

## **Project Report Format**

### **1. INTRODUCTION**

#### **1.1 Project Overview**

The name of the project is Smart Lender - Applicant Credibility Prediction For Loan Approval. This application is used to predict whether the user is eligible for a loan by assessing the dependent values. The application uses ML models to predict the eligibility for the loan. This project makes use of combination of different ML models such as Random Forest, Decision Tree and other such ML models. Thus, the project is a loan predictor which can be used by any people.

#### **1.2 Purpose**

The process of bank credit risk evaluation is recognized at banks across the globe. “As it is known that credit risk evaluation is very crucial, there is a variety of techniques that are used for risk level calculation. In addition, credit risk is one of the main functions of the banking community. The prediction of credit defaulters is one of the difficult tasks for any bank. But by forecasting the loan defaulters, the banks definitely may reduce their loss by reducing their non-profit assets, so that recovery of approved loans can take place without any loss and it can play as the contributing parameter of the bank statement. This makes the study of this loan approval prediction important. Machine Learning techniques are very crucial and useful in the prediction of these types of data. Classification algorithms such as Decision tree, Random forest, KNN, and xgboost will be used. The data will be trained and tested with these algorithms. From this best model is selected and prediction is done.

### **2. LITERATURE SURVEY**

#### **2.1 Existing problem**

With the enhancement in the financial sector, a number of individuals are applying for loans. However the bank has only limited resources and assets ,so discovering to whom the credit can be conceded would definitely be a more secure choice for the bank thus preventing the bank from incurring losses. So in this task we attempt to decrease this danger factor behind by choosing the protected individual in order to save bunches of bank endeavors and resources. Here we implement ML models to automate the process of finding out if an individual is reliable or not.

#### **2.2 References**

[1]Anchal Goyal , Ranpreet Kaur-“Loan Prediction Using Ensemble Technique”, International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 3, March 2016

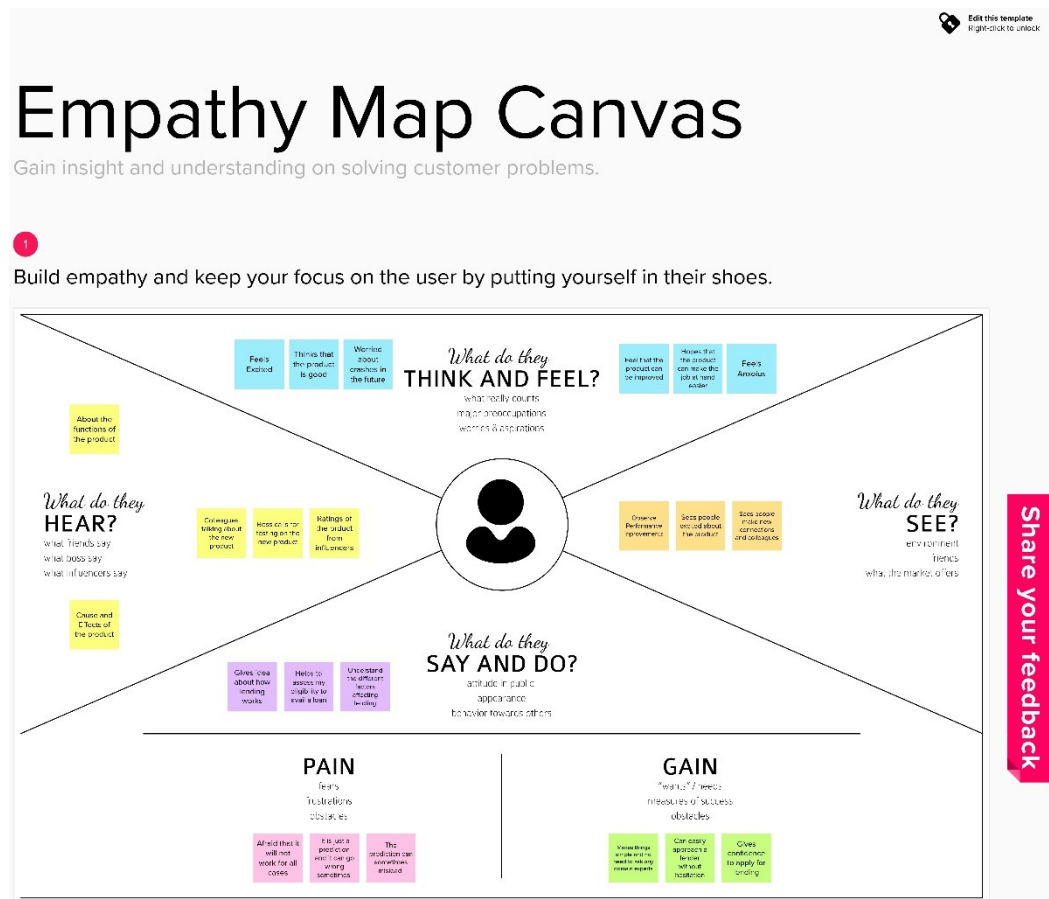
- [2] Xin Li, Xianzhong Long, Guozi Sun, Geng Yang, and Huakang Li "Overdue Prediction of Bank Loans Based on LSTM-SVM" Jiangsu Key Lab of Big Data and Security and Intelligent Processing Nanjing University of Posts and Telecommunications, Nanjing, 210023, China
- [3] H. Meshref, "Predicting Loan Approval of Bank Direct Marketing Data Using Ensemble Machine Learning Algorithms." International Journal of circuits, systems, and signal processing. 2020, Vol. 14, pp. 914-922 DOI: 10.46300/9106.2020.14.117
- [4] Madane N and Nanda S 2019 Loan prediction analysis using decision tree Journal of The Gujarat Research Society 21 p p 214–21
- [5] Jency X F, Sumathi V P and Sri J S 2018 An exploratory data analysis for loan prediction based on nature of the clients Int. Journal of Recent Technol. and Engineering (IJRTE) 7 pp 176–9
- [6] S. Z. H. Shoumo, M. I. M. Dhruba, S. Hossain, N. H. Ghani, H. Arif and S. Islam, "Application of Machine Learning in Credit Risk Assessment: A Prelude to Smart Banking," TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), Kochi, India, 2019, pp. 2023-2028, doi: 10.1109/TENCON.2019.8929527.
- [7] Lops, Pasquale & de Gemmis, Marco & Semeraro, Giovanni & Narducci, Fedelucio & Musto, Cataldo. (2011). Leveraging the LinkedIn social network data for extracting content-based user profiles. RecSys'11 - Proceedings of the 5th ACM Conference on Recommender Systems. 293-296. 10.1145/2043932.2043986.

### 2.3 Problem Statement Definition

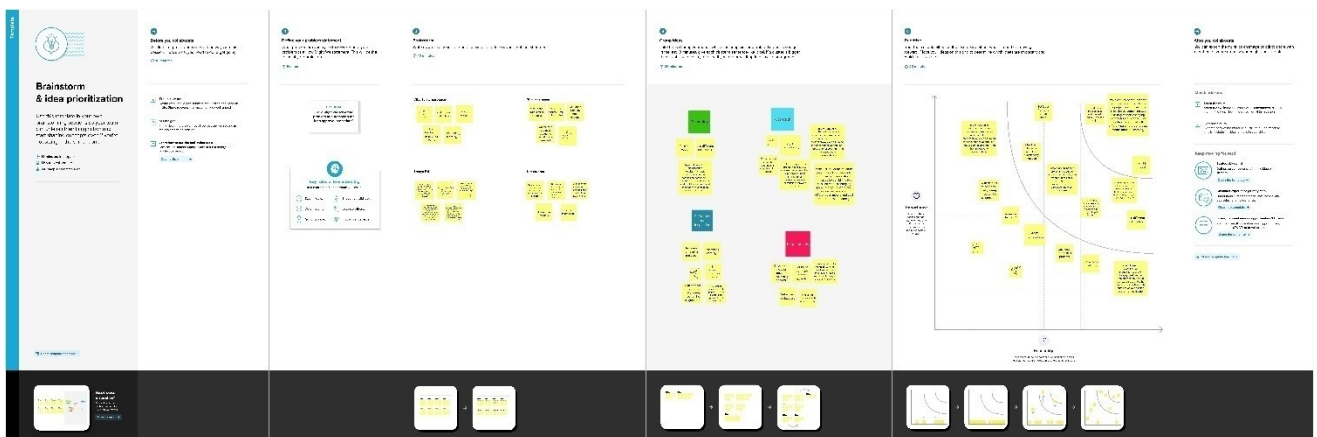
Loans are the core business of banks. The main profit comes directly from the loan's interest. Banks need to ensure that a person, institution, or organization applying for a loan is verified thoroughly before sanctioning them a loan. This poses the problem of automating the loan approval procedure in order to help in reducing the time and energy and making the process more efficient than a manual process. To design and implement the system using machine learning and data mining to predict the probability of the user to get loan or not from bank to improve the accuracy and to minimize the frauds. Banks, Housing Finance Companies and some NBFC deal in various types of loans like housing loan, personal loan, business loan etc in all over the part of countries. These companies have existence in Rural, Semi Urban and Urban areas. After applying loan by customer these companies validates the eligibility of customers to get the loan or not. This project provides a solution to automate this process by employing machine learning algorithm. So the customer will fill an online loan application form. This form consist details like Gender, Marital Status, Qualification, Details of Dependents, Annual Income, Amount of Loan, Credit History of Applicant and others. To automate this process by using machine learning algorithm, First the algorithm will identify those segments of the customers who are eligible to get loan amounts so bank can focus on these customers.

### 3. IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas



#### 3.2 Ideation & Brainstorming



### 3.3 Proposed Solution

#### Problem statement:

To design and implement the system using machine learning and data mining to predict the probability of the user to get loan or not from bank to improve the accuracy and to minimize the frauds. Banks, Housing Finance Companies and some NBFC deal in various types of loans like housing loan, personal loan, business loan etc in all over the part of countries. These companies have existence in Rural, Semi Urban and Urban areas. After applying for loan by customers, these companies validate the eligibility of customers to get the loan or not. This project provides a solution to automate this process by employing machine learning algorithm. So the customer will fill an online loan application form. This form consist details like Gender, Marital Status, Qualification, Details of Dependents, Annual Income, Amount of Loan, Credit History of Applicant and others. To automate this process by using machine learning algorithm, First the algorithm will identify those segments of the customers who are eligible to get loan amounts so bank can focus on these customers.

#### Idea:

A Machine Learning algorithm is to be used in order to construct a robust and efficient software algorithm that classifies individuals based on different characteristics (Gender, Education, Number of Dependents, Marital Status, Employment, Credit Score, Loan Amount, and others) whether they would be eligible for a loan or not. Ensemble learning using multiple ML models is the solution that is going to be used. Ensemble modeling is the method of running two or more associated but different models and then combines the results into a single score to improve the accuracy of predictive data and data mining applications. In machine learning, ensemble methods use several algorithms to get better predictive performance. The different ML models that can be used are KNN, Decision tree, Random forest, Xgboost.

#### Novelty:

Ensemble modeling combines multiple facts to form a better result. This method of prediction has been shown to enhance forecasts when compared to a single model-based approach. The main benefits of Ensemble models are: Better Forecasting, More Constant model, Better results, and Reduces error. All these factors make the project unique.

