FINAL REPORT ON

Website for Loan Sanction Prediction

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1.Problem Statement:

The objective of this project is to develop a web application that predicts loan sanction for customers based on their financial and personal information. The aim is to provide an automated and efficient solution for financial institutions to assess the risk associated with loan applications and make informed decisions.

2.Market/ Customer/ Business needs assessment:

Market/Customer/Business Needs of the Loan Sanction Prediction Project are:

1. Efficient Loan Application Processing: Financial institutions and lending organizations have a significant need for an efficient loan application processing system. The loan sanction prediction website addresses this need by automating the loan approval process, reducing manual efforts, and improving the speed and accuracy of loan application evaluation.

2. Risk Assessment and Decision Making: Financial institutions require accurate risk assessment tools to make informed decisions about loan sanctioning. The machine learning model incorporated in the web application provides valuable insights into the creditworthiness of loan applicants, enabling institutions to evaluate the risk associated with each application and make well-informed decisions.

3. Cost Reduction and Resource Optimization: Automating the loan sanction prediction process through the website helps financial institutions reduce costs and optimize resources. By leveraging machine learning algorithms, the web application eliminates the need for manual assessment and evaluation, reducing the time and effort required by loan officers.

4. Improved Customer Experience: Customers applying for loans expect a seamless and efficient experience. The loan sanction prediction website streamlines the loan approval process, minimizing delays and providing customers with quick and accurate loan sanction decisions. This enhances the overall customer experience and increases customer satisfaction.

5. Risk Mitigation and Fraud Detection: Financial institutions face the challenge of mitigating risks associated with loan default and fraud. The loan sanction prediction model incorporated in the website helps identify potential high-risk loan applications and fraudulent activities, reducing the likelihood of default and minimizing financial losses for the institution.

6. Competitive Advantage: Financial institutions that implement advanced technologies like machine learning for loan sanctioning gain a competitive advantage in the market. The website allows institutions to stay ahead of their competitors by providing faster loan processing, accurate predictions, and improved customer service, attracting more customers and enhancing their reputation in the market.

7. Data-Driven Decision Making: In the age of data-driven decision making, financial institutions rely on accurate and reliable information for strategic planning. The loan sanction prediction website generates valuable insights from historical loan data, enabling institutions to make data-driven decisions and optimize their loan sanctioning processes.

Overall, the loan sanction prediction project addresses the market and business needs by offering an automated, accurate, and efficient solution for loan application evaluation. It helps financial institutions streamline their processes, reduce costs, minimize risks, improve customer experience, and gain a competitive edge in the market.

3. Business Model:

The proposed business model for the loan sanction prediction website involves the following key components:

- Target Audience: Financial institutions, banks, and lending organizations.

- Value Proposition: The web application provides a streamlined and automated loan sanction prediction process, enabling institutions to evaluate loan applications quickly and accurately.

- Revenue Generation: Revenue can be generated through subscription-based models, where financial institutions pay a fee to access the loan sanction prediction services. Additionally, premium features and data analytics services can be offered as add-ons for an additional charge.

4. Abstract:

The website for loan sanction prediction aims to assist financial institutions in evaluating loan applications efficiently and accurately. The web application incorporates a machine learning model trained on historical loan data to predict the likelihood of loan sanctioning.

By leveraging various features such as income, credit score, loan amount, and employment history, the model can provide valuable insights into the creditworthiness of loan applicants.

The web application offers an intuitive interface for users to input their information and receive loan sanction predictions, enhancing the loan approval process and reducing manual efforts. The project report outlines the development process, including data preprocessing, model training, evaluation, and the deployment of the web application.

5.Product Details and Code Implementation:

This product only allows the subscribed user to use the website. This product can be build using any of the below algorithms. The dataset, data visualizations and the performance of each of these algorithms is present in this link: **https://github.com/Lokesh4623/Feynn-Labs-Service-project-Report-1**

1. Random Forest:

Random Forest is an ensemble learning algorithm that combines multiple decision trees to make predictions. It constructs a multitude of decision trees during the training phase and aggregates their predictions to produce the final output. Each decision tree is trained on a random subset of the data, and the final prediction is determined by majority voting or averaging the predictions of individual trees. Random Forest is known for its robustness, ability to handle large datasets, and resistance to overfitting.

2. Decision Tree:

A Decision Tree is a flowchart-like model that represents decisions and their possible consequences. It uses a hierarchical structure of nodes and branches, where each internal node represents a feature, each branch represents a decision based on that feature, and each leaf node represents an outcome or a class label. Decision Trees are constructed using various algorithms, and they can handle both classification and regression tasks. They are interpretable, easy to understand, and useful for feature selection.

3. Naive Bayes:

Naive Bayes is a probabilistic machine learning algorithm based on Bayes' theorem with the assumption of independence between features. It is widely used for classification tasks. Naive Bayes calculates the probability of a given sample belonging to each class and selects the class with the highest probability as the prediction. Despite its "naive" assumption of feature independence, Naive Bayes often performs well in practice and is computationally efficient. It is particularly suitable for text classification and spam filtering.

4. K-Nearest Neighbors (KNN):

K-Nearest Neighbors is a simple yet effective algorithm for both classification and regression tasks. In KNN, the prediction for a new sample is based on the class or value of its nearest neighbors in the feature space. The algorithm calculates the distances between the new sample and all other samples in the training dataset and selects the K nearest neighbors. For classification, the majority class among the neighbors is assigned as the prediction; for regression, the average or median value of the neighbors is used. KNN is easy to understand, non-parametric, and adaptable to various data distributions.

