**Project Description:**

**What are ETFs?**

Exchange-Traded Funds (ETFs) are investment funds that trade on stock exchanges, much like individual stocks. They pool money from investors to buy a diversified portfolio of assets such as stocks, bonds, commodities, or other securities. ETFs are popular due to their low costs, tax efficiency, and ability to provide diversification in a single trade.

There are different types of ETF funds based on equity ETFs are as follows:

**Small-Cap Funds**:

* Invest in companies with a market cap under $2 billion.
* Characteristics:
  + High growth potential but higher risk and volatility.
  + Ideal for investors with higher risk tolerance and long-term horizons.

**Mid-Cap Funds**:

* Invest in companies with a market cap between $2 billion and $10 billion.
* Characteristics:
  + A balance between growth and stability.
  + Suitable for moderate-risk investors.

**Large-Cap Funds**:

* Invest in companies with a market cap over $10 billion.
* Characteristics:
  + Stable and reliable companies with lower risk.
  + Ideal for conservative or income-focused investors.

This project involves a comprehensive financial analysis of different ETF datasets using Python. The analysis utilizes multiple libraries, such as Pandas, Seaborn, and Matplotlib, to explore and visualize trends, patterns, and key metrics. The project focuses on historical price and volume data, along with technical indicators, to derive meaningful insights for investment analysis and choosing the best among ETFs from different category of equity ETFs i.e. Small-Cap, Mid-Cap, Large-Cap in order to take wise investment decisions in near future.  
For this project we will work on data of three ETFs,

1. IWM (small-cap)
2. VO (mid-cap)
3. SPY (large-cap)

**The importing of necessary libraries is followed by different analysis as stated below**:

1. **Data Overview and Cleaning**:
   * Importing and cleaning the respective dataset from specific ETF category, ensuring no missing values or duplicates.
   * Converting data types (e.g., date format) for analysis compatibility.
2. **Investment Growth Analysis**:
   * Simulating the growth of a ₹100 investment from 2004 to the present day.
   * Visualizing investment growth over time.
3. **Annual Trading Volume Analysis**:
   * Aggregating and visualizing annual traded volume.
4. **Volatility and Open-Close Analysis**:
   * Calculating and visualizing annual average volatility and daily open-close price differences.
5. **Moving Averages**:
   * Calculating and visualizing 20-day and 50-day simple moving averages to identify trends.
6. **Rolling Volatility**:
   * Analyzing and plotting 30-day rolling standard deviation to assess market volatility.
7. **Annualized Return**:
   * Calculating the annualized return of the fund to evaluate its performance over time.
8. **Monthly Average Close Prices**:
   * Analyzing and visualizing average close prices by month to understand seasonal trends.
9. **Correlation Analysis**:
   * Computing and visualizing the correlation between key financial metrics (e.g., volume and price).
10. **Drawdown Analysis**:
    * Calculating and visualizing maximum drawdowns to understand the risk of losses.
11. **Biggest Price Movements**:
    * Identifying the largest single-day price increases and decreases.
12. **Relative Strength Index (RSI)**:
    * Calculating and visualizing RSI to identify overbought or oversold conditions.
13. **Bullish and Bearish Signals**:
    * Identifying "Golden Cross" (bullish) and "Death Cross" (bearish) signals using 50-day and 200-day moving averages.

**Tools and Techniques:**

* **Libraries**: Pandas for data manipulation, Seaborn and Matplotlib for visualization.
* **Technical Indicators**: Moving averages, Relative Strength Index, and volatility calculations.
* **Statistical Analysis**: Correlation and trend analysis.

**Visual Outputs:**

The analysis is complemented with detailed visualizations, including:

* Investment growth over time.
* Annual traded volumes.
* Rolling volatility and open-close differences.
* Moving averages and Relative stren trends.
* Drawdown curves and correlation heatmaps.

**Conclusion:**

This project provides a detailed financial analysis of the respective ETF fund, leveraging data-driven insights to evaluate investment performance, volatility, and technical signals. The findings can assist investors in making informed decisions based on historical trends and technical indicators. The same code when used with dataset from each category gives exact idea about the volatility risk involved, past growth and various other parameters which can help any investor to differentiate properly.