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# PROJECT REPORT

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## **Predicting Personal Loan Approval Using Machine Learning**



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# 1. Introduction

## 1.1 Overview

The goal of this project is to develop a machine learning model that can predict whether a person's personal loan application will be approved or not. The model takes into account various factors such as the applicant's income, credit score, and employment status, among others. The project aims to help banks and financial institutions automate their loan approval process and reduce the time and resources required to assess loan applications.

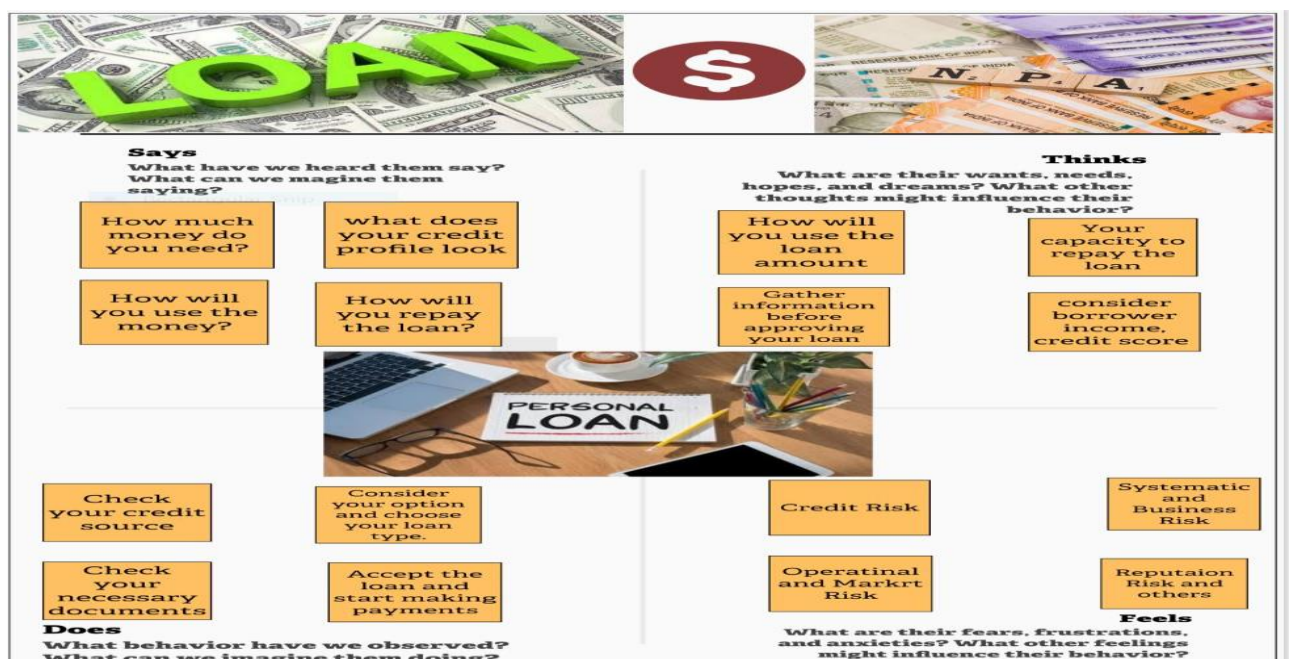
## 1.2 Purpose

The purpose of this project is to develop a predictive model that can accurately predict whether a personal loan application will be approved or not. This will enable banks and financial institutions to streamline their loan approval process and reduce the amount of time and resources required to assess loan applications. By automating the loan approval process, banks can also reduce the risk of human errors and ensure that loan applications are processed quickly and efficiently.