#### Social Impact/Customer Satisfaction:

Now a day's bank plays a vital role in market economy. The success or failure of organization largely depends on the industry's ability to evaluate credit risk. Banks have many products to sell in our banking system, but their main source of income is their credit lines. As a result, they are likely to profit from the interest on the loans they make. Loans, or whether customers repay or default on their loans, affect a bank's profit or loss.


The bank can minimize its Non-Performing Assets by forecasting loan defaulters. Because precise predictions are crucial for maximizing earnings, it's essential to look at the different methodologies and compare them.


### Business Model(Financial Benefit):

The bank can minimize its Non-Performing Assets by forecasting loan defaulter. Furthermore, automation of the loan approval processes opens new financing opportunities for small businesses and individuals. These previously suffered from limited access to credit, due to the high cost of human involvement in the process. Ultimately, automation of this process carries the potential to reduce human bias and corruption, making access to credit fairer for all.

### 3.4 Problem Solution fit

Problem-Solution fit canvas 2.0		To find a solution that can help the banking sector identify whether a given person is eligible for a loan.	
Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> Our Customers are officials from the banking sector who handle the loaning process for their customers.	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> Choices of solutions are limited by the budget, knowledge required to use the solution, database access, internet connectivity, etc.	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> Solutions include: 1. Creating an database functions that gives results based on information of a person. Pros: simple, Cons: low accuracy. 2. Using past records of other people with conditions similar to the current person. Pros: Good Accuracy, Cons: Past records cannot exist for all types of conditions of the current person. 3. Creating an app/ai that uses machine learning techniques to predict the loan eligibility of person.
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span> Problems include deciding whether or not a customer is eligible for availing a loan scheme from bank, increasing customer interaction, etc.	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> Customer are required to increase their ability to recognise a person's loan eligibility in order increase the productivity of the company and cater to needs of the customers.	<b>7. BEHAVIOUR</b> <span>BE</span> Customers spend time slowly analysing the various details of people inorder to derive the result. They also conduct various interviews with the person to see if they are who they claim to be.
Focus on J&P, tap into C	<b>3. TRIGGERS</b> <span>TR</span> Customers are triggered from the need to standardise the loan process and make their work more customer-friendly.	<b>10. YOUR SOLUTION</b> <span>SL</span> Our Solution involve using ensemble ML models which can predict the loan eligibility of a person in the form of score that can be used as standard in the banking sector. It will also include an application framework that uses this ML model and some UI/UX to provide the results directly to the customer.	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span> 8.1 ONLINE They also conduct various interviews with the person to see if they are who they claim to be. 8.2 OFFLINE Customers spend time slowly analysing the various details of people inorder to derive the result.
	<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> Customers, from being indecisive, become more confident about the whether or not the person-in-question is able to avail their loan schemes.		
Identify strong TR & EM			Extract online & offline CH of BE


 Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license  
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**AMALTAMA**

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional requirement

FRNo.	Functional Requirement(Epic)	Sub Requirement(Story/Sub-Task)
FR-1	User Interface	Ability to enter details Ability to add to required details
FR-2	Modify Parameters List	Ability to add or delete parameters from list
FR-2	Display Eligibility Score	Ability to change the format of the score Ability to send the results to a specified email
FR-3	Submit Feedback	Ability to Submit user feedback
FR-4	Request Email Transcript	Ability to get an email of the details and their associated prediction score
FR-5	Admin Interface	Ability to view past user predictions Ability to view past user feedbacks Ability to modify the underlying ML model

### 4.2 Non-Functional requirements

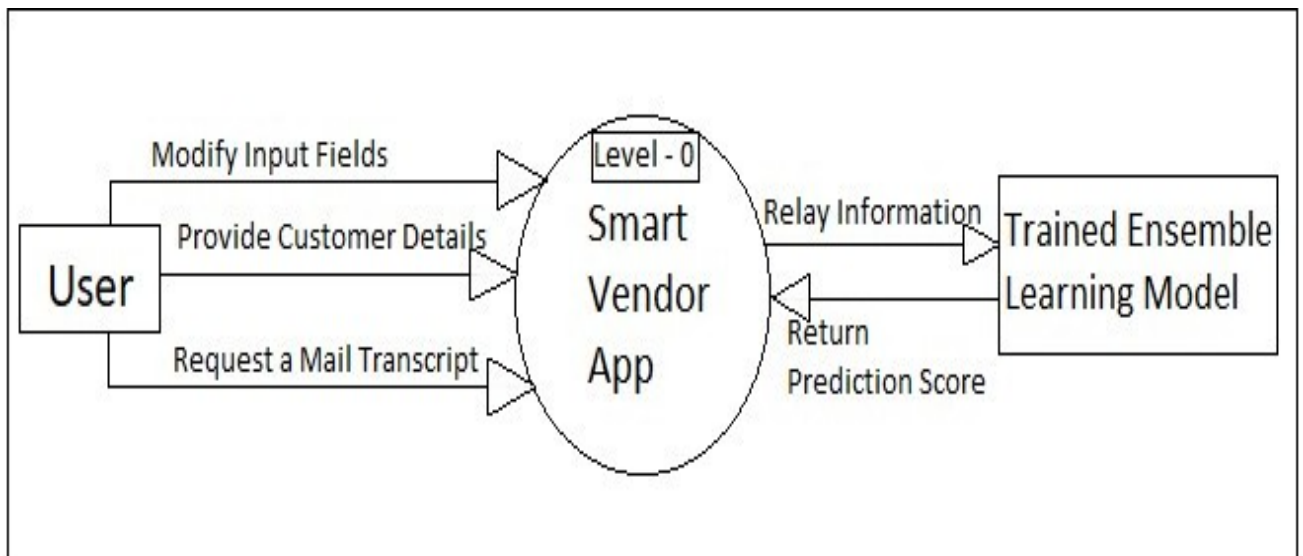
FRNo.	Non-FunctionalRequirement	Description
NFR-1	<b>Usability</b>	How easy is it for a customer to use the system
NFR-2	<b>Security</b>	How well are the system and its data protected against attacks
NFR-3	<b>Reliability</b>	How often does the system experience critical failures and How much time does it take to fix the issue when it arises
NFR-4	<b>Performance</b>	How fast does the system return results and How much will this performance change with higher workloads
NFR-5	<b>Availability</b>	How is user availability time compared to downtime
NFR-6	<b>Scalability</b>	What are the highest workloads under which the system will still perform as expected

## 5. PROJECT DESIGN

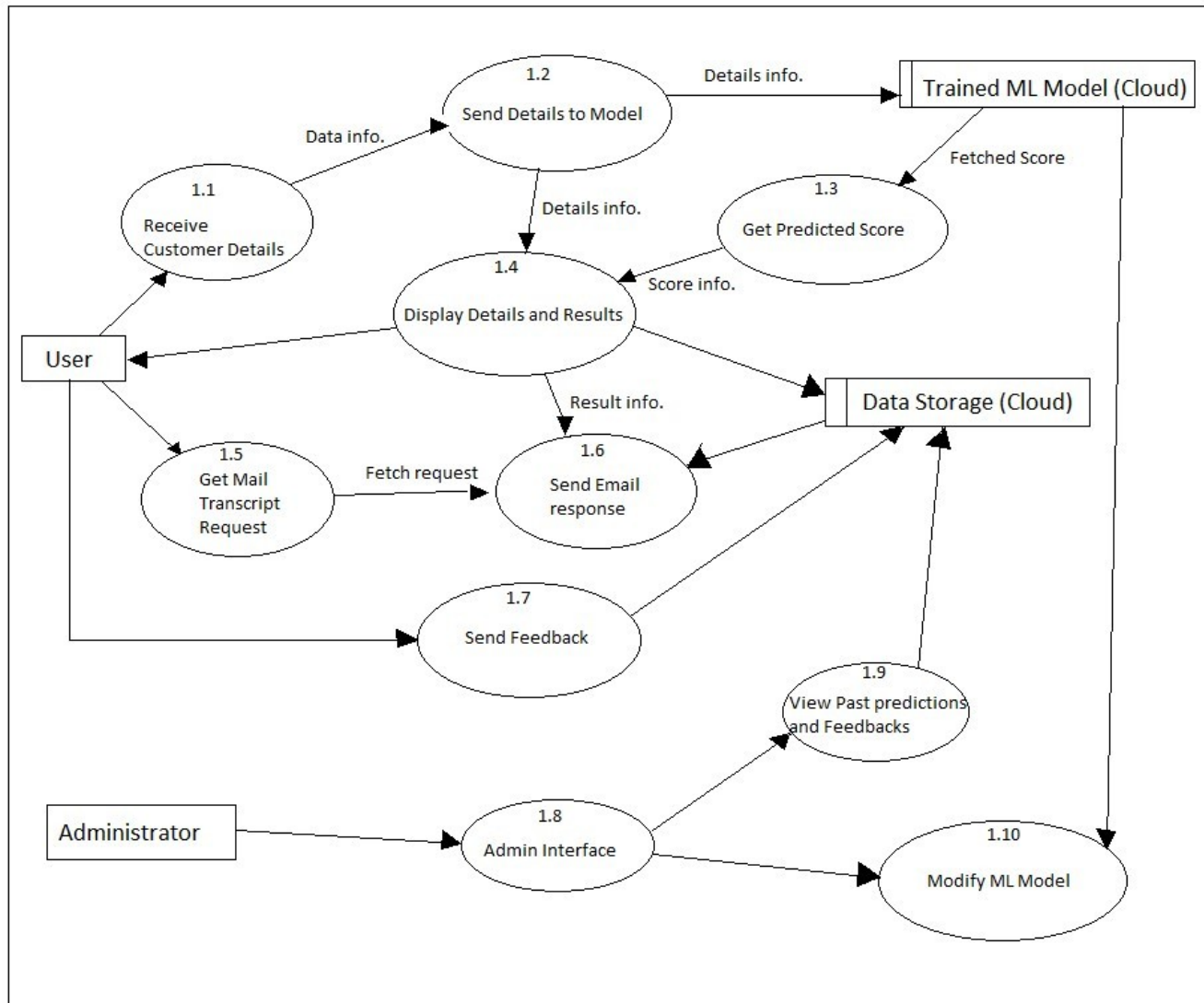
### 5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flow within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

