Required Libraries and Implementation Dependencies

The stock recommendation system requires several Python libraries to handle data processing, machine learning, and visualization tasks:

Libraries

- **NumPy**: For efficient numerical computations and array operations
- **Pandas**: For data manipulation, cleaning, and analysis through DataFrames
- **pandas_ta**: For technical analysis indicators (MACD, RSI, etc.)
- **yfinance**: For fetching stock data and fundamental metrics from Yahoo Finance

Machine Learning Libraries

- **scikit-learn**: Used for:
    - StandardScaler and MinMaxScaler for data normalization
    - PCA implementation for dimensionality reduction
    - Evaluation metrics (mean_squared_error, mean_absolute_error)
- **TensorFlow/Keras**: For building and training LSTM neural network models with layers including:
    - LSTM layers for time series modeling
    - Dense layers for output prediction
    - Dropout layers for regularization

Visualization Tools

- **Matplotlib**: For creating plots of price trends, performance comparisons, and backtests
- **Seaborn**: For statistical visualizations like correlation heatmaps and distribution plots

Environment Configuration

- **Random seed setting**: For reproducibility of results across runs
- **OS Environment variables**: To control TensorFlow behavior