

MKSSS's Cummins College of Engineering for Women, Pune

Subject-AIML Lab

WealthWise – Personal Finance Assistant

AI-Powered Insights for Investment, Assets Growth, and Retirement Planning.

TY, Computer Engineering Department, Div-B, Batch-B4

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PROBLEM STATEMENTS

- Individuals struggle to decide how to allocate their money across different investment options due to limited financial knowledge and unclear risk understanding.
- High volatility in assets like stocks, gold, crypto, and indices makes it difficult to estimate long-term investment growth and plan finances realistically.
- People lack accessible tools that can forecast future asset values, optimize investment allocation, and guide financial decisions based on personal profiles.
- Retirement planning becomes even more challenging due to inflation, income variability, and uncertainty about future financial preparedness.

WealthWise



WealthWise is an AI-driven personal finance intelligence system designed to help users make smarter, data-backed financial decisions.

It integrates multiple machine-learning models to analyze an individual's financial profile and provide personalized insights in three key areas:

our three models :

- **Optimal Investment Allocation**
- **Retirement Readiness Scoring**
- **Multi-Year Asset Growth Forecasting**

In addition, WealthWise includes a simple Expenses & Savings Calculator to help users understand their current financial standing before exploring advanced predictions.

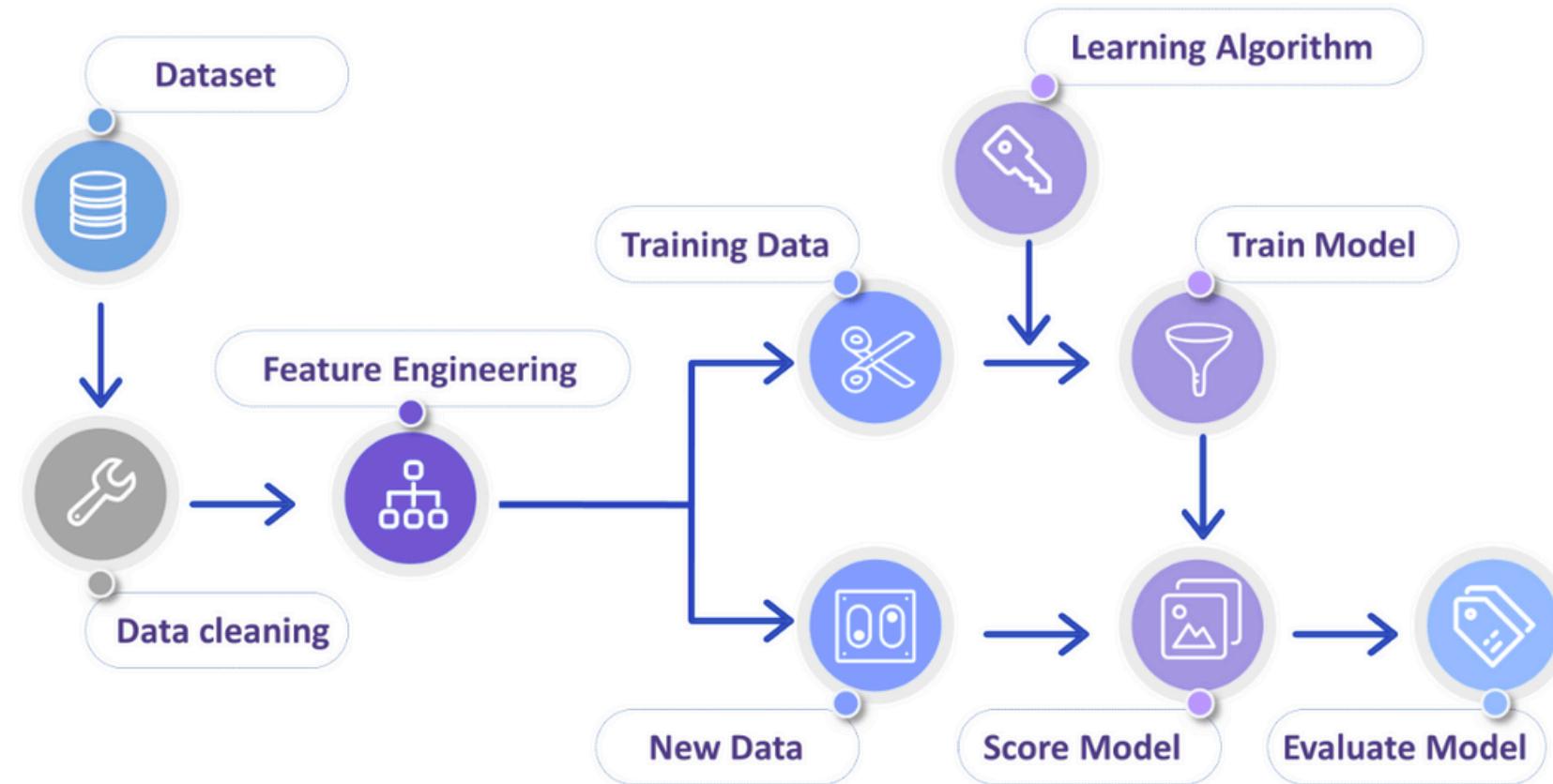
The system is built using Python Flask, SQLite, and ML models trained on realistic financial datasets, making it a complete end-to-end solution for modern financial planning.