#### Level - 0 Data Flow Diagram:



### Level - 1 Data Flow Diagram:





## 5.2 Solution & Technical Architecture

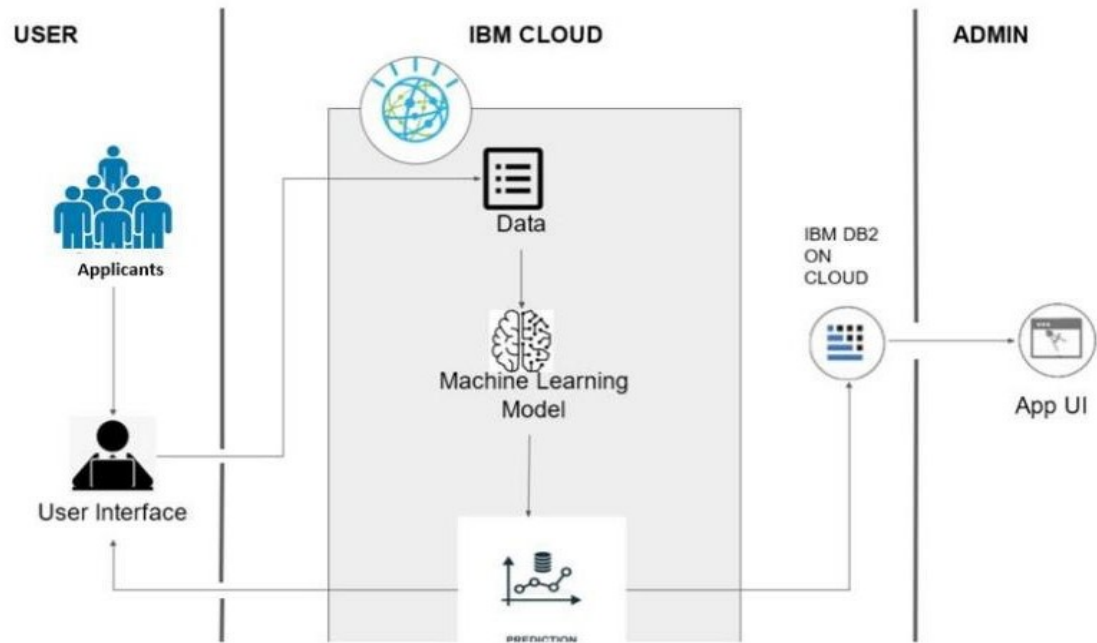


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Users will be able to register, login and use the functionalities available to them via a web user interface.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	The user / Applicant can enter the data / information in the form ,which is displayed using the flask and it is sent for the machine learning model for the prediction	Python/HTML
3.	Application Logic-2	The application is deployed using IBM cloud service	IBM Waston Assistance
4.	Database	The user credentials are stored, which is used to send notification of any updates.	MySQL/SqlServer

5.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
6.	File Storage	ML model and training/testing data have to be stored in a file storage.	IBM Block Storage or Other Storage Service or Local Filesystem
7.	Machine Learning Model	Machine Learning Models are used to predict the credibility of the applicant based on the several inputs provided by the user. thus performing binary classification-eligible or not for a particular proposed amount of loan	KNN,K Means,RandomForest,DecisionTrees,Ensemble Learning Methods are implemented using various python open source frameworks
8.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local ServerConfiguration, Cloud ServerConfiguration	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Flask is used to connect the front end with the backend. Other open-source python frameworks like scikit, numpy, tensorflow, keras are used in training and testing the model. Angular, express, bootstrap are a few open source frameworks for web development.	Flask, scikit, tensorflow, keras, express, bootstrap angular
2.	Security Implementations	OpenSSL is a program library that supports many different cryptographic operations, including symmetric key encryption, Public/private key pair generation, Public key encryption and Hash functions. Firewalls, authentication and authorization are also of utmost importance to maintain security. It can be achieved by using SHA algorithm. Role based access control must be provided.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Horizontal scaling is provided by adding more machines to the pool of servers. Vertical scaling is achieved by adding more CPU and RAM to the existing machines. All modules must be implemented by using the micro-services approach and must be deployed in docker containers.	Docker, Micro-services(Nodejs, Angular)

4.	Availability	By following the distributed computing approach and decentralized storing of data availability of the application can be ensured. A backup server must be maintained to perform hot swap if necessary. Data must be replicated across machines. Application must be stored in the form of containers which automatically takes care of the load balancing.	Docker,Kubernetes,IBM cloud file storage,SQL online
5.	Performance	The landing page supporting a number of users (max 5000) per hour must provide 6 second or less response time in a Chrome desktop browser, including the rendering of text and images and over an LTE connection. User's data must be stored in a cache to retrieve it quickly.	APM technology

### 5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	User Interface	USN-1	As a user, I can view the web application and I am able to interact with it.	I can access the website	High	Sprint-1
		USN-2	As a user, I will be able to enter the details of the customer who I'm looking to appraise	I can enter the details in the given parameters list	High	Sprint-1
		USN-3	As a user, I can add or change the parameters list to accommodate for the unavailability of a specific data.	I can modify the parameters list to an extent	Low	Sprint-1
		USN-4	As a user, I can ask for the data's prediction score at any time.	I can get some prediction score for any input	Medium	Sprint-1
		USN-5	As a user, I can request for mail transcript of the prediction along with the details given at the time to	I can request and receive an email transcript of the results	High	Sprint-2

			a specified email id.			
		USN-6	As a user, I should be able to submit some feedback on the website.	I can submit feedback	Medium	Sprint-2
Administrator	User Interface	USN-7	As an admin, I can look at the past prediction stored in the cloud	I can view past predictions	Medium	Sprint-2
		USN-8	As an admin, I can look at the user feedbacks	I can view the user feedbacks	Medium	Sprint-3
		USN-9	As an admin, I can tweak the ML model	I can modify ML model	Low	Sprint-3

## 6. PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	ML Model	USN-10	Get the Dataset for training	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-1		USN-11	Pre-Process the Dataset	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-1		USN-12	Train the Model	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-1		USN-13	Optimize the Model	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-2		USN-14	Connect Model to User Interface	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-2	Customer User Interface	USN-1	As a user, I can view the web application and I am able to interact with it.	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman

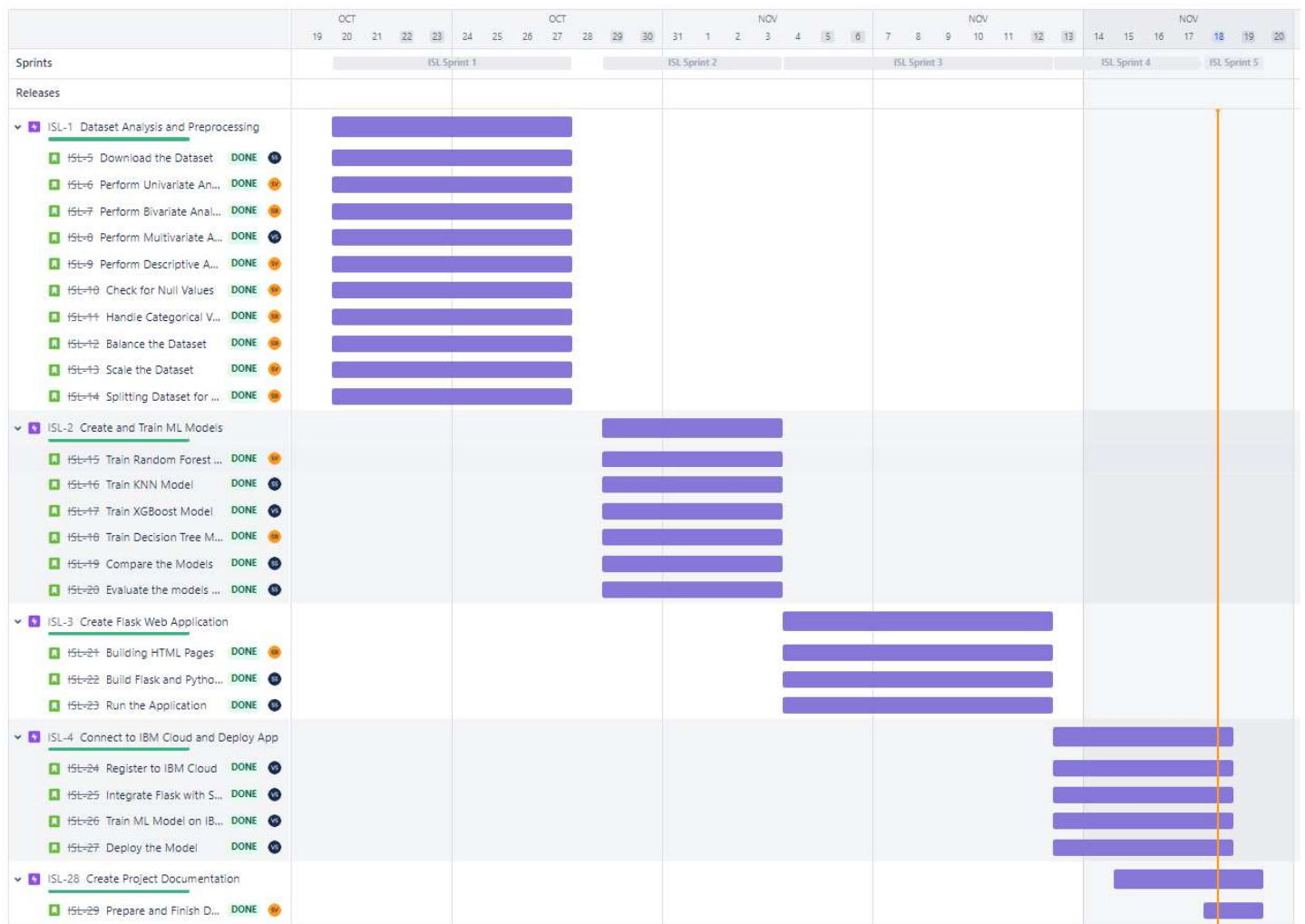
<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-2		USN-2	As a user, I will be able to enter the details of the customer who I'm looking to appraise	3	High	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-2		USN-3	As a user, I can add or change the parameters list to accommodate for the unavailability of a specific data.	2	Medium	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-3		USN-4	As a user, I can ask for the data's prediction score at any time.	2	Medium	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-3		USN-5	As a user, I can request for mail transcript of the prediction along with the details given at the time to a specified email id.	2	Medium	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-3		USN-6	As a user, I should be able to submit some feedback on the website.	1	Low	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-4	Admin User Interface	USN-7	As an admin, I can look at the past prediction stored in the cloud	1	Low	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-4		USN-8	As an admin, I can look at the user feedbacks	1	Low	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman
Sprint-4		USN-9	As an admin, I can tweak the ML model	1	Low	Vijay Sankarnarayanan, Shreya P S, Sanjoosree, Shankararaman

## 6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	12	9 Days	24 Oct 2022	01 Nov 2022	12	29 Oct 2022
Sprint-2	11	8 Days	01 Nov 2022	08 Nov 2022	11	29 Oct 2022
Sprint-3	5	5 Days	08 Nov 2022	12 Nov 2022	5	29 Oct 2022
Sprint-4	3	5 Days	12 Nov 2022	16 Nov 2022	3	29 Oct 2022

## 6.3 Reports from JIRA

- Roadmap























- Status Reports

### 6.3..1 Sprint-1

#### Completed Issues













[View in Issue Navigator](#)

Key	Summary	Issue Type	Priority	Status	Story Points (0)
ISL-5	Download the Dataset	 Story	 Medium	<span>DONE</span>	-
ISL-6	Perform Univariate Analysis	 Story	 Medium	<span>DONE</span>	-
ISL-7	Perform Bivariate Analysis	 Story	 Medium	<span>DONE</span>	-
ISL-8	Perform Multivariate Analysis	 Story	 Medium	<span>DONE</span>	-
ISL-9	Perform Descriptive Analysis	 Story	 Medium	<span>DONE</span>	-
ISL-10	Check for Null Values	 Story	 Medium	<span>DONE</span>	-
ISL-11	Handle Categorical Values	 Story	 Medium	<span>DONE</span>	-
ISL-12	Balance the Dataset	 Story	 Medium	<span>DONE</span>	-
ISL-13	Scale the Dataset	 Story	 Medium	<span>DONE</span>	-
ISL-14	Splitting Dataset for Training and Testing	 Story	 Medium	<span>DONE</span>	-

### 6.3..2 Sprint-2

#### Completed Issues


[View in Issue Navigator](#)

