STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY®

SYS-660

Decision and Risk Analysis

Instruction Manual for Running and Using the Investment Portfolio Decision Support System

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1. Overview

This manual provides step-by-step instructions to download, set up, and run the **Investment Portfolio Decision Support System (DSS)** on your local machine. The DSS helps users make optimized investment decisions by analyzing historical stock and bond data.

2. Prerequisites

Before running the code, ensure the following software and tools are installed:

1. **Python (Version 3.8 or higher)**
   Download and install Python from the official site: https://www.python.org/.
2. **Streamlit**
   Streamlit is a Python-based framework to deploy interactive applications. Install it using the command:
3. `pip install streamlit`
4. **Required Python Libraries**
   The following libraries must be installed:
   - Pandas
   - NumPy
   - Matplotlib

   Run the following command in your terminal to install all dependencies:

   ```
   pip install pandas numpy matplotlib
   ```

3. Downloading the Code and Dataset

1. **Code File**
   Download the file named `Final_DSS.py`. This is the main Python script for the DSS.
2. **Dataset**
   Download the dataset `financial_data_last_year.csv`. This dataset contains historical stock and bond price data.
3. **Directory Setup**
   - Place both files (`Final_DSS.py` and `financial_data_last_year.csv`) in the same folder on your local system.
   - For example:
   - `/Users/username/Downloads/SYS660/`

4. Running the DSS

Follow these steps to run the application:

1. Open the **Terminal** (on Mac/Linux) or **Command Prompt** (on Windows).
2. Navigate to the folder where the code and dataset are stored.
   Use the `cd` command to move into the directory. For example:
3. `cd /Users/username/Downloads/SYS660`
4. Start the Streamlit application using the following command:
5. `streamlit run Final_DSS.py`
6. After running the command, a browser window will automatically open, displaying the user interface of the DSS.

5. Using the DSS

Step-by-Step Instructions

1. **Input Parameters:**
   - Enter the **monthly investment amount** (e.g., $500.00).
   - Set your **current age** and **retirement age** using sliders.
   - You can click **"Adjust Horizon to Retirement Age"** to calculate your investment horizon automatically.
   - Alternatively, manually adjust your **investment horizon (years)**.
2. **Risk Tolerance:**
   - Select your **Risk Tolerance**:
     - Low
     - Moderate
     - High
3. **Portfolio Allocation:**
   - Adjust the **Stock Allocation (%)** using the slider.
   - The DSS automatically adjusts the Bond allocation based on the Stock percentage.
4. **Review Utility Scores:**
   - View a table of **available investments** with their respective metrics:
     - Mean Return
     - Volatility
     - Utility Score (calculated based on your inputs).
5. **Selected Investments:**
   - The DSS presents the **top stock and bond picks** based on utility scores and your risk profile.
6. **Portfolio Metrics:**
   - View the calculated **Portfolio Mean Return** and **Volatility**.
7. **Monte Carlo Simulation:**
   - The DSS performs a **Monte Carlo simulation** for your portfolio.
   - Review:
     - **Total Invested Amount**

        - **Mean Portfolio Value**
        - **5th and 95th Percentile Values**
    - A histogram visualizes the simulation results.

6. Troubleshooting

1. **Error: File Not Found**
   Ensure the `financial_data_last_year.csv` file is in the **same directory** as the code file.
2. **Error: Module Not Found**
    - If a library is missing, install it using:
    - `pip install <library_name>`

      For example:

      ```
      pip install pandas
      ```

3. **Streamlit Not Opening Automatically**
   If the browser does not open, manually navigate to the provided URL in the terminal (e.g., `http://localhost:8501`).
4. **Incorrect Data Display**
    - Ensure the dataset file is clean and correctly formatted.
    - Check for missing or corrupted columns in `financial_data_last_year.csv`.

7. Example Workflow

Inputs:

- Monthly Investment: $500
- Age: 25
- Retirement Age: 65
- Investment Horizon: 40 years
- Risk Tolerance: High
- Stock Allocation: 80%, Bond Allocation: 20%

Outputs:

1. Top Stocks and Bonds selected based on utility scores.
2. Portfolio Metrics:
    - Mean Return: 0.056821 (Monthly)
    - Volatility: 0.124289 (Monthly)
3. Monte Carlo Simulation:
    - Mean Portfolio Value: $931,525.54
    - 5th Percentile: $312,501.40
    - 95th Percentile: $2,025,203.55

Visualization:

- A histogram displays the portfolio value distribution.

8. Conclusion

The Investment Portfolio DSS provides an interactive and user-friendly interface to make informed investment decisions. Users can adjust parameters such as risk tolerance, investment horizon, and allocation, while leveraging utility-based scoring and Monte Carlo simulations for reliable portfolio recommendations.

If you encounter any issues or require additional guidance, please refer to the Troubleshooting section or contact gshroff@stevens.edu .