**Crypto Fund Management and Trading Strategy Report**

**Crypto Analyst Intern Project**  
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**1. Introduction**

This report summarizes the analysis and development conducted in two main areas: managing a diversified crypto fund and developing a trading strategy for a specified crypto asset. Task 1 focuses on portfolio management using several cryptocurrencies, while Task 2 involves creating and optimizing a backtest trading strategy using a simple moving average (SMA) crossover.

**2. Task 1: Crypto Fund Management**

**Objectives**

* To design and analyze a diversified crypto portfolio.
* Calculate various performance metrics, including APR, APY, volatility, Value at Risk (VaR), and beta.
* Simulate and assess portfolio resilience in market crash scenarios.

**Data Collection and Portfolio Allocation**

Using **Yahoo Finance**, we retrieved historical price data for the selected assets in our portfolio:

* **Assets:** BTC, ETH, SOL, DOT, LINK, Stablecoin, DeFi Yield
* **Portfolio Allocation:** Defined for each asset, including stablecoins and DeFi yield-based investments, with allocations summing to 100%.

**Calculations and Analysis**

1. **Daily Returns Calculation:**  
   Daily returns were calculated based on percent changes, forming the foundation for further analysis.
2. **APR and APY Calculation:**
   * **APR (Annual Percentage Rate):** Calculated by annualizing mean daily returns over 252 trading days.
   * **APY (Annual Percentage Yield):** Calculated using daily compounding for a more accurate yield estimation.
3. **Volatility and VaR Calculation:**
   * **Volatility:** Calculated as the annualized standard deviation of daily returns.
   * **Value at Risk (VaR):** Estimated at the 95% confidence level, indicating the maximum expected loss under normal market conditions.
4. **Beta Calculation:**  
   Beta values were calculated relative to Bitcoin to measure each asset's correlation with Bitcoin’s price movements.

**Portfolio Performance Metrics**

The portfolio’s overall APR, APY, volatility, and VaR were calculated. The portfolio's performance was compared to individual assets, showcasing an APR of 24.43%, an APY of 27.65%, a volatility of 51.98%, and a VaR at the 95% confidence level of 0.86.

**Market Crash Scenario Analysis**

A hypothetical 30% market crash was simulated by adjusting returns accordingly. Key performance metrics under these conditions:

* **APR:** 17.10%
* **Volatility:** 36.39%
* **VaR:** 0.60 at 95% confidence

**Visualizations**

* **Portfolio Allocation Pie Chart:** Visual representation of portfolio allocations.
* **Portfolio Daily Returns:** A line plot of daily returns to observe trends and volatility.

**3. Task 2: Trading Strategy Development and Backtesting**

**Objectives**

* Develop a Python-based trading strategy using a simple moving average (SMA) crossover.
* Implement backtesting to evaluate strategy performance.
* Optimize parameters and apply risk management for improved stability.

**Strategy and Data Preparation**

1. **Data Collection and Indicators:**  
   Historical Bitcoin data was retrieved, with daily returns calculated for analysis. Short (20-day) and long (50-day) SMAs were added to implement the crossover strategy.
2. **Signal Generation:**
   * **Buy Signal:** Generated when the short SMA crosses above the long SMA.
   * **Sell Signal:** Triggered when the short SMA crosses below the long SMA.

**Backtesting**

The strategy was backtested, simulating a $10,000 investment. Portfolio value was calculated based on returns generated by following the SMA crossover signals.

**Performance Metrics**

* **Total Return:** Measure of portfolio appreciation from start to end.
* **Annual Return and Volatility:** Annualized return and risk exposure.
* **Sharpe Ratio:** Performance metric relative to risk taken.
* **Max Drawdown:** Maximum observed loss from a peak to a trough in portfolio value.

**Parameter Optimization**

A grid search was performed over SMA window parameters to maximize the Sharpe Ratio. Optimized parameters for SMA periods were identified, improving the strategy’s robustness.

**Risk Management**

A simple stop-loss (5%) and take-profit (10%) system was implemented to limit losses and lock in gains. This additional risk control adjusted strategy returns when conditions were met.

**Performance Visualization**

* **Portfolio Value Comparison:** Plots of strategy performance vs. buy-and-hold Bitcoin investment.
* **Drawdown Over Time:** Shows strategy stability and risk exposure.

**4. Conclusion**

The crypto fund management and trading strategy tasks demonstrated robust financial analysis capabilities and offered insights into managing crypto investments and developing algorithmic trading strategies. Task 1 presented a diversified portfolio analysis, showing substantial risk-adjusted returns, while Task 2 illustrated how parameter optimization and risk management can enhance a trading strategy's stability and profitability.

**5. Appendix: Code and Output**

**Task 1: Crypto Fund Management**

* Code snippets and output summaries for data collection, APR/APY, volatility, VaR, and beta calculations, as well as portfolio metrics and visualizations.

**Task 2: Trading Strategy Development and Backtesting**

* Code for SMA crossover implementation, parameter optimization, risk management, and visualization of portfolio performance.