Key	Summary	Issue Type	Priority	Status	Story Points (0)
ISL-15	Train Random Forest Model	 Story	 Medium	<span>DONE</span>	-
ISL-16	Train KNN Model	 Story	 Medium	<span>DONE</span>	-
ISL-17	Train XGBoost Model	 Story	 Medium	<span>DONE</span>	-
ISL-18	Train Decision Tree Model	 Story	 Medium	<span>DONE</span>	-
ISL-19	Compare the Models	 Story	 Medium	<span>DONE</span>	-
ISL-20	Evaluate the models and Save the models	 Story	 Medium	<span>DONE</span>	-

### 6.3..3 Sprint-3

#### Completed Issues









[View in Issue Navigator](#)

Key	Summary	Issue Type	Priority	Status	Story Points (0)
<a href="#">ISL-21</a>	Building HTML Pages	 Story	 Medium	<span>DONE</span>	-
<a href="#">ISL-22</a>	Build Flask and Python Code	 Story	 Medium	<span>DONE</span>	-
<a href="#">ISL-23</a>	Run the Application	 Story	 Medium	<span>DONE</span>	-

### 6.3..4 Sprint-4

#### Completed Issues

[View in Issue Navigator](#)

Key	Summary	Issue Type	Priority	Status	Story Points (0)
<a href="#">ISL-24</a>	Register to IBM Cloud	 Story	 Medium	<span>DONE</span>	-
<a href="#">ISL-25</a>	Integrate Flask with Scoring Endpoint	 Story	 Medium	<span>DONE</span>	-
<a href="#">ISL-26</a>	Train ML Model on IBM	 Story	 Medium	<span>DONE</span>	-
<a href="#">ISL-27</a>	Deploy the Model	 Story	 Medium	<span>DONE</span>	-



- Meeting Notes
- ❖ 2022-10-20 Meeting notes



### Date

20 Oct 2022



### Participants

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#))



### Goals

- Familiarize team members with JIRA
- Start sprint - 1 and divide tasks



### Discussion topics

Time	Item	Presenter	Notes
6:15pm	JIRA	<a href="#">VIJAY SANKARNARAYANAN</a>	<ul style="list-style-type: none"> <li>• JIRA was discussed.</li> </ul>
7pm	Tasks	<a href="#">VIJAY SANKARNARAYANAN</a>	<ul style="list-style-type: none"> <li>• Tasks were assigned to team.</li> </ul>



### Action items

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) downloaded the dataset.
- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) Perform Univariate, Bivariate, Multivariate and Descriptive Analysis of the dataset.
- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) Perform Null checking, Dataset scaling and balancing, Split Dataset for Training and Testing.



### Decisions

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) decide to complete sprint - 1

❖ 2022-10-29 Meeting notes



**Date**

29 Oct 2022



**Participants**

- IBM Team (VIJAY SANKARNARAYANAN SHANKARARAMAN VS Sanjoosree B Shreya P S)



**Goals**

- Discuss the various ML Models
- Assign tasks to train the models



**Discussion topics**

Time	Item	Presenter	Notes
6:15pm	Tasks	<u>VIJAY SANKARNARAYANAN</u>	<ul style="list-style-type: none"><li>• Tasks were assigned.</li></ul>



**Action items**

- Shreya P S was tasked to train KNN Model
- VIJAY SANKARNARAYANAN was tasked to train XGBoost Model
- Sanjoosree B was tasked to train Decision Tree Model
- SHANKARARAMAN VS was tasked to train Random Forest Model



**Decisions**

- IBM Team (VIJAY SANKARNARAYANAN SHANKARARAMAN VS Sanjoosree B Shreya P S) decided tasks and models to train.

❖ 2022-11-04 Meeting notes



**Date**

04 Nov 2022



**Participants**

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B](#) [Shreya P S](#))



**Goals**

- Discuss Frontend and Backend for the Web App
- Familiarize team with HTML and Flask



**Discussion topics**

Time	Item	Presenter	Notes
6:15pm	Frontend and Backend	<a href="#">Shreya P S Sanjoosree B</a>	<ul style="list-style-type: none"><li>• UI for the App was decided</li></ul>



**Action items**

- [Sanjoosree B](#) and [Shreya P S](#) will work together to create the UI of the Web App and report to [VIJAY SANKARNARAYANAN](#)



**Decisions**

- [Sanjoosree B](#) and [Shreya P S](#) will work together on Web App UI

- 2022-11-18 Meeting notes



### Date

18 Nov 2022



### Participants

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#))



### Goals

- Set up IBM Cloud Accounts
- Train ML Model on the cloud
- Deploy Web App



### Discussion topics

Time	Item	Presenter	Notes
11:00am	IBM Cloud Account	<a href="#">IBM Team</a> ( <a href="#">VIJAY SANKARNARAYANAN</a> )	<ul style="list-style-type: none"> <li>• IBM Account was created for the team.</li> </ul>
12:15pm	ML Model	<a href="#">VIJAY SANKARNARAYANAN</a>	<ul style="list-style-type: none"> <li>• ML Model was trained use IBM Cloud</li> </ul>
1pm	Web App	<a href="#">IBM Team</a> ( <a href="#">VIJAY SANKARNARAYANAN</a> <a href="#">SHANKARARAMAN VS Sanjoosree B Shreya P S</a> )	<ul style="list-style-type: none"> <li>• Web App was deploy on IBM Cloud</li> </ul>
2pm	Project Documentation	<a href="#">SHANKARARAMAN VS</a>	<ul style="list-style-type: none"> <li>• Initiated Project Documentation</li> </ul>



### Action items

- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) registered with IBM Cloud and delpoyed Web App.
- [IBM Team](#) ([VIJAY SANKARNARAYANAN](#) [SHANKARARAMAN VS Sanjoosree B Shreya P S](#)) finishes Project Documentation

## 7. CODING & SOLUTIONING (Explain the features added in the project along with code)

### 7.1 Web Pages

Free-to access web pages created using Flask and HTML.

The following are the import necessary to create this:

```
import flask
import pickle
import pandas as pd
import numpy as np
import requests
```

We used Flask's routing method to render the templates for User perusal.

```
app = flask.Flask(__name__, template_folder='templates')
@app.route('/')
def main():
    return (flask.render_template('index.html'))

@app.route('/report')
def report():
    return (flask.render_template('report.html'))

@app.route('/jointreport')
def jointreport():
    return (flask.render_template('jointreport.html'))

if __name__ == '__main__':
    app.run(debug=True)
```

report.html and jointreport.html are debugging html templates.

We created aspects of the template for index.html as follows:

- Navigation bar

```
<div class="collapse navbar-collapse" id="navbarsExampleDefault">
  <ul class="navbar-nav ml-auto">
    <li class="nav-item">
      <a class="nav-link page-scroll" href="#header">HOME <span
class="sr-only">(current)</span></a>
    </li>
    <li class="nav-item">
      <a class="nav-link page-scroll" href="#Predict">PREDICT</a>
    </li>
    <li class="nav-item">
      <a class="nav-link page-scroll" href="#Insights">INSIGHTS</a>
    </li>
    <li class="nav-item">
```

```

        <a class="nav-link page-scroll" href="#contact">CONTACT</a>
      </li>
    </ul>
  </div>

```

- Data about the website for user convenience and assurance

```

<div class="row">
  <div class="col-lg-12">

    <!-- Card -->
    <div class="card">
      <span class="fa-stack">
        <span class="hexagon"></span>
        <i class="fas fa-binoculars fa-stack-1x"></i>
      </span>
      <div class="card-body">
        <h4 class="card-title">Data Analysis</h4>
        <p>
          &#8226 Shape: 613 x 13 | 1 column Target</br>
          &#8226 Data Source: IBM</br>
          &#8226 Platform: Jupyter & Google Colab</br>
          &#8226 Deployment: IBM Watson & IBM Cloud</br>
        </p>
      </div>
    </div>
    <!-- end of card -->

    <!-- Card -->
    <div class="card">
      <span class="fa-stack">
        <span class="hexagon"></span>
        <i class="fas fa-list-alt fa-stack-1x"></i>
      </span>
      <div class="card-body">
        <h4 class="card-title">Data Visualization</h4>
        <p>&#8226 Matplotlib</br>&#8226 Seaborn to
visualize.</br>
      </div>
    </div>
    <!-- end of card -->

    <!-- Card -->
    <div class="card">
      <span class="fa-stack">
        <span class="hexagon"></span>

```



```

        <li class="media">
            <i class="fas fa-square"></i>&nbsp;&nbsp;&nbsp;LoanAmount is also correlated with CoapplicantIncome</li>
        </ul>
    </div>
</li>
</ul>
<h5> Feature Engineering and using models XGBoost, KNN, Decision Tree, Random Forest</h5>
<p> After using Feature engineering with the introduction of some new features like
    <ul class="list-unstyled li-space-lg">
        <li><i class="fas fa-square"></i><strong> Total Income</strong>: As discussed during bivariate analysis we will combine the Applicant Income and Coapplicant Income. If the total income is high, chances of loan approval might also be high.</li>
        <li><i class="fas fa-square"></i><strong> EMI</strong>:is the monthly amount to be paid by the applicant to repay the loan. Idea behind making this variable is that people who have high EMI's might find it difficult to pay back the loan. We can calculate the EMI by taking the ratio of loan amount with respect to loan amount term.</li>
        <li><i class="fas fa-square"></i><strong> Balance Income</strong>:This is the income left after the EMI has been paid. Idea behind creating this variable is that if this value is high, the chances are high that a person will repay the loan and hence increasing the chances of loan approval.</li>
    </ul>

    </p>
    <ul class="list-unstyled li-space-lg">
        <li class="media">
            <i class="fas fa-square"></i>
            <div class="media-body">
                We can see that:
                <ul class="list-unstyled li-space-lg">
                    <li class="media"><strong> Credit_History</strong> is the most important feature followed by</li>
                    <li><strong> Balance Income</strong>,</li>
                    <li><strong> EMI</strong>,</li>
                    <li class="media"><strong> Total Income = ApplicantInc + Co-AppIncome</strong></li>
                </ul>
            </div>
        </li>
    </ul>

```



```

        </ul>

    </div> <!-- end of text-container -->
</div> <!-- end of col -->
</div> <!-- end of row -->
</div> <!-- end of container -->
</div>

```

- Redirection button to prediction environment

```
<div class="container">

    <div class="row">
        <div class="col-lg-6">

            <!-- Call Me Form -->
            <form id="callMeForm" data-toggle="validator" data-
focus="false">

                <div class="form-group">
                    <a type="submit" class="form-control-submit-button-1"
href="Loan_Application"><span style="font-size: 20px; color: black; ">Click Here
To Check Your Loan Eligibility</span ></a>
                </div>
            </form>
            <!-- end of call me form -->

        </div> <!-- end of col -->
    </div> <!-- end of row -->
</div>
```

- Contact Info

[illegible]

```

        <p class="white"><i class="fa fa-map-marker" aria-
hidden="true">&nbsp;&nbsp;&SSNCE</i></p>

    </div> <!-- end of text-container -->
</div> <!-- end of col -->
<div class="col-md-2">
    <div class="text-container">
        <h4>Tools Used</h4>
        <ul class="list-unstyled li-space-lg">
            <li>
                <a class="white" href="#">Python</a>
            </li>
            <li>
                <a class="white" href="#">Seaborn &amp;
Matplotlib</a>
            </li>
            <li class="media">
                <a class="white" href="#">Scikit-learn</a>
            </li>
            <li class="media">
                <a class="white" href="#">Flask</a>
            </li>
            <li class="media">
                <a class="white" href="#">Scikit-learn</a>
            </li>
        </ul>
    </div> <!-- end of text-container -->
</div> <!-- end of col -->

</div> <!-- end of row -->
</div> <!-- end of container -->
</div>