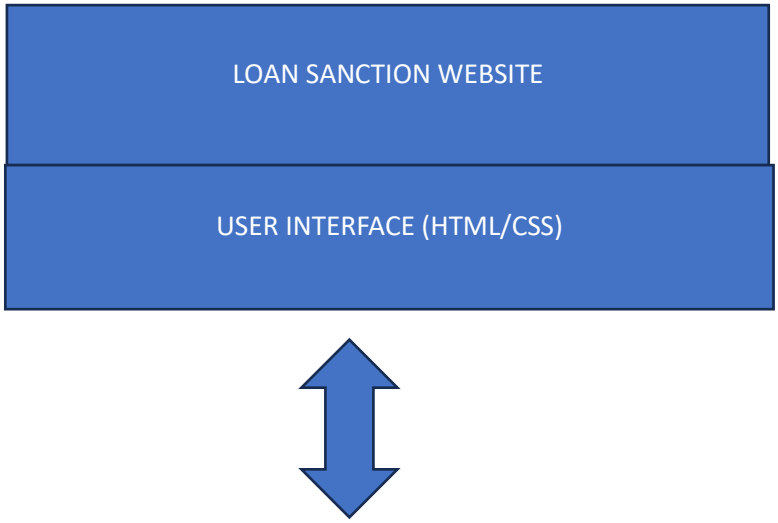
The accuracy of the above algorithms are tabulated below and we can infer that Naïve Bayes algorithm is best suited, as it has highest accuracy value.

ML ALGORITHM	**ACCURACY(In Percentage)**
RANDOM FOREST	76.4%
NAÏVE BAYES	82.9%
DECISION TREE	71.5%
KNN	79.6%

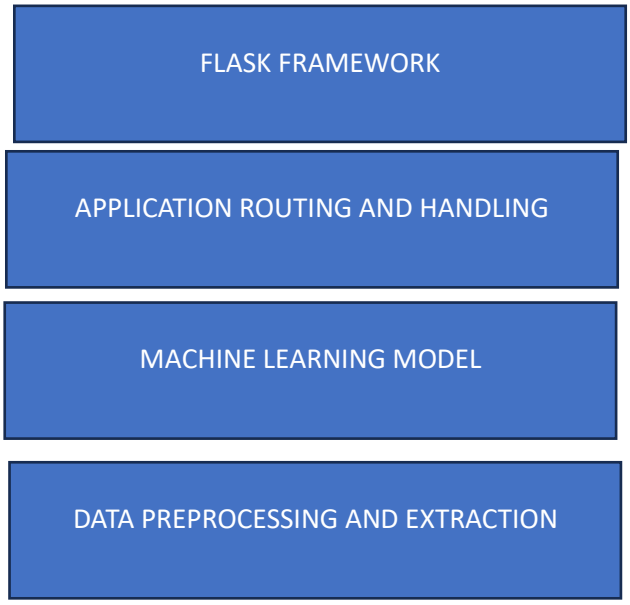
6. Final Product:

The schematic diagram below illustrates the architecture of the loan sanction prediction web application:

FRONT END:



BACK END:



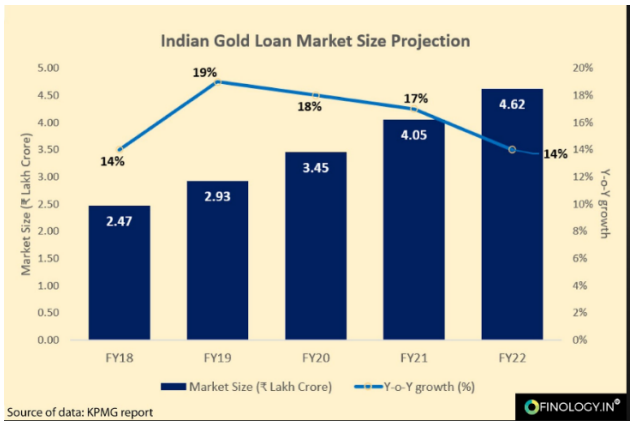
FRONT END DESIGN:

- The Front end of the application is built using HTML, CSS and JS Framework.
- The Front end plays a crucial role as it is the interface with which the customer will be working and it is convenient for everyone.
- The web app will have 2 pages.
- The first page for registration and make payments to get the login credentials of the main app for loan sanction prediction.
- The second is the login page.
- The third is the actual web page for loan sanction prediction.

BACK END DESIGN:

The back end focuses on building the ml model and integrating it with the frontend using Flask Framework.

7. Financial equation:



From the above graph, we can infer that the demand for loans such housing, gold and etc…will be in increasing in the future. So, the market size will also grow.

From the above trend it would be advisable to price our service around Rs.10000 for six months for a financial organization or banks. Once the customer base increases we can either increase the price or reduce the duration for which our product will be available.

Let's assume that the duration of developing the ML model takes about 1 to 3 weeks and the cost for producing the model is the salary of the members the team. Let there be two ML engineers and one full stack web developer. Let the salary of the ML engineers be 'ml' and the full stack web developer be 'fs'. So, the total cost c = 2*ml + fs.

So the profit or financial equation will look like this y = 10000*x(t) – (2*ml+ fs). Here, x(t) is a function that represents the growth of the customer base (the financial institutions and banks) and y is the total profit earned.

8. Conclusion:

The loan sanction prediction website provides financial institutions with a powerful tool to streamline and automate their loan approval process. By leveraging machine learning techniques and historical loan data, the web application enables accurate prediction of loan sanctioning, empowering institutions to make informed decisions based on applicants' financial and personal information. The project report outlines the key components, development process, and business model associated with the website, highlighting the potential benefits and opportunities for further enhancements.