**Project Title**

**Investment Decision (Financial) Calculator using Python**

**Introduction**

Investment decisions are among the most important aspects of financial management. Before committing money to a project, managers need to evaluate whether it will generate enough returns to justify the investment.

This project focuses on building a **Financial Calculator in Python** that uses three widely recognized techniques to evaluate an investment:

1. **Net Present Value (NPV):** Tells us the total value an investment will add, considering the time value of money.
2. **Internal Rate of Return (IRR):** The rate of return at which the investment breaks even (NPV = 0).
3. **Payback Period:** The number of years required to recover the initial investment.

Along with calculations, the project also provides a **graphical visualization of cash flows** to make results easier to interpret.

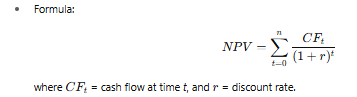
**Objectives**

The main objectives of this project are:

* To apply finance concepts (NPV, IRR, Payback) in a programming environment.
* To automate investment evaluation using Python functions.
* To visualize financial results so that decision-making becomes clearer.
* To demonstrate practical use of Python in finance by combining theory and coding.

**Features:**

**1.Net Present Value (NPV):**

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* If **NPV > 0** → Investment is profitable.
* If **NPV < 0** → Investment is not profitable.

**2. Internal Rate of Return (IRR)**

* IRR is the discount rate that makes NPV = 0.
* In this project, Python’s scipy.optimize.newton method is used to calculate IRR.
* Decision Rule:
  + If IRR > discount rate → Accept project.
  + If IRR < discount rate → Reject project.

**3. Payback Period**

* The time it takes to recover the initial investment from cumulative cash inflows.
* Useful for understanding how quickly the investment risk is recovered.
* Limitation: It ignores the time value of money, but still provides an additional decision-making check.

**4. Cash Flow Visualization**

* A bar chart is created using Matplotlib.
* Red bars represent outflows (investment).
* Green bars represent inflows (returns).
* NPV, IRR, and the final decision (ACCEPT / REJECT) are displayed on the graph.

**Tools & Technologies**

* Python – core programming language.
* Google Colab – for implementation.
* Matplotlib – for cash flow visualization.
* Scipy – for IRR calculation using numerical methods.

**Project Workflow**

1. **Step 1 – Import Libraries**  
   Import required libraries (scipy, matplotlib).
2. **Step 2 – Define NPV Function**  
   A custom Python function to calculate NPV for given cash flows and discount rate.
3. **Step 3 – Define IRR Function**  
   Uses numerical methods to solve for IRR.
4. **Step 4 – Input Cash Flows**  
   Example: [-1000, 500, 600, 700] where -1000 is investment and the rest are returns.
5. **Step 5 – Perform Calculations**  
   Program calculates NPV and IRR, then applies decision rules.
6. **Step 6 – Visualization**  
   A bar chart of inflows/outflows with decision displayed.
7. **Step 7 – Payback Period**  
   Function checks how many years it takes to recover initial investment.
8. **Step 8 – Final Decision**  
   Combines all rules (NPV, IRR, Payback) to make the final accept/reject decision.

**Results**

* Input Cash Flows: [-1000, 500, 600, 700]
* Discount Rate: 10%
* Output:
  + NPV = 272.33
  + IRR = 18.3%
  + Payback Period = 2 years
  + Final Decision = ACCEPT

A close-up of a computer screen

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* Graph Output**:**
  + Year 0 → Red bar (investment)
  + Year 1–3 → Green bars (returns)
  + Chart shows NPV, IRR, and final decision label.

A graph of green and red squares

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**Learning & Reflection**

During this project, I gained both financial knowledge and programming practice.

* I learned how to convert theoretical formulas (NPV, IRR, Payback) into Python functions.
* Visualization improved my understanding of investment decisions.
* Adding Payback Period as an extra feature showed creativity beyond basic requirements.
* Overall, I connected finance concepts with real coding skills, which was the main objective of the assignment.