```

## 7.2 Prediction Environment

The prediction environment is described by three things:

- Prediction form in Loan\_Application.html:

```

<div id="Predict" class="ex-basic-2">
    <div class="container">
        <div class="row">
            <h4> Please Fill in the details to get your chances of Loan
Approval.</h4><br>
            <form style="width: 100%; " id="contactForm" data-
toggle="validator" data-focus="false" action="/Loan_Application" method="POST">
                <div class="col-lg-6">

```

```

        <div class="text-container">
            <!-- Contact Form -->
            <div class="form-group">
                <input name="genders_type" list="genders"
class="form-control-input" required select>
                <label class="label-control"
for="genders_type">Gender</label>
                <datalist id="genders">
                    <option value="MALE">
                    <option value="FEMALE">

                </datalist>
                <div class="help-block with-errors"></div>
            </div>

            <div class="form-group">
                <input name="marital_status" list="married"
class="form-control-input" required select>
                <label class="label-control"
for="marital_status"> Marital status of the applicant</label>
                <datalist id="married">
                    <option value="YES">
                    <option value="NO">

                </datalist>
                <div class="help-block with-errors"></div>
            </div>

            <div class="form-group">
                <input name="education_status" list="education"
class="form-control-input" required select>
                <label class="label-control"
for="education_status">Education level of the applicant</label>
                <datalist id="education">
                    <option value="GRADUATED">
                    <option value="NOT GRADUATED">

                </datalist>
                <div class="help-block with-errors"></div>
            </div>

            <div class="form-group">
                <input name="dependents" list="dependents_list"
class="form-control-input" required select>

```

```

        <label class="label-control"
for="dependents">Dependents: No. of people dependent on the applicant
(0,1,2,3+)</label>

        <datalist id="dependents_list">
            <option value="0">
            <option value="1">
            <option value="2">
            <option value="3+ ">
        </datalist>
        <div class="help-block with-errors"></div>
    </div>

    <!-- <div class="form-group">
        <input name="education_status" list="education"
class="form-control-input" required select>
        <label class="label-control"
for="education_status">Education level of the applicant (Graduated, Not
Graduated)</label>

        <datalist id="education">
            <option value="GRADUATED">
            <option value="NOT GRADUATED">

        </datalist>
        <div class="help-block with-errors"></div>
    </div> -->

    <div class="form-group">
        <input name="self_employment" list="employment"
class="form-control-input" required select>
        <label class="label-control"
for="self_employment"> Self-employed (Yes, No)</label>
        <datalist id="employment">
            <option value="YES">
            <option value="NO">

        </datalist>
        <div class="help-block with-errors"></div>
    </div>
</div> <!-- end of contact form -->
</div> <!-- end of text-container -->
<div class="col-lg-6">
    <div class="text-container">
        <!-- Contact Form -->
        <div class="form-group">

```

```

        <input name="applicantIncome" type="number"
min="0" max="100000" class="form-control-input" id="applicantIncome" required>
        <label class="label-control"
for="applicantIncome">Applicant Income: The amount of income the applicant
earns:</label>

        <div class="help-block with-errors"></div>
    </div>

    <div class="form-group">
        <input name="coapplicantIncome" type="number"
min="0" max="100000" class="form-control-input" id="coapplicantIncome" required>
        <label class="label-control"
for="coapplicantIncome">Co-applicant Income: The amount of income the co-
applicant earns:</label>

        <div class="help-block with-errors"></div>
    </div>

    <div class="form-group">
        <input name="loan_amnt" class="form-control-
input" type="number" min="500" max="40000" id="loan_amnt" required>
        <label class="label-control" for="loan_amnt">Loan
Amount:</label>

        <div class="help-block with-errors"></div>
    </div>

    <div class="form-group">
        <input name="term_d" class="form-control-input"
type="number" min="10" max="365" id="term_d" required>
        <label class="label-control" for="term_d">Loan
Amount Term: The no. of days over which the loan will be paid (in Days)</label>
        <div class="help-block with-errors"></div>
    </div>

    <div class="form-group">
        <input name="credit_history" list="crhist_list"
class="form-control-input" required select>
        <label class="label-control"
for="credit_history">Credit History (1- has all debts paid, 0- not paid)</label>
        <datalist id="crhist_list">
            <option value="0">
            <option value="1">
        </datalist>
        <div class="help-block with-errors"></div>
    </div>

```

```

        <div class="form-group">
            <input name="property_area" list="property_list"
class="form-control-input" required select>
            <label class="label-control"
for="property_area">Property_Area</label>
            <datalist id="property_list">
                <option value="RURAL">
                <option value="SEMIRURAL">
                <option value="URBAN">
            </datalist>
            <div class="help-block with-errors"></div>
        </div>
    </div> <!-- end of text-container -->
</div>
    <button type="submit" class="form-control-submit-button">MAKE
PREDICTION</button>
</form>
</div> <!-- end of container -->
<div class="result" align="center">
    {% if result %}
    {% for variable, value in original_input.items() %}
    <br><b>{{ variable }}</b> : {{ value }}
    {% endfor %}
    <br>
    <br> Loan Decision:
    <p style="font-size:20px">{{ result }}</p>
    {% endif %}
</div>
</div>
</div>

```

- API token for requesting prediction deployed model

```

API_KEY = "dxP1HCGL9lgecETNiZGb7KHLTBHt166ozvcz999j_ML8"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token',
data={"apikey":
    API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' +
mltoken}

```

- Route Function for the Prediction form:

```

@app.route("/Loan_Application", methods=['GET', 'POST'])
def Loan_Application():

```

```

if flask.request.method == 'GET':
    return (flask.render_template('Loan_Application.html'))

if flask.request.method == 'POST':

    genders_type = flask.request.form['genders_type']
    #marriage status as boolean YES: 1 , NO: 0
    marital_status = flask.request.form['marital_status']
    #Dependents: No. of people dependent on the applicant (0,1,2,3+)
    dependents = flask.request.form['dependents']

    #dependents = dependents_to_int[dependents.upper()]

    #education status as boolean Graduated, Not graduated.
    education_status = flask.request.form['education_status']
    #Self_Employed: If the applicant is self-employed or not (Yes, No)
    self_employment = flask.request.form['self_employment']
    #Applicant Income
    applicantIncome = float(flask.request.form['applicantIncome'] if
flask.request.form['applicantIncome'] else 0)
    #Co-Applicant Income
    coapplicantIncome = float(flask.request.form['coapplicantIncome'] if
flask.request.form['coapplicantIncome'] else 0)
    #loan amount as integer
    loan_amnt = float(flask.request.form['loan_amnt'] if
flask.request.form['loan_amnt'] else 0)
    #term as integer: from 10 to 365 days...
    term_d = int(flask.request.form['term_d'] if flask.request.form['term_d']
else 0)
    # credit_history
    credit_history = int(flask.request.form['credit_history'] if
flask.request.form['credit_history'] else 1)
    # property are
    property_area = flask.request.form['property_area']
    #property_area = property_area_to_int[property_area.upper()]

    #create original output dict
    output_dict = dict()
    output_dict['ApplicantIncome'] = applicantIncome
    output_dict['CoapplicantIncome'] = coapplicantIncome
    output_dict['LoanAmount'] = loan_amnt
    output_dict['Loan Amount Term']=term_d
    output_dict['Credit History'] = credit_history
    output_dict['Gender'] = 1 if genders_type=='MALE' else 0
    output_dict['Marital Status'] = 1 if marital_status=='YES' else 0

```

```

        output_dict['Education Level'] = 1 if education_status=='GRADUATED' else
0
        output_dict['Dependents_0'] = 1 if dependents=='0' else 0
        output_dict['Dependents_1'] = 1 if dependents=='1' else 0
        output_dict['Dependents_2'] = 1 if dependents=='2' else 0
        output_dict['Dependents_3+'] = 1 if dependents=='3+' else 0
        output_dict['Self Employment'] = 1 if self_employment=='YES' else 0
        output_dict['Property Area Rural'] = 1 if property_area=='RURAL' else 0
        output_dict['Property Area Semirural'] = 1 if property_area=='SEMIRURAL'
else 0
        output_dict['Property Area Urban'] = 1 if property_area=='URBAN' else 0

        df = pd.DataFrame([output_dict])

        df.ApplicantIncome = np.sqrt(df.ApplicantIncome)
        df.CoapplicantIncome = np.sqrt(df.CoapplicantIncome)
        df.LoanAmount = np.sqrt(df.LoanAmount)
        x = df.values.tolist()

        payload_scoring = {"input_data": [{"fields": [['ApplicantIncome',
'CoapplicantIncome', 'LoanAmount', 'Loan_Amount_Term', 'Credit_History',
'Gender', 'Married', 'Education', 'Dependents_0', 'Dependents_1', 'Dependents_2',
'Dependents_3+', 'Self_Employed', 'Property_Area_Rural',
'Property_Area_Semiurban', 'Property_Area_Urban']], "values": x}]}

        response_scoring = requests.post('https://us-
south.ml.cloud.ibm.com/ml/v4/deployments/17c96438-9f16-49ea-9f7d-
e90409d0e746/predictions?version=2022-11-18', json=payload_scoring,
            headers={'Authorization': 'Bearer ' + mltoken})
        print("Scoring response")
        print(response_scoring.json())
        pred = response_scoring.json()['predictions'][0]['values'][0][0]
        print(pred)
        if pred==1:
            res = '??Congratulations! your Loan Application has been Approved!??'
        else:
            res = '??Unfortunately your Loan Application has been Denied??'

        return flask.render_template('Loan_Application.html',
original_input=output_dict, result=res)

```



## 7.3 Deployments:

### Deployments

1 space

Activity Spaces

Filter by: All spaces Which deployment space are you looking for?

