**Project Overview: Advanced Stock Market Analyzer**

**Objective:**

The **Advanced Stock Market Analyzer** is a comprehensive tool for analyzing stocks using real-time data, technical indicators, machine learning (ML)-based price predictions, and currency conversion. This project combines data analytics with deep learning to offer detailed insights into stock market trends and provide users with buy/sell recommendations based on historical performance and technical indicators.

**Key Features:**

1. **Real-time Stock Data**:
   * Fetches historical and real-time stock price data using Yahoo Finance API (yfinance).
   * Converts stock prices from USD to INR using live exchange rates from an API.
2. **Technical Indicator Calculation**:
   * **SMA (Simple Moving Average)**: Calculates 50-day and 200-day SMAs for the stock, providing insights into long and short-term price trends.
   * **RSI (Relative Strength Index)**: Measures the strength of price movements, indicating overbought or oversold conditions.
3. **ML-based Stock Price Prediction**:
   * **LSTM (Long Short-Term Memory)**: Utilizes LSTM neural networks to predict future stock prices based on historical data.
   * The model is trained on the past 100 days of closing prices to predict the next day's stock price.
4. **Currency Conversion**:
   * Converts the stock price from USD to INR using live exchange rates fetched from an API.
   * Displays the real-time price of the stock in INR.
5. **Buy/Sell Recommendation**:
   * Provides a recommendation (Buy/Sell/Hold) based on the relationship between the current stock price, SMAs, and RSI values.
6. **Volume Analysis**:
   * Analyzes the stock's trading volume, providing insights into market activity and momentum.
7. **Interactive UI**:
   * Built using **Streamlit**, offering a dynamic and intuitive interface.
   * **Custom CSS**: Applies a dark theme for a modern look and feel with customized buttons, inputs, and charts.

**Technical Stack:**

1. **Frontend**:
   * **Streamlit**: A Python-based web framework to build interactive web apps.
   * Custom CSS for styling.
2. **Backend**:
   * **Yahoo Finance API (yfinance)**: For fetching historical and real-time stock price data.
   * **Requests**: To fetch live currency exchange rates.
   * **Pandas & Numpy**: For data manipulation and calculations.
   * **Matplotlib**: For visualizing stock price data, technical indicators, and volume analysis.
3. **Machine Learning**:
   * **TensorFlow/Keras**: Used for building and training an LSTM model for stock price prediction.
   * **MinMaxScaler**: Scales stock price data for use in the LSTM model.

**How it Works:**

1. **Data Fetching**:
   * The user inputs a stock ticker (e.g., AAPL) in the sidebar.
   * The app retrieves the stock’s historical data for the past year using yfinance.
   * Real-time stock price is fetched and displayed, converted to INR based on the current exchange rate.
2. **Data Processing**:
   * **SMA Calculation**: Calculates 50-day and 200-day simple moving averages.
   * **RSI Calculation**: Determines the relative strength of the stock based on historical price movements.
3. **Prediction**:
   * The LSTM model is trained on the last 100 days of closing prices to predict the next day's closing price.
   * If enough data is available, the predicted price is displayed.
4. **Buy/Sell Recommendation**:
   * If the stock’s current price is above the 50-day and 200-day SMAs and the RSI is balanced, the tool recommends a **Buy**.
   * If the stock is below the SMAs and RSI indicates overbought conditions, it suggests a **Sell**.
   * If the market conditions are unclear, the recommendation is to **Hold**.
5. **Visualization**:
   * A chart displays the historical closing prices, technical indicators, and trading volume.
   * Users can visually analyze stock performance through interactive charts.
6. **User Interface**:
   * Stock metrics such as Open, High, and Low prices are displayed in INR.
   * Custom CSS is applied to enhance the user experience, with a dark theme and well-designed charts.

**Potential Applications:**

* **Personal Investment Tools**: For individuals tracking their investments.
* **Educational Use**: As a tool for teaching stock market analysis and technical indicators.
* **Institutional Use**: For investment firms to quickly analyze stock trends and predictions.

**Future Improvements:**

* **Sentiment Analysis**: Integrating news sentiment analysis to further refine buy/sell decisions.
* **Enhanced Predictions**: Adding more advanced models like GRU or transformers for price predictions.
* **Multiple Stock Comparison**: Allowing users to compare multiple stocks side-by-side.

**Limitations:**

* **Data Dependency**: Accurate predictions require sufficient historical data (minimum 101 days).
* **Model Accuracy**: The LSTM model may not always predict accurately due to market volatility.
* **Limited Financial Indicators**: Currently focused on SMAs and RSI; additional indicators could be added.

**Conclusion:**

The **Advanced Stock Market Analyzer** is a powerful and user-friendly tool designed to empower users with real-time stock market insights, technical analysis, and machine learning-based price predictions. Its dark-themed, intuitive UI ensures accessibility for novice investors while providing the advanced features needed by experienced traders.