Our aim is to simplify complex financial concepts and empower users with clear, actionable guidance tailored to their unique financial situations.

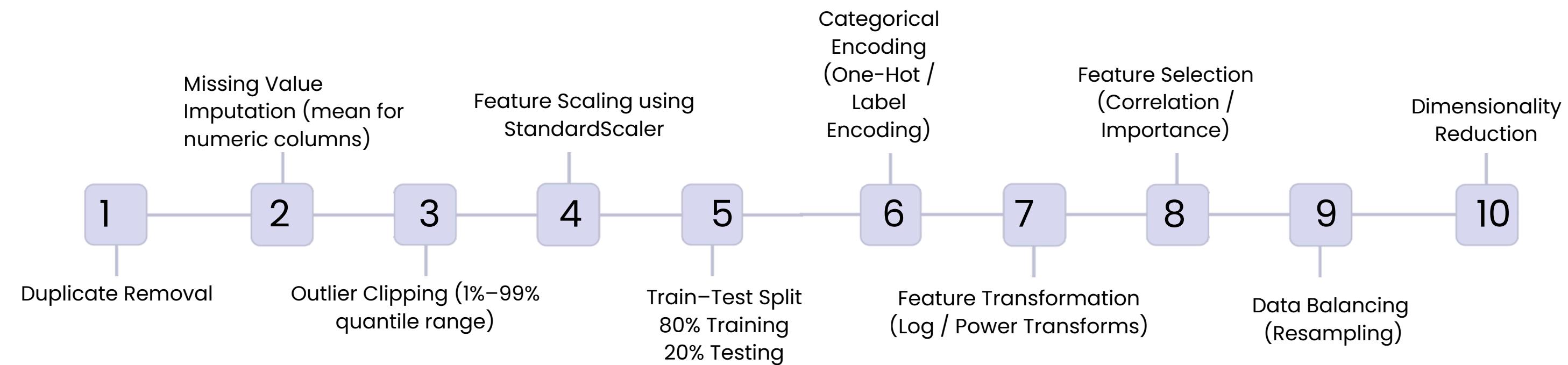


DATA PREPROCESSING

The "Training" Phase

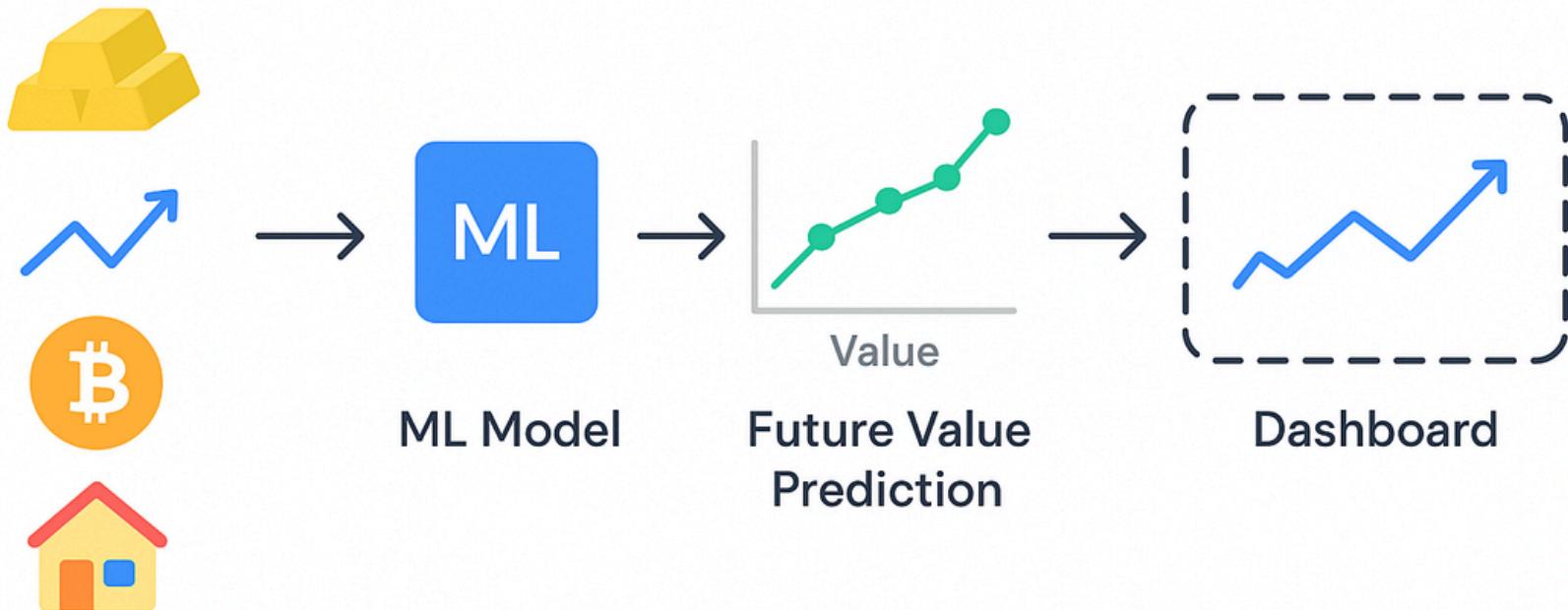


The "Runtime" Phase



ASSET GROWTH PREDICTION – WEALTHWISE

AI powered Financial Forecasting tool trained on Yahoo's Finance data with publically available tickers



Purpose

Predict future asset values over 1–50 years.

Assets Covered

Stocks, Gold, Mutual Funds, Crypto, Real Estate, Bonds.

User Inputs

Asset type, quantity, current price, expected return.

Asset Growth Prediction

System Generates
Yearly projections for each asset + total portfolio value.

