Research Model: Development of AI-Powered Loan Eligibility Advisory System

1. Research Problem

Financial institutions face a challenge in quickly and fairly determining whether a loan applicant is eligible. Traditional methods rely heavily on manual evaluation and rigid rules, which may overlook patterns in customer data. An **AI-powered advisory system** can automate this process and improve decision-making.

2. Objective

* To design a machine learning model that predicts **loan eligibility** based on applicant financial and personal data.
* To provide an **advisory tool** for loan officers, making the process faster, more transparent, and consistent.

3. Proposed Model

The system will work in three stages:

1. Data Collection & Preprocessing

  * Input: applicant income, co-applicant income, loan amount, loan term, employment status, credit history, property type, etc.
  * Clean missing values and standardize the dataset.
  * Convert categorical data (like gender, education, property area) into numerical form for the model.

2. Model Development

  * Start with a simple **Logistic Regression model** (baseline).
  * Compare with **Decision Tree** and **Random Forest** models for better performance.
  * Select the model with the highest accuracy and reliability.

3. Advisory Output

* The system outputs: **“Eligible”** or **“Not Eligible”**, along with a probability score (e.g., 85% chance of approval).
* It can also provide reasoning, such as *“High credit history score”* or *“Low income-to-loan ratio”*.

4. Evaluation

* Use metrics such as **Accuracy, Precision, Recall, and F1-score**.
* Compare multiple models and choose the most effective one.
* Cross-validate results to ensure fairness and reduce bias.

5. Expected Contributions

Efficiency : Faster screening of loan applications.
Fairness : Decisions based on data, reducing human bias.
Scalability : Can handle large volumes of applications.
Transparency : Provides explainable results to both officers and applicants.

6. Applications

* Banks and NBFCs (Non-Banking Financial Companies).
* Online loan platforms and fintech companies.
* Microfinance institutions serving rural and urban customers.