Name	Last modified	Your role	Collaborators	Tags	Online deployments	Jobs
loan_space	Nov 18, 2022, 10:53 AM	Admin	VS		6	0

### Assets

5 assets

All assets 5

Asset types

Models 5

Name	Last modified
knn_loan_approval_model Model	15 hours ago Service
xg_loan_approval_model Model	15 hours ago Service
dt_loan_approval_model Model	15 hours ago Service
rf_loan_approval_model Model	23 hours ago Service
loan_approval_model Model	1 day ago Service

## knn\_loan\_approval\_model

### Deployments

Model details

New deployment

DEPLOYMENT TYPES	1 Online Deployment(s)						
Online (1)	<table><thead><tr><th>Name</th><th>Status</th><th>Last modified</th></tr></thead><tbody><tr><td>knn_deploy</td><td>Deployed</td><td>Nov 18, 2022, 8:16 PM</td></tr></tbody></table>	Name	Status	Last modified	knn_deploy	Deployed	Nov 18, 2022, 8:16 PM
Name	Status	Last modified					
knn_deploy	Deployed	Nov 18, 2022, 8:16 PM					
Batch (0)							

## knn\_deploy

### API reference

Test

Direct link

Endpoint

`https://us-south.ml.cloud.ibm.com/ml/v4/deployments/17c96438-9f16-49ea-9f7d-e98409d0e746/predictions?version=2022-11-18`

Bearer <token>

IAM

Code snippets

cURL Java JavaScript Python Scala

```
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account.
API_KEY = "<your API key>"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey":
API_KEY, "grant_type": "urn:ibm:params:oauth:grant-type:apikey"})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

# NOTE: manually define and pass the array(s) of values to be scored in the next line
payload_scoring = {"input_data": [{"fields": [array_of_input_fields], "values": [array_of_values_to_be_scored, another_array_of_values_to_be_scored]}]}

response_scoring = requests.post('https://us-south.ml.cloud.ibm.com/ml/v4/deployments/17c96438-9f16-49ea-9f7d-e98409d0e746/predictions?version=2022-11-18', json=payload_scoring,
headers={'Authorization': 'Bearer ' + mltoken})
```

## 8. TESTING

### 8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
HomePage_TC_001	Functional	Home Page	User is able to view the website when he opens it	User must have stable internet connection	1.Open any browser 2.Follow the url link to reach the website 3.Verify if the website is being displayed		The browser must be displayed immediately	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankaraman VS
HomePage_TC_002	Functional	Home Page	Verify if the redirection from the home page to prediction page is successful on clicking click here to check loan eligibility button		1.Hover the mouse over the click here to check loan eligibility button 2.Hold down the mouse and click on the button once		The user should be navigated to the prediction page from the home page on clicking the button	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankaraman VS
PredictionPage_TC_003	Functional	Prediction page	Verify if the system throws an error message if all the fields of the form aren't filled	User must have navigated from the home page to prediction page	1.Enter the URL 2.Navigate to prediction page 3.Scroll down and click on make prediction button	1.Gender:No input 2.Marital status of the applicant :No input 3.Education level of the applicant:No input 4.Dependents: No. of people dependent on the applicant (0,1,2,3+):No input 5.Self-employed (Yes, No):No input 6.Applicant Income: The amount of income the applicant earns:No input 7.Co-applicant Income: The amount of income the co-applicant earns:No input 8.Loan Amount:No input 9.Loan Amount Term: The no. of days over which the loan will be paid (in Days):No input 10.Credit History (1- has all debts paid, 0- not paid):No input 11.Property_Area:No input	Application must display "Fill out this display" error message	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankaraman VS

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
PredictionPage_TC_004	Functional	Prediction page	Verify if the user is able to click on the make prediction button after filling out all the fields	All the fields must be filled	1.Enter the URL 2.Navigate to prediction page 3.Fill in all the fields with appropriate values 4.Scroll down and click on make prediction button	1.Gender:Male 2.Marital status of the applicant :YES 3.Education level of the applicant:GRADUATED 4.Dependents: No. of people dependent on the applicant (0,1,2,3+):2 5.Self-employed (Yes, No):YES 6.Applicant Income: The amount of income the applicant earns:8000 7.Co-applicant Income: The amount of income the co-applicant earns:4000 8.Loan Amount:500 9.Loan Amount Term: The no. of days over which the loan will be paid (in Days):360 10.Credit History (1- has all debts paid, 0- not paid):1 11.Property_Area:RURAL	Application should display the predicted result	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankararaman VS
PredictionPage_TC_005	Functional	Prediction page	Verify if the sytem throws an error message when a negative value is given as input to the numerical fields	User must have navigated from the home page to prediction page	1.Enter the URL 2.Navigate to prediction page 3.Fill in the numerical field values with negative values(below 0) 4.Scroll down and click on make prediction button	1.Gender:Male 2.Marital status of the applicant :YES 3.Education level of the applicant:GRADUATED 4.Dependents: No. of people dependent on the applicant (0,1,2,3+):2 5.Self-employed (Yes, No):YES 6.Applicant Income: The amount of income the applicant earns:-9 7.Co-applicant Income: The amount of income the co-applicant earns:-10 8.Loan Amount:-100 9.Loan Amount Term: The no. of days over which the loan will be paid (in Days):-9 10.Credit History (1- has all debts paid, 0- not paid):1 11.Property_Area:RURAL	Application should show "enter values above 0 "validation message.	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankararaman VS

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
PredictionPage_TC_006	Functional	Prediction page	Verify if the system throws an error when applicant income exceeds 100000 or when co applicant income exceeds 40000 or when the loan term exceeds 365 or if a loan amount is less than 500	User must have navigated from the home page to prediction page	1.Enter the URL 2.Navigate to prediction page 3.Fill in applicant income with a value greater than 100000. 4.Fill in co applicant income with a value greater than 40000 5.Fill in loan term with a value greater than 365 6.Fill in loan amount with a value less than 500 6.Scroll down and click on make prediction button	1.Gender:Male 2.Marital status of the applicant :YES 3.Education level of the applicant:GRADUATED 4.Dependents: No. of people dependent on the applicant (0,1,2,3+):2 5.Self-employed (Yes, No):YES 6.Applicant Income: The amount of income the applicant earns:20000000 7.Co-applicant Income: The amount of income the co-applicant earns:-6666660 8.Loan Amount:-50 9.Loan Amount Term: The no. of days over which the loan will be paid (in Days):-223 10.Credit History (1- has all debts paid, 0- not paid):1 11.Property_Area:RURAL password: Testing123678686786876876	Application should show incorrect credentials validation message.	Working as expected	Pass				Shreya P S, Sanjoosree, Vijay Sankamarayanan, Shankaraman VS

## 8.2 User Acceptance Testing

### 1. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity1	Severity2	Severity3	Severity4	Subtotal
By Design	10	0	0	9	19
Duplicate	1	0	0	2	3
External	2	0	0	1	3
Fixed	11	0	0	10	21
Not Reproduced	0	0	0	0	0
Skipped	0	0	0	0	0
Won'tFix	0	0	0	0	0
Totals	24	0	0	22	46

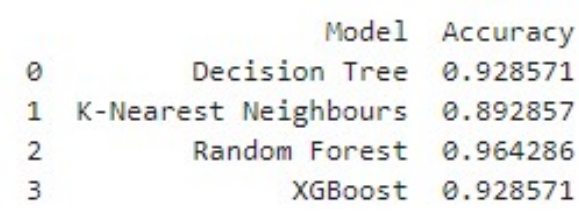

## 2. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	0	0	0	0
Client Application	5	0	0	5
Security	1	0	0	1
Outsource Shipping	0	0	0	0
Exception Reporting	1	0	0	1
Final Report Output	1	0	0	1
Version Control	0	0	0	0

## 9. RESULTS

### 9.1 Performance Metrics

S.No.	Parameter	Values	Screenshot															
1.	Metrics	Accuracy Scores- Decision tree: 93% KNN :89% Random Forest:96% XGBoost:92%	 <table><thead><tr><th></th><th>Model</th><th>Accuracy</th></tr></thead><tbody><tr><td>0</td><td>Decision Tree</td><td>0.928571</td></tr><tr><td>1</td><td>K-Nearest Neighbours</td><td>0.892857</td></tr><tr><td>2</td><td>Random Forest</td><td>0.964286</td></tr><tr><td>3</td><td>XGBoost</td><td>0.928571</td></tr></tbody></table>		Model	Accuracy	0	Decision Tree	0.928571	1	K-Nearest Neighbours	0.892857	2	Random Forest	0.964286	3	XGBoost	0.928571
	Model	Accuracy																
0	Decision Tree	0.928571																
1	K-Nearest Neighbours	0.892857																
2	Random Forest	0.964286																
3	XGBoost	0.928571																
2.	Tune the Model	Hyperparameter Tuning - GridSearchCV Validation Method – Ensembling and Voting	 <pre>params_xg = {'max_depth':np.arange(3,10)} xg_gs = GridSearchCV(XGBClassifier(),params_xg,cv=5) xg_gs.fit(X_train,y_train)  GridSearchCV(cv=5, estimator=XGBClassifier(),               param_grid={'max_depth': array([3, 4, 5, 6, 7, 8, 9])})  print(xg_gs.best_estimator_)  XGBClassifier(max_depth=6)</pre>															

## 10. ADVANTAGES & DISADVANTAGES

### 10.1 Advantages

- Solves the loan approval problem faster and more effectively.
- ML model that is used has high prediction accuracy.



- Enables users to automate loan approval to make their easier.
- Can cater to many users as well as customers at once

## 10.2 Disadvantages

- Limited by the parameters list that was used to train the ML model.
- Requires modification of input data which can reduce reliability.
- Relies on the cloud deployed ML model which can affect availability.

## 11. CONCLUSION

Smart Lender Application was built to solve the problem of checking whether a customer is eligible to apply for a loan or not. This application was built, successfully tested for bugs and finally deployed using the cloud infrastructure of IBM.

## 12. FUTURE SCOPE

This application can be improved upon to give better accuracy, increase the number of input parameters for the customer to choose from, provide better reliability and security via cloud platforms and increase automation efficiency.

## 13. APPENDIX

### Source Code

/templates/index.html:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

  <!-- SEO Meta Tags -->
  <meta name="author" content="Ayoub Berdeddouch">

  <!-- OG Meta Tags to improve the way the post looks when you share the page on LinkedIn, Facebook, Google+ -->
  <meta property="og:site_name" content="" /> <!-- website name -->
  <meta property="og:site" content="" /> <!-- website link -->
  <meta property="og:title" content="" /> <!-- title shown in the actual shared post -->
  <meta property="og:description" content="" /> <!-- description shown in the actual shared post -->
  <meta property="og:image" content="" /> <!-- image link, make sure it's jpg -->
->
```

```

    <meta property="og:url" content="" /> <!-- where do you want your post to
link to -->
    <meta property="og:type" content="article" />

    <!-- Website Title -->
    <title>Loan Application</title>

    <!-- Styles -->
    <link
href="https://fonts.googleapis.com/css?family=Montserrat:500,700&display=swap&sub
set=latin-ext" rel="stylesheet">
    <link
href="https://fonts.googleapis.com/css?family=Open+Sans:400,400i,600&display=swap
&subset=latin-ext" rel="stylesheet">
    <link href="{{url_for('static', filename='css/styles.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/fontawesome-all.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/swiper.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/magnific-popup.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/bootstrap.css')}}"
rel="stylesheet">

    <!-- Favicon -->
    <link rel="icon" href="{{url_for('static', filename='images/logo.svg')}}">
</head>
<body data-spy="scroll" data-target=".fixed-top">

    <!-- Preloader -->
    <div class="spinner-wrapper">
        <div class="spinner">
            <div class="bounce1"></div>
            <div class="bounce2"></div>
            <div class="bounce3"></div>
        </div>
    </div>
    <!-- end of preloader -->

```



```

<!-- Navbar -->
<nav class="navbar navbar-expand-md navbar-dark navbar-custom fixed-top">
  <!-- Text Logo - Use this if you don't have a graphic logo -->
  <!-- <a class="navbar-brand logo-text page-scroll"
href="index.html">Aria</a> -->
  <!-- Image Logo -->
  <a class="navbar-brand logo-image" href="/"></a>

  <!-- Mobile Menu Toggle Button -->
  <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarsExampleDefault" aria-controls="navbarsExampleDefault" aria-
expanded="false" aria-label="Toggle navigation">
    <span class="navbar-toggler-awesome fas fa-bars"></span>
    <span class="navbar-toggler-awesome fas fa-times"></span>
  </button>
  <!-- end of mobile menu toggle button -->

  <div class="collapse navbar-collapse" id="navbarsExampleDefault">
    <ul class="navbar-nav ml-auto">
      <li class="nav-item">
        <a class="nav-link page-scroll" href="#header">HOME <span
class="sr-only">(current)</span></a>
      </li>
      <li class="nav-item">
        <a class="nav-link page-scroll" href="#Predict">PREDICT</a>
      </li>
      <li class="nav-item">
        <a class="nav-link page-scroll" href="#Insights">INSIGHTS</a>
      </li>
      <li class="nav-item">
        <a class="nav-link page-scroll" href="#contact">CONTACT</a>
      </li>
    </ul>
  </div>
</nav> <!-- end of navbar -->
<!-- end of navbar -->