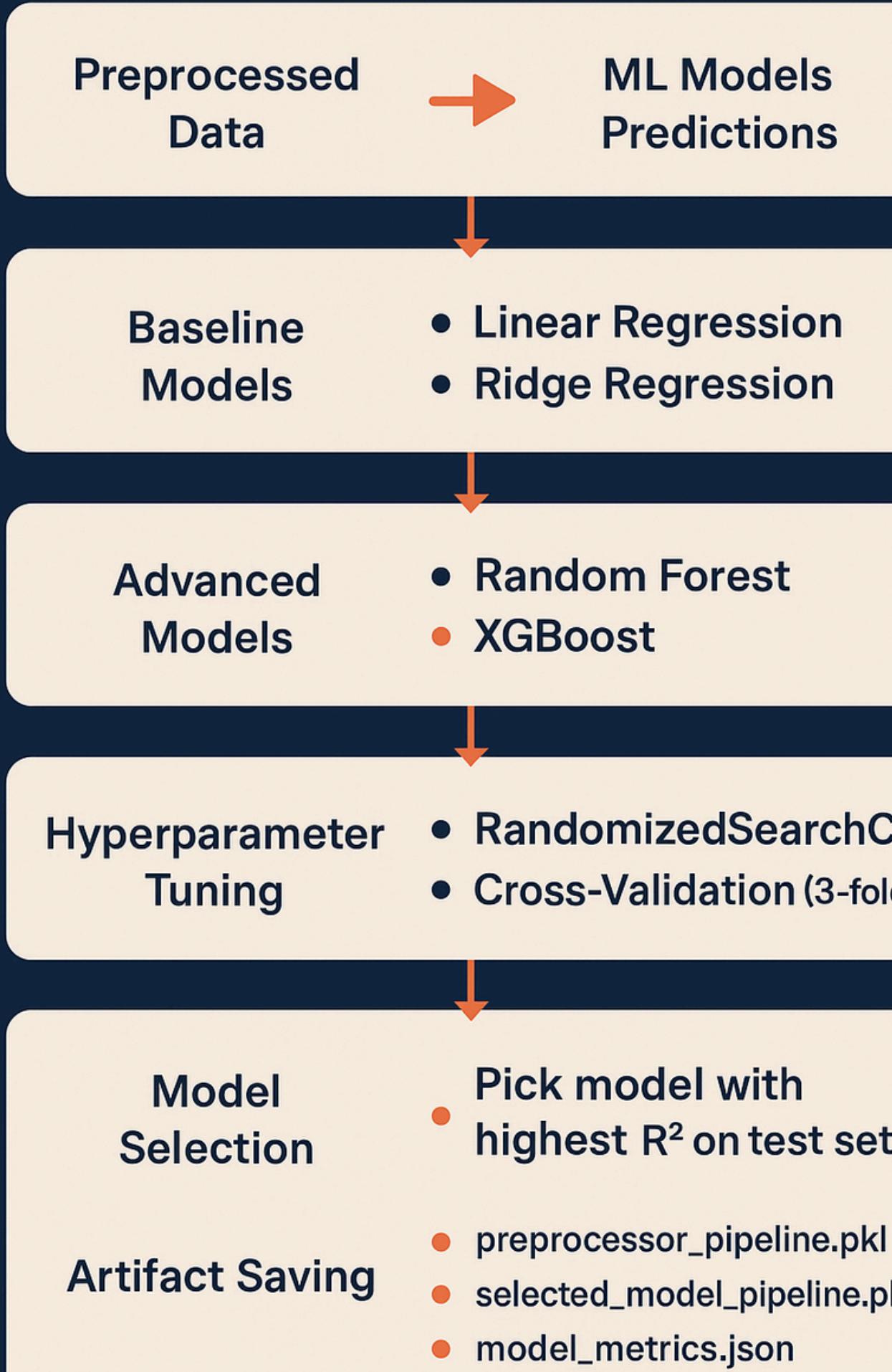
How It Works

AI/ML model calculates future values based on historical and expected returns.

