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Mathematical Trading Strategies
Assignment 4

In this code, I have used the indicator- **Keltner Channel** and the chart pattern- **Descending Triangle** as learnt and implemented earlier.
Further to improve the strategy, I have optimized the parameters for Keltner channel (not manually), but by using **Grid Search Algorithm**, which generated the best parameters and the improved metrics evaluations. This saved the manual hit and trial and was very efficient.

The final results I got by using Grid Search Algorithm are:

Best Cumulative Return:	0.1924093651626993 3
Best Max Drawdown:	-0.1613618366176165 2
Best Sharpe Ratio:	0.2913396264464378 5

To breakdown the implementation of strategy:

- The **get_kc()** function calculates the Keltner Channels based on the high, low, and close prices.

- It calculates the average true range (ATR) and uses it to determine the upper and lower bands of the channels.
- The middle band is calculated as the exponential moving average (EMA) of the closing prices.
- The **method**() function generates buy and sell signals based on the Keltner Channels.
- It compares the prices with the upper and lower bands to determine the signal and returns the buy and sell prices, along with the signals.
- The **is_descending_triangle**() function checks if a descending triangle pattern is present in the data by comparing the highs, lows, and closes of four consecutive periods to determine if the pattern is formed.
- If a descending triangle pattern is found, the start date of the pattern is recorded in the marked_dates list.
- The code performs a **grid search** to find the best parameters for the Keltner Channels.
- It defines ranges for the three parameters: kc_lookback, multiplier, and a_lookback.
- It iterates over the parameter ranges and calculates the evaluation metrics for each combination.
- The metrics are updated and the best parameter combination is recorded if it improves