<!-- Header -->
<header id="header" class="header">
  <div class="header-content">
    <div class="container">
      <div class="row">
        <div class="col-lg-12">

```

```

        <div class="text-container">
            <h1>Loan Data <span id="js-rotating"> Analysis,
Prediction, Visualization</span></h1>
            <p class="p-heading p-large"></p>
            <a class="btn-solid-lg page-scroll"
href="#Predict">Predict Approval</a>
            <!-- <a class="btn-solid-lg page-scroll"
href="#Visualize">Visualize Data</a> -->

        </div>
    </div> <!-- end of col -->
</div> <!-- end of row -->
</div> <!-- end of container -->
</div> <!-- end of header-content -->
</header> <!-- end of header -->
<!-- end of header -->

<!-- Description -->
<div id="Predict" class="cards-1">
    <div class="container">
        <div class="row">
            <div class="col-lg-12">

                <!-- Card -->
                <div class="card">
                    <span class="fa-stack">
                        <span class="hexagon"></span>
                        <i class="fas fa-binoculars fa-stack-1x"></i>
                    </span>
                    <div class="card-body">
                        <h4 class="card-title">Data Analysis</h4>
                        <p>
                            &#8226 Shape: 613 x 13 | 1 column Target</br>
                            &#8226 Data Source: IBM</br>
                            &#8226 Platform: Jupyter & Google Colab</br>
                            &#8226 Deployment: IBM Watson & IBM Cloud</br>
                        </p>
                    </div>
                </div>
            </div>
            <!-- end of card -->

            <!-- Card -->
            <div class="card">
                <span class="fa-stack">
                    <span class="hexagon"></span>

```

```

        <i class="fas fa-list-alt fa-stack-1x"></i>
    </span>
    <div class="card-body">
        <h4 class="card-title">Data Visualization</h4>
        <p># Matplotlib<br/># Seaborn to
visualize.</br>
    </div>
</div>
<!-- end of card -->

<!-- Card -->
<div class="card">
    <span class="fa-stack">
        <span class="hexagon"></span>
        <i class="fas fa-chart-pie fa-stack-1x"></i>
    </span>
    <div class="card-body">
        <h4 class="card-title">Main Goal</h4>
        <p># Get your loan application approval chances
by providing few necessary informations.</p>
    </div>
</div>
<!-- end of card -->

</div> <!-- end of col -->
</div> <!-- end of row -->
</div> <!-- end of container -->
</div> <!-- end of cards-1 -->
<!-- end of description -->
<!-- Intro -->
<div >
    <!-- Predict -->
    <div class="container">
        <div class="row">
            <div class="col-lg-6">

                <!-- Call Me Form -->
                <form id="callMeForm" data-toggle="validator" data-
focus="false">

                    <div class="form-group">
                        <a type="submit" class="form-control-submit-button-1"
href="Loan_Application"><span style="font-size: 20px; color: black; ">Click Here
To Check Your Loan Eligibility</span ></a>
                    </div>
                </form>

```

```

        <!-- end of call me form -->

    </div> <!-- end of col -->
</div> <!-- end of row -->
</div> <!-- end of container -->
<!-- end of call me -->
</div> <!-- end of basic-1 -->
<!-- end of intro -->

<div id="Insights" class="counter">
    <div class="container">
        <div class="row">
            <div class="col-lg-5 col-xl-6">
                <div>
                    
                    
                </div> <!-- end of image-container -->
            </div> <!-- end of col -->
            <div class="col-lg-7 col-xl-6">
                <div class="text-container">
                    <div class="section-title"><span class="mod-title">Few
Insights.</span></div>
                    <p>ML System tries to predict the people who can be
granted loans or need to be rejected</p>
                    <ul class="list-unstyled li-space-lg">
                        <li class="media">
                            <div class="media-body">
                                We see that the most correlate variables are:
                                <ul class="list-unstyled li-space-lg">
                                    <li class="media">
                                        <i class="fas fa-square"></i>
                                        &nbsp;&nbsp;&nbsp;ApplicantIncome with
LoanAmount
                                    </li>
                                    <li class="media">
                                        <i class="fas fa-
square"></i>&nbsp;&nbsp;&nbsp;Credit_History with Loan_Status.</li>
                                    <li class="media">
                                        <i class="fas fa-
square"></i>&nbsp;&nbsp;&nbsp;LoanAmount is also correlated with CoapplicantIncome</li>
                                </ul>

```



[illegible]

```

        </div> <!-- end of text-container -->
    </div> <!-- end of col -->

    </div> <!-- end of row -->
</div> <!-- end of container -->
</div> <!-- end of footer -->
<!-- end of footer -->

<!-- Scripts -->
<script src="{{url_for('static', filename='js/jquery.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static', filename='js/popper.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static', filename='js/bootstrap.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static',
filename='js/jquery.easing.min.js')}}"></script> <!-- jQuery for Bootstrap's
JavaScript plugins -->
<script src="{{url_for('static', filename='js/jquery.magnific-
popup.js')}}"></script> <!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static', filename='js/morphext.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static',
filename='js/isotope.pkgd.min.js')}}"></script> <!-- jQuery for Bootstrap's
JavaScript plugins -->
<script src="{{url_for('static', filename='js/validator.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
<script src="{{url_for('static', filename='js/scripts.js')}}"></script> <!--
jQuery for Bootstrap's JavaScript plugins -->
</body>
</html>

```

/templates/Loan\_Application.html:

```

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-
to-fit=no">

    <!-- OG Meta Tags to improve the way the post looks when you share the page
on LinkedIn, Facebook, Google+ -->

```

```

    <meta property="og:site_name" content="" /> <!-- website name -->
    <meta property="og:site" content="" /> <!-- website link -->
    <meta property="og:title" content="" /> <!-- title shown in the actual shared
post -->
    <meta property="og:description" content="" /> <!-- description shown in the
actual shared post -->
    <meta property="og:image" content="" /> <!-- image link, make sure it's jpg -
->
    <meta property="og:url" content="" /> <!-- where do you want your post to
link to -->
    <meta property="og:type" content="article" />

    <!-- Website Title -->
    <title>Loan Application Form</title>
    <!-- Styles -->
    <link
href="https://fonts.googleapis.com/css?family=Montserrat:500,700&display=swap&sub
set=latin-ext" rel="stylesheet">
    <link
href="https://fonts.googleapis.com/css?family=Open+Sans:400,400i,600&display=swap
&subset=latin-ext" rel="stylesheet">
    <link href="{{url_for('static', filename='css/styles.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/fontawesome-all.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/swiper.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/magnific-popup.css')}}"
rel="stylesheet">
    <link href="{{url_for('static', filename='css/bootstrap.css')}}"
rel="stylesheet">

    <!-- Favicon -->
    <link rel="icon" href="{{url_for('static', filename='images/logo.svg')}}">
</head>
<body data-spy="scroll" data-target=".fixed-top">

    <!-- Preloader -->
    <div class="spinner-wrapper">
        <div class="spinner">
            <div class="bounce1"></div>
            <div class="bounce2"></div>
            <div class="bounce3"></div>
        </div>

```



```

</div>
<!-- end of preloader -->

<!-- Navbar -->
<nav class="navbar navbar-expand-md navbar-dark navbar-custom fixed-top">
  <!-- Text Logo - Use this if you don't have a graphic logo -->
  <!-- <a class="navbar-brand logo-text page-scroll"
href="index.html">Aria</a> -->

  <!-- Image Logo -->
  <a class="navbar-brand logo-image" href="/"></a>

  <!-- Mobile Menu Toggle Button -->
  <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarsExampleDefault" aria-controls="navbarsExampleDefault" aria-
expanded="false" aria-label="Toggle navigation">
    <span class="navbar-toggler-awesome fas fa-bars"></span>
    <span class="navbar-toggler-awesome fas fa-times"></span>
  </button>
  <!-- end of mobile menu toggle button -->

  <nav class="navbar navbar-expand-md navbar-dark navbar-custom fixed-
top">
    <!-- Text Logo - Use this if you don't have a graphic logo -->
    <!-- <a class="navbar-brand logo-text page-scroll"
href="index.html">Aria</a> -->

    <!-- Image Logo -->
    <a class="navbar-brand logo-image" href="/"></a>

    <!-- Mobile Menu Toggle Button -->
    <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarsExampleDefault" aria-controls="navbarsExampleDefault" aria-
expanded="false" aria-label="Toggle navigation">
      <span class="navbar-toggler-awesome fas fa-bars"></span>
      <span class="navbar-toggler-awesome fas fa-times"></span>
    </button>
    <!-- end of mobile menu toggle button -->

    <div class="collapse navbar-collapse" id="navbarsExampleDefault">
      <ul class="navbar-nav ml-auto">
        <li class="nav-item">

```

```

        <a class="nav-link page-scroll" href="#header">HOME <span
class="sr-only">(current)</span></a>
    </li>
    <li class="nav-item">
        <a class="nav-link page-scroll" href="#Predict">PREDICT</a>
    </li>
    <!-- <li class="nav-item">
        <a class="nav-link page-scroll" href="report">VISUALIZE</a>
    </li> -->
    <li class="nav-item">
        <a class="nav-link page-scroll" href="#Insights">INSIGHTS</a>
    </li>
    <li class="nav-item">
        <a class="nav-link page-scroll" href="#contact">CONTACT</a>
    </li>
</ul>

</div>
</nav> <!-- end of navbar -->
</nav> <!-- end of navbar -->

<!-- end of navbar -->

<!-- Header -->
<header id="header" class="ex-header">
    <div class="container">
        <div class="row">
            <div class="col-lg-12">
                <h1>Loan Application</h1>
            </div> <!-- end of col -->
        </div> <!-- end of row -->
    </div> <!-- end of container -->
</header> <!-- end of ex-header -->
<!-- end of header -->

<!-- Breadcrumbs -->
<div class="ex-basic-1">
    <div class="container">
        <div class="row">
            <div class="col-lg-12">
                <div class="breadcrumbs">
                    <a href="/">Home</a><i class="fa fa-angle-double-
right"></i><span>Predict Loan Application Approval</span>

```

```

        </div> <!-- end of breadcrumbs -->
    </div> <!-- end of col -->
</div> <!-- end of row -->
</div> <!-- end of container -->
</div> <!-- end of ex-basic-1 -->
<!-- end of breadcrumbs -->

<!-- Terms Content -->
<div id="Predict" class="ex-basic-2">
    <div class="container">
        <div class="row">
            <h4> Please Fill in the details to get your chances of Loan
Approval.</h4><br>
            <form style="width: 100%; " id="contactForm" data-
toggle="validator" data-focus="false" action="/Loan_Application" method="POST">
                <div class="col-lg-6">
                    <div class="text-container">
                        <!-- Contact Form -->
                        <div class="form-group">
                            <input name="genders_type" list="genders"
class="form-control-input" required select>
                                <label class="label-control"
for="genders_type">Gender</label>
                                <datalist id="genders">
                                    <option value="MALE">
                                    <option value="FEMALE">

                                </datalist>
                                <div class="help-block with-errors"></div>
                            </div>