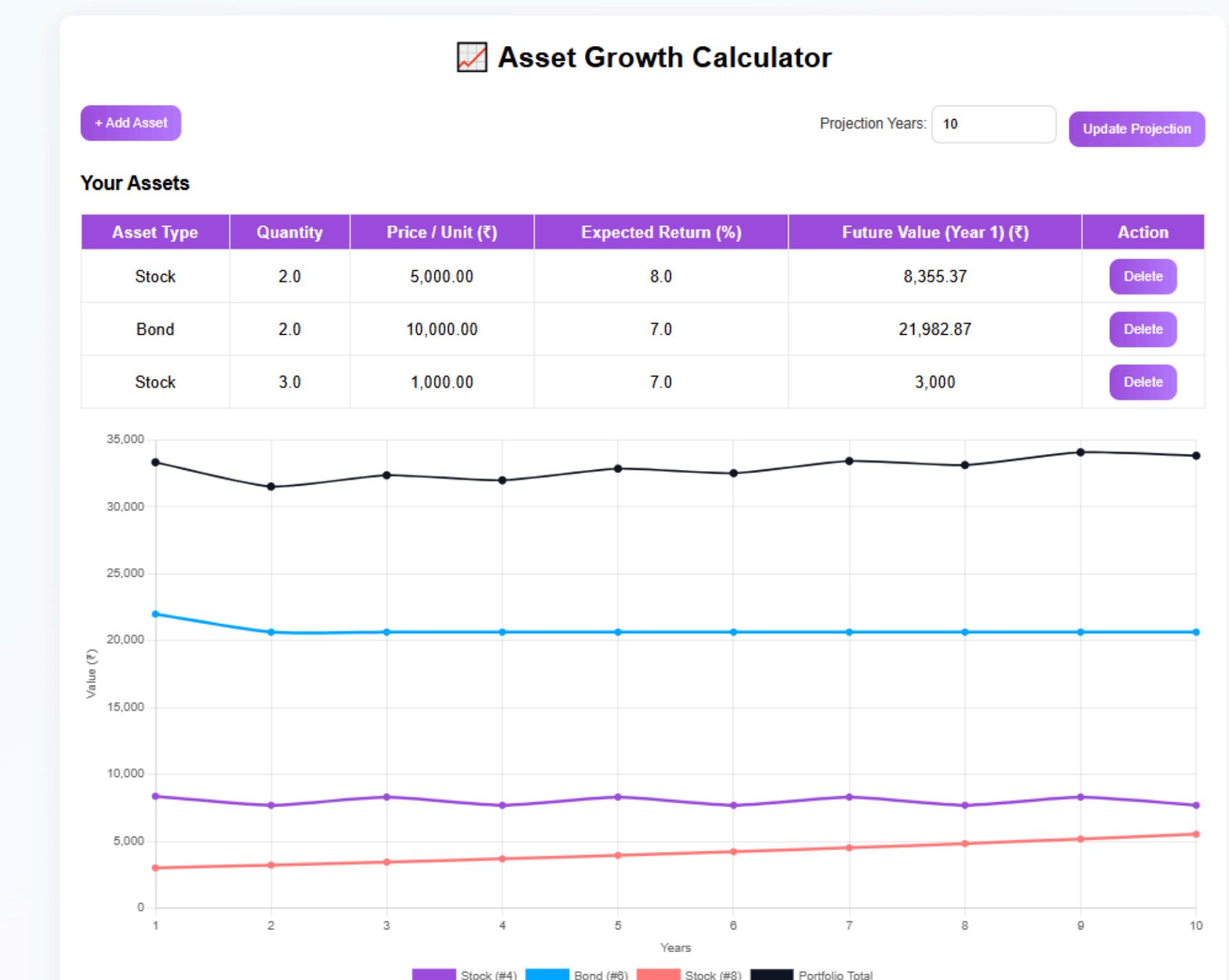
What Users See

Interactive charts + clean projection dashboard.

METHODOLOGY & MODELS



Model	R^2 (Test)	MAE	RMSE
Random Forest	0.91	12.3	18.7
XGBoost	0.98	11.5	17.2



Investment Allocation Prediction System Using Machine Learning

This model presents an intelligent system that predicts the ideal investment portfolio allocation for users based on their financial profile.

Model Purpose

01

Understanding Investment Allocation

Investment planning is challenging for beginners due to **multiple financial** factors such as income, savings, liabilities, credit score, dependents, and long-term goals.

Manual calculations often lead to incorrect or suboptimal allocations.

This is a predictive ML model to **assist** users in making **informed financial decisions**.

Dataset Overview

02

Input Features (10)

- 1.Age
- 2.Monthly Income
- 3.Current Savings
- 4.Investment Horizon (Years)
- 5.Credit Score
- 6.Expenses per Month
- 7.Debt Amount
- 8.Marital Status (0/1)
- 9.Dependents
- 10.Has Existing Investments (0/1)

Output Targets (4)

- Equity %
- Debt %
- Gold %
- Real Estate %

10000 rows

Methodology

03

01 — Data Acquisition & Cleaning

02 — Outlier Treatment (1%–99%)

03 — Preprocessing & Scaling

04 — Splitting into Train-Test Sets

05 — Model Training (Random Forest Regressor)

06 — Model Evaluation (MAE, RMSE, R²)

07 — Model Saving (.pkl via joblib)

08 — Flask Backend Integration