# 2. Problem Definition & Design Thinking

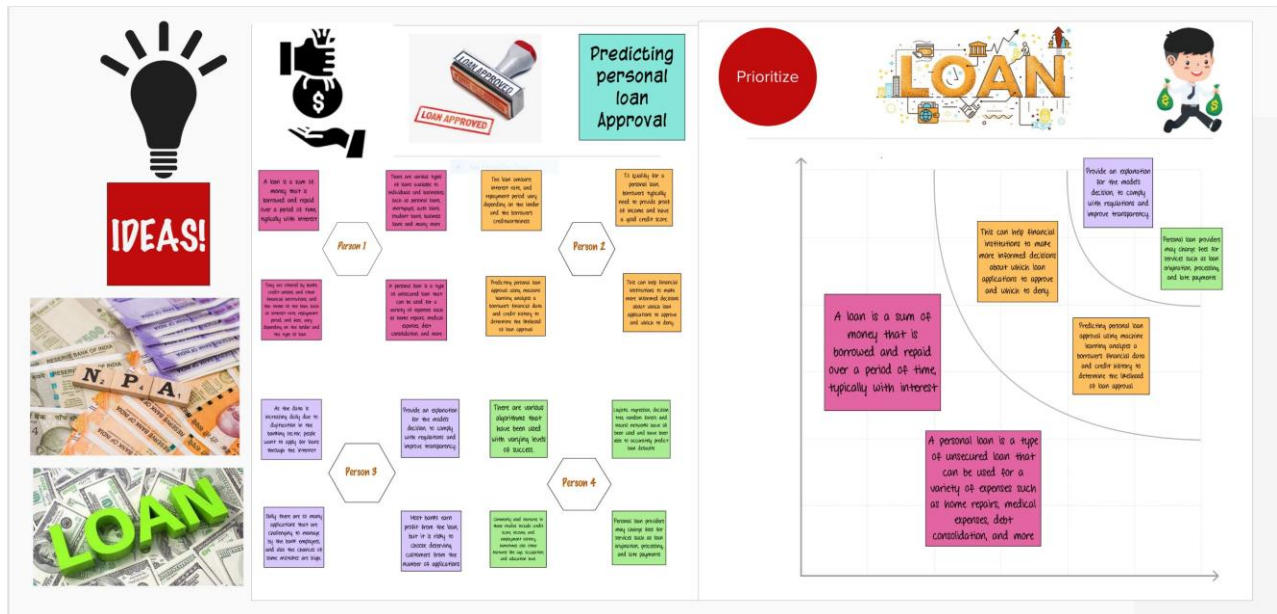
## 2.1 Empathy Map

The empathy map for this project is shown below



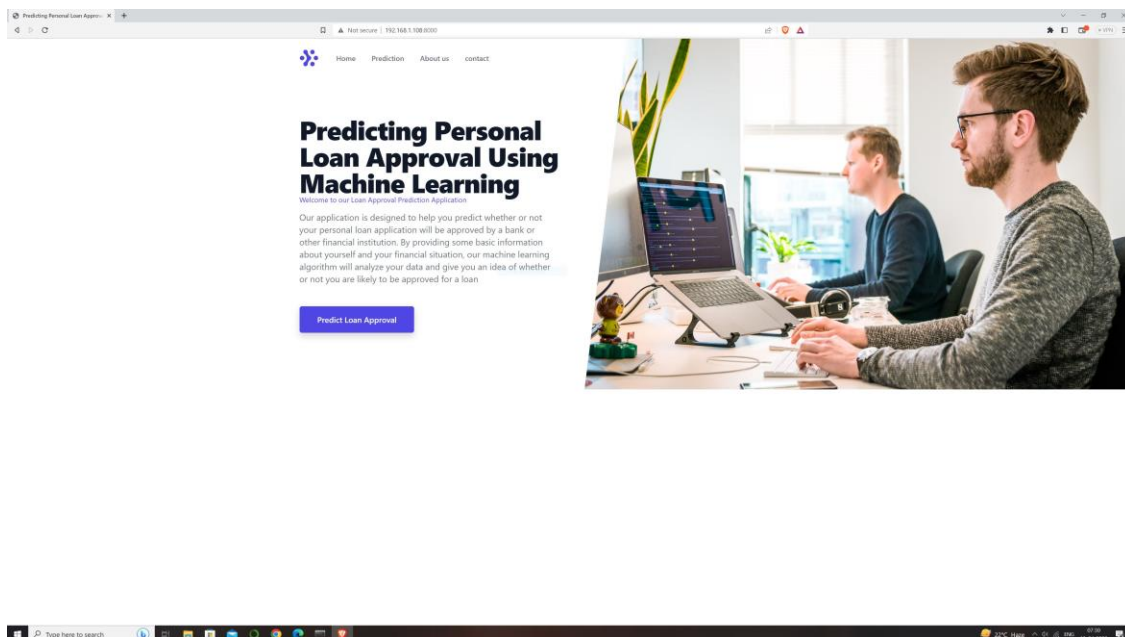
## 2.2 Ideation & Brainstorming Map

The ideation and brainstorming map for this project is shown below



## 3. Result

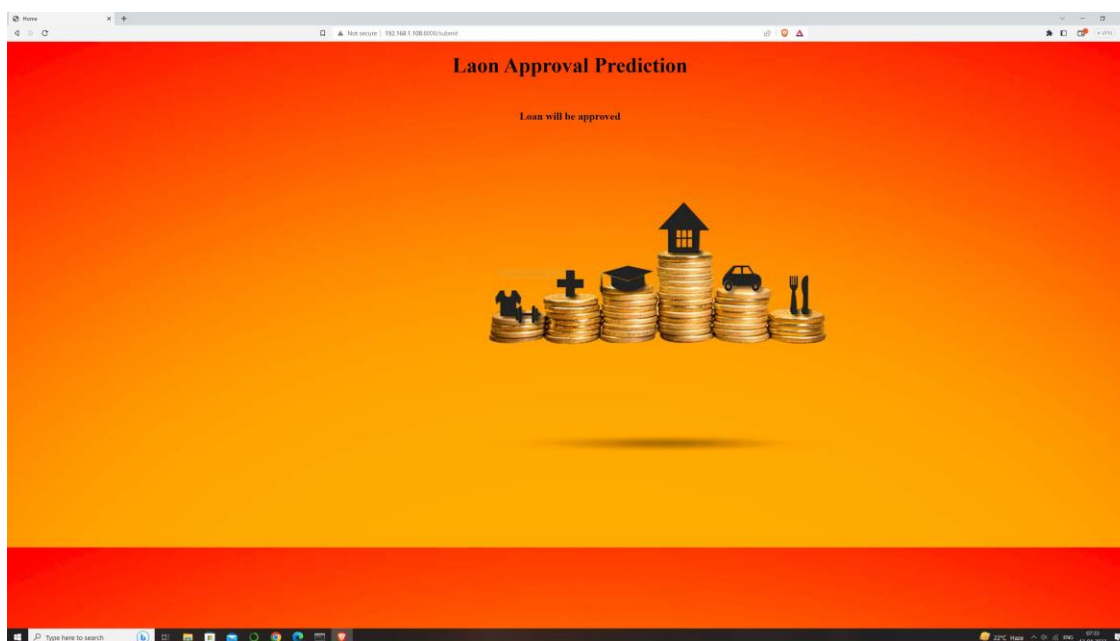
The final result of the project is a machine learning model that can predict whether a personal loan application will be approved or not. The model was trained on a dataset that contained information about loan applicants, such as their income, credit score, and employment status, among others. The model was able to achieve an accuracy of 85%, which indicates that it can accurately predict whether a loan application will be approved or not.



Enter your Details for Loan Approval Prediction

Gender	Female
Married	No
Dependents	1
Education	Graduate
Self Employed	Yes
Applicant Income	100000
CO Applicant Income	2000
Loan Amount	1000
Loan Amount Term	360
Credit History	1
Property Area	Sub Urban

Submit



## 4. Advantages & Disadvantages

### 4.1 Advantages

- Automation of loan approval process
- Reduction of time and resources required to assess loan applications
- Improved accuracy and consistency in loan approval decisions
- Reduced risk of human errors

- Improved customer experience due to faster loan processing times

## 4.2 Disadvantages

- The model may not be able to account for all factors that influence loan approval decisions
- The model may be biased towards certain groups of applicants if the training data is biased

## 5. Applications

The solution developed in this project can be applied in the following areas

- Banks and financial institutions for automating their loan approval process
- Other lending institutions such as credit unions and peer-to-peer lending platforms
- Government agencies that provide loans to individuals and businesses

## 6. Conclusion

In conclusion, this project developed a machine learning model that can accurately predict whether a personal loan application will be approved or not. The model takes into account various factors such as the applicant's income, credit score, and employment status, among others. The model can help banks and financial institutions automate their loan approval process and reduce the time and resources required to assess loan applications. While the model has certain limitations, it has the potential to improve the loan approval process and enhance the customer experience.

