected. In what way can this behavior become an advantage?

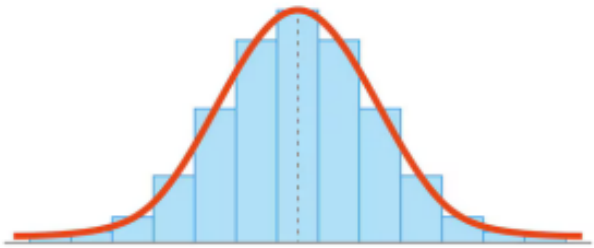

Figure 1: Normal Distribution

2 Daily Returns Distribution: QQQ Case

The image shows how daily returns are distributed. The value is obtained by adding the stock return during market hours and the difference between the closing price and the opening price of the following day. The distribution appears shifted to the right, indicating a greater presence of positive returns compared with negative ones. In the next slide, we will see how to take advantage of this characteristic.

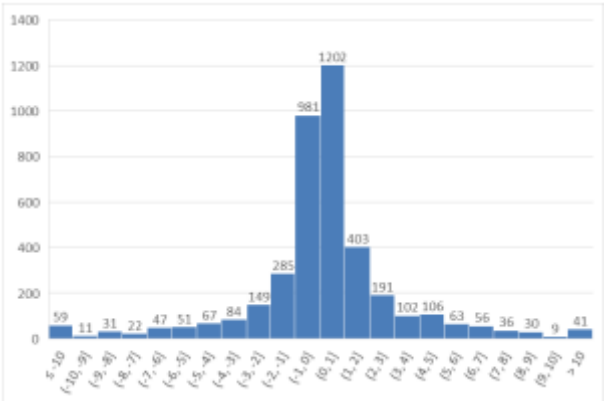

Figure 2: Daily returns from 01-01-2010 to 31-12-2025 without Stop Loss

3 Applying a Stop Loss

By applying a stop loss that closes the position with a maximum loss of $3 relative to the entry price, only on intraday trades it is possible to exploit the "fat tails" of the return distribution. In fact, by introducing a stop loss, extreme negative events are limited while positive ones are preserved. In operational terms, this means limiting losses while capturing positive returns. The distribution changes as shown in the sequence of images below.

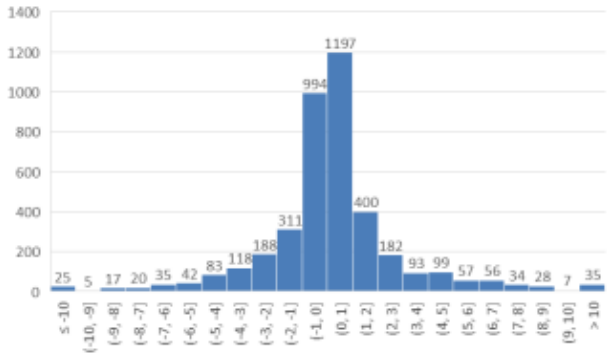

Figure 3: Daily returns from 01-01-2010 to 31-12-2025 with Stop Loss

4 Technical Limitations of the Bot

The implemented bot has technical limitations, so it is not possible to replicate exactly what was described in the previous slides. For this reason, the bot will open two daily positions at the following times: the first position will be opened at 9:32 AM and automatically closed at 3:28 PM, while the second position will be opened at 3:29 PM and closed at 9:31 AM the following day. This still has a slightly negative impact on returns.

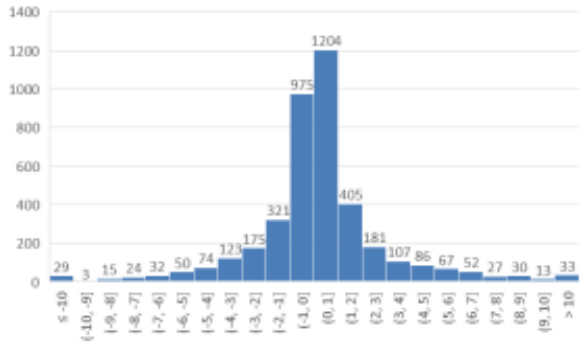

Figure 4: Daily returns

Figure 5: Equity Line

5 Results and Conclusions

In summary, as reported in this article, it is possible to exploit a distribution with "fat tails" through the application of stop losses on positions opened in the market. Based on the backtest, conducted by applying the strategy to 15 years of daily returns, it is possible to outperform the performance of the underlying stock and thus achieve an additional return. However, since this is a long-only strategy that is strongly correlated with the underlying asset, the return mainly derives from the movement of the index. The strategy amplifies this movement to take advantage of it.
For this reason, it is recommended to implement the strategy on low-volatility assets, such as indices or geographic ETFs, that have positive momentum.

Strategy	Return (%)
Titolo QQQ*	1.238
Strategia QQQ*	1.567
Strategia Bot*	1.446

Table 1: Performance comparison of QQQ and strategy implementations