09 — Frontend Input Form & Result Display

Algorithm Used - Random Forest Regressor

- Selected due to:
 - Ability to model **non-linear financial relationships**
 - High stability** and **low overfitting**
 - Automatic handling of feature interactions
 - Excellent **real-world performance** for tabular data
- Why Not Linear Regression?
 - Cannot capture non-linear investment relationships
 - Lower accuracy observed
- why not xgBoost?
 - target is **multi-output regression** (4 targets)

Random Forest natively supports multi-output regression, meaning it predicts at the same time using one model.

XGBoost does NOT support **multi-output regression directly**.

You would need 4 separate models, one for each target:

- XGB model for equity
- XGB model for debt
- XGB model for gold
- XGB model for real estate

Model Training Process

- Loaded dataset
- Split into 80% Training + 20% Testing : Ensures fair performance evaluation
- Trained RandomForestRegressor with:
 - n_estimators = 500
 - max_depth = 25
 - min_samples_split = 2
 - min_samples_leaf = 1
 - random state = 42
- Evaluated using R² Score
- Exported final model as : investment.pkl

Evaluation Metrics

- Mean Absolute Error (MAE) : Average difference between predicted & actual percentages.
- Root Mean Squared Error (RMSE) : Penalizes larger errors more strongly.
- R² Score : Explains how much variance the model captures.
Closer to 1 → better performance. Model Accuracy (%) - $R^2 \times 100$