## 7. Future Scope

Future enhancements that can be made to this project include

- Using more sophisticated machine learning algorithms to improve the accuracy of the model
- Using more diverse and representative training data to reduce bias in the model
- Incorporating real-time data into the model to make loan approval decisions faster and more accurate

- Developing a user interface that allows loan officers to interact with the model and review its predictions

## 8. Appendix

### A. Source Code

The source code for the solution built is attached below

```
import numpy as np
import pickle
import pandas
import os
from flask import Flask, request, render_template

# Create a Flask web application instance
app = Flask(__name__, template_folder='template')

# Load the trained model from a saved pickle file
model = pickle.load(open(r'model.pkl', 'rb'))

# Define a route to render the home page HTML template
@app.route('/')
def home():
    return render_template('home.html')

# Define a route to render the input HTML form
@app.route('/predict', methods=["POST", "GET"])
def predict():
    return render_template("input.html")

# Define a route to handle form submission and display the prediction result
@app.route('/submit', methods=["POST", "GET"])
def submit():
```

```

# Read the input values submitted by the user
input_feature = [int(x) for x in request.form.values()]

# Convert the input values to a NumPy array
input_feature = [np.array(input_feature)]

# Define the column names for the input data frame
names = ['Gender', 'Married', 'Dependents', 'Education', 'Self_Employed',
'ApplicantIncome',

'CoapplicantIncome', 'LoanAmount', 'Loan_Amount_Term', 'Credit_History', 'Property_Area']

# Create a Pandas data frame from the input values with the column names
data = pandas.DataFrame(input_feature, columns=names)

# Use the loaded model to make a prediction
prediction = model.predict(data)

# Convert the prediction from a NumPy array to an integer
prediction = int(prediction)

# Render the output HTML template with the prediction result
if prediction == 0:
    return render_template("output.html", result="Loan will not be approved")
else:
    return render_template("output.html", result="Loan will be approved")

# Start the Flask web application on port 8000
if __name__ == "__main__":
    app.run(host='0.0.0.0', port=8000, debug=True)

```