Overall Accuracy (Regression Evaluation)

Metric	Value	Interpretation
MAE	1.6646	prediction off by ~ 1.6
RMSE	2.1367	Low prediction error, no major deviations
Overall R ²	0.8543	Model explains 85.43% variance – very strong

R² Score Per Output

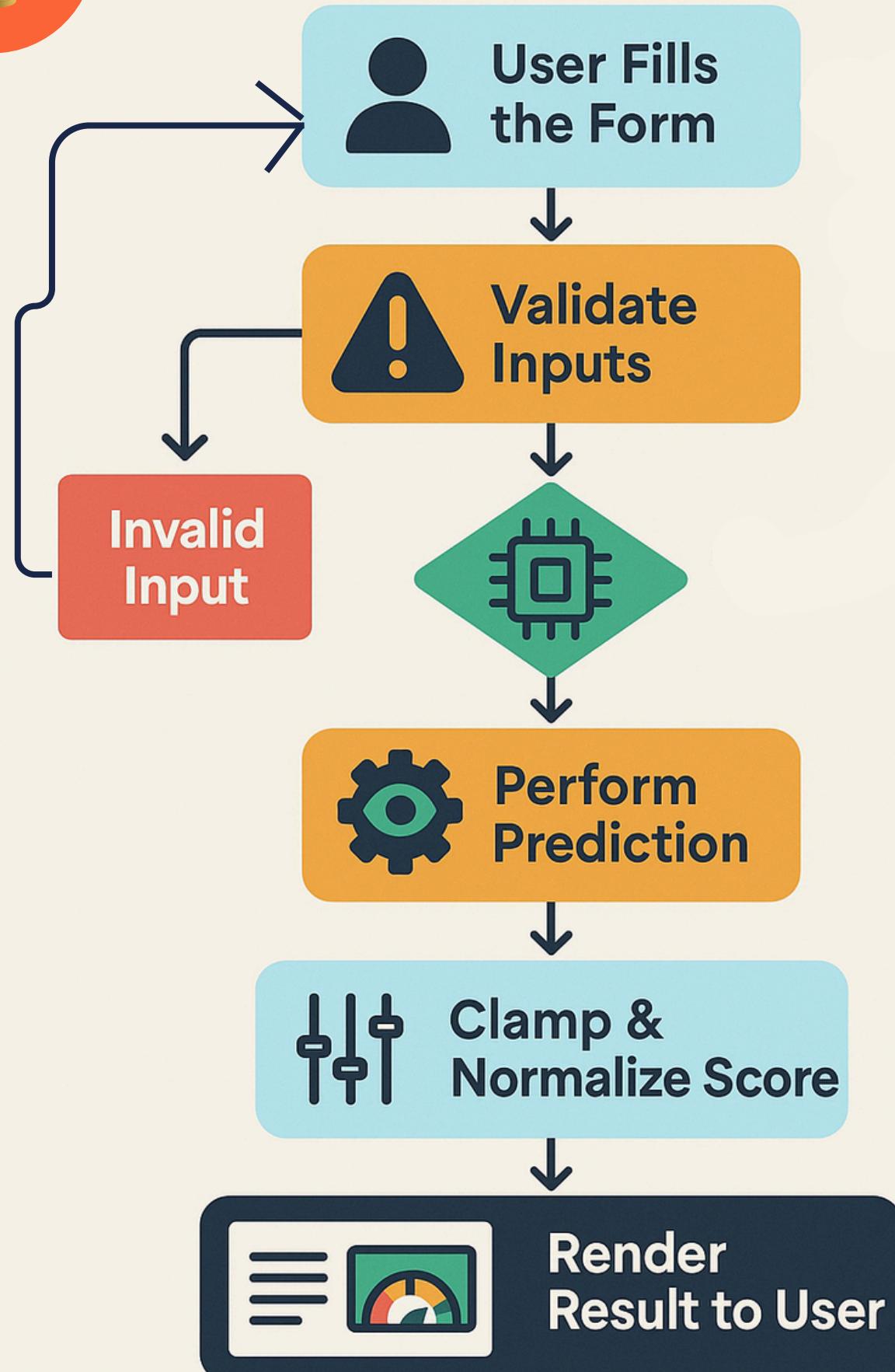
Output Variable	R ² Score
Equity %	0.8768
Debt %	0.8979
Gold %	0.927
Real Estate %	0.9159

RETIREMENT READINESS

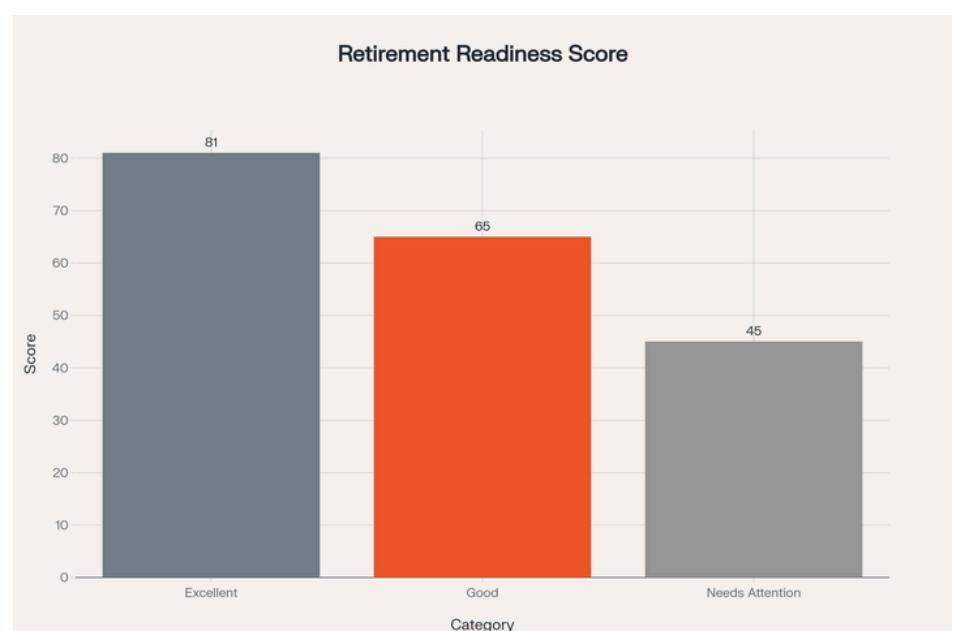
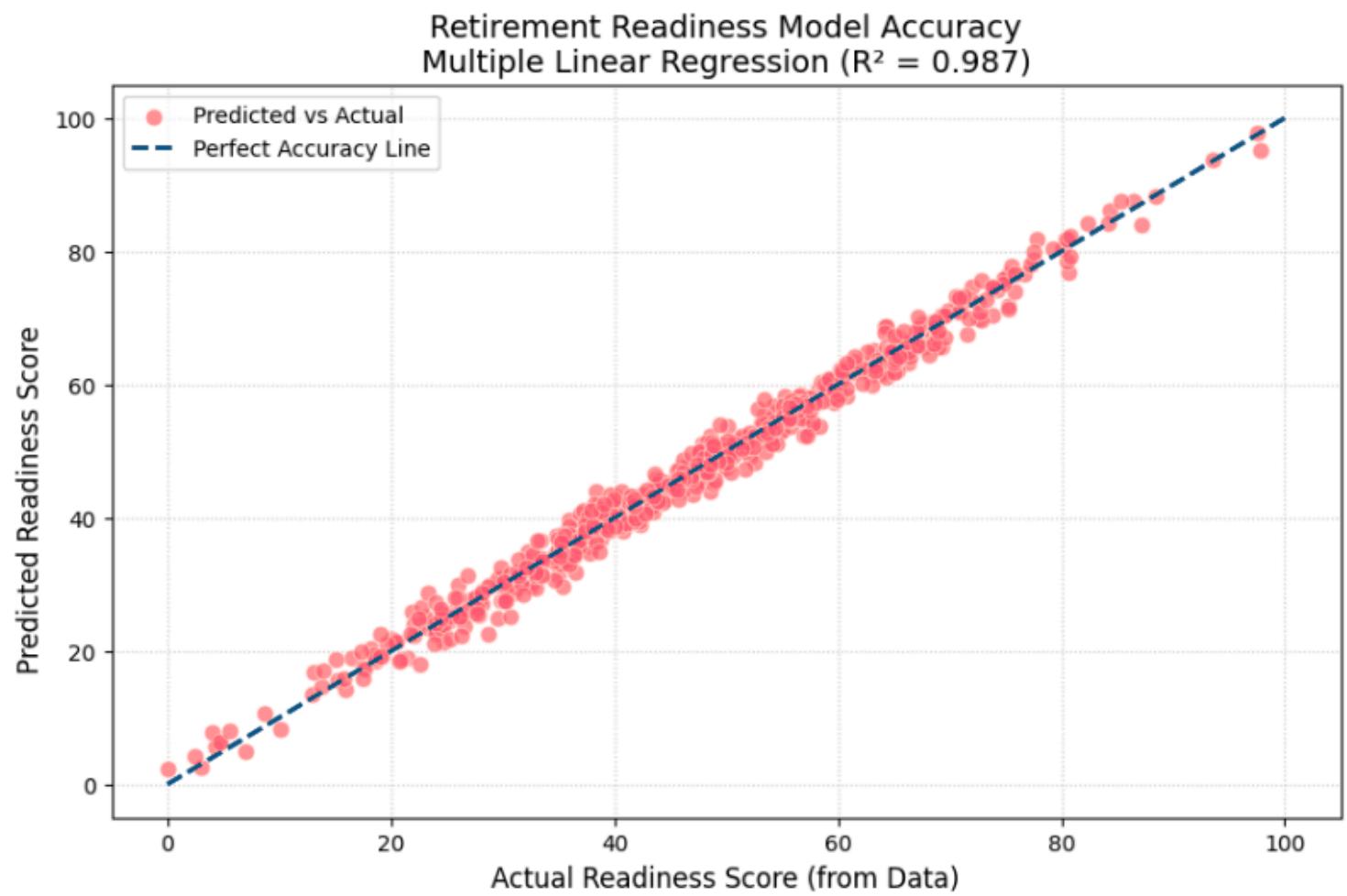
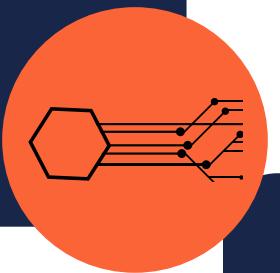


RETIREMENT READINESS SCORE FLOWCHART

- ◆ Problem
 - Retirement planning is complex due to multiple dynamic factors—income variability, inflation, market volatility, and compounding—making it difficult for individuals to accurately gauge their long-term financial preparedness.
- ◆ Solution
 - A machine-learning-powered Retirement Readiness Score (0–100) that instantly evaluates a user's financial health and predicts how prepared they are for retirement.
- ◆ Purpose, Methodology & Dataset Overview
 - Our model uses Multiple Linear Regression (MLR) trained on an India-specific financial dataset containing key variables such as **age, income, expenses, savings, investment value, inflation rate, and expected returns**.
 - The model learns statistical relationships between these features and actual retirement preparedness outcomes, enabling accurate score generation.
- ◆ Target Context & Goal
 - Optimized for Indian financial conditions (income brackets, inflation trends, savings habits).
 - The tool delivers clear, actionable insights by classifying users into Excellent, Good, or Needs Attention, helping them make informed retirement decisions immediately.



RESULTS



$$\text{Score} = \beta_0 + \beta_1(\text{Age}) + \beta_2(\text{Retirement Age}) + \dots + \beta_8(\text{Return Rate})$$

Why Multiple Linear Regression?

- Interpretable coefficients → shows how each factor affects readiness
- Works excellently for continuous financial variables
- Low overfitting compared to black-box models
- Fast inference → real-time score generation
- Stable with structured numeric data

Additional Processing:

- Normalization of monetary values
- Outlier handling
- Inflation-adjusted projections
- Score clamping to 0–100

FUTURE SCOPE

ASSET GROWTH

- Add More Assets & Indicators: Expand to global indices, commodities, and sentiment-based features.
- Real-Time Predictions: Integrate live market data to provide instant buy/sell signals.
- Deployment as a Dashboard/App: Build a user-friendly web or mobile platform for visualizing

INVESTMENT ALLOCATION

- Add More User Inputs : The system can include additional factors like investment goals, monthly SIP amount, and risk tolerance to give even more accurate portfolio suggestions.
- Mobile App Integration : The system can be expanded into a mobile application, allowing users to check and update their investment plan anytime.

RETIREMENT READINESS

- Adding real-time inflation and interest rate updates to provide more accurate and dynamic retirement planning forecasts.
- Integrating lifestyle-based expense modeling to personalize retirement predictions based on user habits, goals, and living standards.

THANK YOU