                            <div class="form-group">
                                <input name="marital_status" list="married"
class="form-control-input" required select>
                                    <label class="label-control"
for="marital_status"> Marital status of the applicant</label>
                                    <datalist id="married">
                                        <option value="YES">
                                        <option value="NO">

                                    </datalist>
                                    <div class="help-block with-errors"></div>
                                </div>

```

```

        <div class="form-group">
            <input name="education_status" list="education"
class="form-control-input" required select>
                <label class="label-control"
for="education_status">Education level of the applicant</label>
                <datalist id="education">
                    <option value="GRADUATED">
                    <option value="NOT GRADUATED">

                </datalist>
                <div class="help-block with-errors"></div>
            </div>

            <div class="form-group">
                <input name="dependents" list="dependents_list"
class="form-control-input" required select>
                <label class="label-control"
for="dependents">Dependents: No. of people dependent on the applicant
(0,1,2,3+)</label>

                <datalist id="dependents_list">
                    <option value="0">
                    <option value="1">
                    <option value="2">
                    <option value="3+ ">
                </datalist>
                <div class="help-block with-errors"></div>
            </div>

            <!-- <div class="form-group">
                <input name="education_status" list="education"
class="form-control-input" required select>
                <label class="label-control"
for="education_status">Education level of the applicant (Graduated, Not
Graduated)</label>

                <datalist id="education">
                    <option value="GRADUATED">
                    <option value="NOT GRADUATED">

                </datalist>
                <div class="help-block with-errors"></div>
            </div> -->

            <div class="form-group">
                <input name="self_employment" list="employment"
class="form-control-input" required select>

```

```

        <label class="label-control"
for="self_employment"> Self-employed (Yes, No)</label>
        <datalist id="employment">
            <option value="YES">
            <option value="NO">

        </datalist>
        <div class="help-block with-errors"></div>
    </div>
</div> <!-- end of contact form -->
</div> <!-- end of text-container -->
<div class="col-lg-6">
    <div class="text-container">
        <!-- Contact Form -->
        <div class="form-group">
            <input name="applicantIncome" type="number"
min="0" max="100000" class="form-control-input" id="applicantIncome" required>
            <label class="label-control"
for="applicantIncome">Applicant Income: The amount of income the applicant
earns:</label>

            <div class="help-block with-errors"></div>
        </div>

        <div class="form-group">
            <input name="coapplicantIncome" type="number"
min="0" max="100000" class="form-control-input" id="coapplicantIncome" required>
            <label class="label-control"
for="coapplicantIncome">Co-applicant Income: The amount of income the co-
applicant earns:</label>

            <div class="help-block with-errors"></div>
        </div>

        <div class="form-group">
            <input name="loan_amnt" class="form-control-
input" type="number" min="500" max="40000" id="loan_amnt" required>
            <label class="label-control" for="loan_amnt">Loan
Amount:</label>

            <div class="help-block with-errors"></div>
        </div>
        <div class="form-group">
            <input name="term_d" class="form-control-input"
type="number" min="10" max="365" id="term_d" required>
            <label class="label-control" for="term_d">Loan
Amount Term: The no. of days over which the loan will be paid (in Days)</label>
            <div class="help-block with-errors"></div>
        </div>
    </div>

```

```

        </div>

        <div class="form-group">
            <input name="credit_history" list="crhist_list"
class="form-control-input" required select>
            <label class="label-control"
for="credit_history">Credit History (1- has all debts paid, 0- not paid)</label>
            <datalist id="crhist_list">
                <option value="0">
                <option value="1">
            </datalist>
            <div class="help-block with-errors"></div>
        </div>

        <div class="form-group">
            <input name="property_area" list="property_list"
class="form-control-input" required select>
            <label class="label-control"
for="property_area">Property_Area</label>
            <datalist id="property_list">
                <option value="RURAL">
                <option value="SEMIRURAL">
                <option value="URBAN">
            </datalist>
            <div class="help-block with-errors"></div>
        </div>
    </div> <!-- end of text-container -->
</div>
    <button type="submit" class="form-control-submit-button">MAKE
PREDICTION</button>
</form>
</div> <!-- end of container -->
<div class="result" align="center">
    {% if result %}
    {% for variable, value in original_input.items() %}
    <br><b>{{ variable }}</b> : {{ value }}
    {% endfor %}
    <br>
    <br> Loan Decision:
    <p style="font-size:20px">{{ result }}</p>
    {% endif %}
</div>
</div>
</div> <!-- end of ex-basic -->

```

```

<!-- end of terms content -->
<!-- Details 2 -->
<div id="Insights" class="tabs">
    <div class="row">

        <div class="area-1">

            <div class="tabs-container">

                <!-- Tabs Links -->
                <ul class="nav nav-tabs" id="ariaTabs" role="tablist">
                    <li class="nav-item">
                        <a class="nav-link active" id="nav-tab-1" data-
toggle="tab" href="#tab-1" role="tab" aria-controls="tab-1" aria-
selected="true"><i class="fas fa-th"></i>F1 SCORE</a>
                    </li>
                    <li class="nav-item">
                        <a class="nav-link" id="nav-tab-2" data-toggle="tab"
href="#tab-2" role="tab" aria-controls="tab-2" aria-selected="false"><i
class="fas fa-th"></i>ROC AUC</a>
                    </li>

                </ul>
                <!-- end of tabs links -->

                <!-- Tabs Content -->
                <div class="tab-content" id="ariaTabsContent">

                    <!-- Tab -->
                    <div class="tab-pane fade show active" id="tab-1"
role="tabpanel" aria-labelledby="tab-1">
                        <h4>F1 Score</h4>
                        <p>The following graph shows the F1 SCORE for Logistic
Regression Machine Learning Model. </p>

                        <!-- Progress Bars -->
                        <div class="col-lg-5 col-xl-6">
                            <div class="image-container">
                                
                            </div> <!-- end of image-container -->
                        </div> <!-- end of col -->
                    </div> <!-- end of progress bars -->
                </div>
            </div>
        </div>
    </div>

```

```

        </div> <!-- end of tab-pane -->
        <!-- end of tab -->

        <!-- Tab -->
        <div class="tab-pane fade" id="tab-2" role="tabpanel" aria-
labelledby="tab-2">
            <h4>ROC AUC Score</h4>
            <p>The following graph shows the ROC AUC Curve for
Logistic Regression Machine Learning Model. It gives the best AUC.</p>

            <!-- Progress Bars -->
            <div class="col-lg-5 col-xl-6">
                <div class="image-container">
                    
                </div> <!-- end of image-container -->
            </div> <!-- end of col -->
            <!-- end of progress bars -->

        </div> <!-- end of tab-pane -->
        <!-- end of tab -->

        <!-- end of tab -->

    </div> <!-- end of tab-content -->
    <!-- end of tabs content -->

</div> <!-- end of tabs-container -->
</div>
<div class="area-2">

    <!-- <div class="tabs-container"> -->

        <!-- Tabs Links -->
        <!-- <ul class="nav nav-tabs" id="ariaTabs" role="tablist">
            <li class="nav-item">
                <a class="nav-link active" id="nav-tab-1" data-
toggle="tab" href="#tab-3" role="tab" aria-controls="tab-3" aria-
selected="true"><i class="fas fa-th"></i>Features</a>
            </li>
        </ul> -->

```



```

        </ul> -->
        <!-- end of tabs links -->

        <!-- Tabs Content -->
        <!-- <div class="tab-content" id="ariaTabsContent"> -->

                <!-- Tab -->
                <!-- <div class="tab-pane fade show active" id="tab-3"
role="tabpanel" aria-labelledby="tab-3">
                        <h4>Random Forest Feature Importance After Feature
Engineering</h4>
                                <p>The following graph gives the feature importance to
predict the Loan Application Approval.</p> -->

                                <!-- Progress Bars -->
                                <!-- <div class="col-lg-5 col-xl-6">
                                <div class="image-container">
                                         -->

                                <!-- </div> end of image-container -->
                                <!-- </div> end of col -->
                                <!-- end of progress bars -->

                                <!-- </div> end of tab-pane -->
                                <!-- end of tab -->

        </div> <!-- end of tab-content -->
        <!-- end of tabs content -->

        <!-- </div> end of tabs-container -->
</div>
</div>
</div> <!-- end of tabs -->
<!-- end of details 2 -->
<br>
<br>
<br>
<br>
<br>
<br>
<br>

```

[illegible]

```

        </li>
        <li class="media">
            <a class="white" href="#">Flask</a>
        </li>
        <li class="media">
            <a class="white" href="#">Scikit-learn</a>
        </li>
    </ul>
</div> <!-- end of text-container -->
</div> <!-- end of col -->

</div> <!-- end of row -->
</div>
</div> <!-- end of footer -->
<!-- end of footer -->

<!-- end of copyright -->
<!-- end of copyright -->
<!-- Scripts -->
    <script src="{{url_for('static', filename='js/jquery.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static', filename='js/popper.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static', filename='js/bootstrap.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static',
filename='js/jquery.easing.min.js')}}"></script> <!-- jQuery for Bootstrap's
JavaScript plugins -->
    <script src="{{url_for('static', filename='js/jquery.magnific-
popup.js')}}"></script> <!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static', filename='js/morphext.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static',
filename='js/isotope.pkgd.min.js')}}"></script> <!-- jQuery for Bootstrap's
JavaScript plugins -->
    <script src="{{url_for('static', filename='js/validator.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static', filename='js/scripts.js')}}"></script> <!--
jQuery for Bootstrap's JavaScript plugins -->
    <script src="{{url_for('static', filename='js/swiper.min.js')}}"></script>
<!-- jQuery for Bootstrap's JavaScript plugins -->
</body>

```

```
</html>
```

```
/static/css/styles.css:
```

```
/* Template: Aria - Business HTML Landing Page Template  
   Author: Inovatik  
   Created: Jul 2019  
   Description: Master CSS file  
*/
```

```
/*****
```

```
Table Of Contents:
```

```
01. General Styles  
02. Preloader  
03. Navigation  
04. Header  
05. Intro  
06. Description  
07. Services  
08. Details 1  
09. Details 2  
10. Testimonials  
11. Call Me  
12. Projects  
13. Project Lightboxes  
14. Team  
15. About  
16. Contact  
17. Footer  
18. Copyright  
19. Back To Top Button  
20. Extra Pages  
21. Media Queries
```

```
*****/
```

```
/*****
```

```
Colors:
```

```
- Backgrounds - light gray #fbfbfb  
- Background - dark blue #153e52  
- Backgrounds navbar, footer - dark gray #113448  
- Buttons, bullets, icons - green #14bf98  
- Headings text - black #484a46  
- Body text - gray #787976
```

```
- Body text - light gray #dfe5ec
*****/

/*****/
/*      01. General Styles      */
/*****/
body,
html {
    width: 100%;
    height: 100%;
}

body, p {
    color: #787976;
    font: 400 1rem/1.5625rem "Open Sans", sans-serif;
}

.p-large {
    font: 400 1.125rem/1.625rem "Open Sans", sans-serif;
}

.p-small {
    font: 400 0.875rem/1.375rem "Open Sans", sans-serif;
}

.p-heading {
    margin-bottom: 3.5rem;
    text-align: center;
}

.li-space-lg li {
    margin-bottom: 0.375rem;
}

.indent {
    padding-left: 1.25rem;
}

h1 {
    color: #484a46;
    font: 700 2.5rem/3rem "Montserrat", sans-serif;
}

h2 {
```

```
    color: #484a46;
    font: 700 1.75rem/2.125rem "Montserrat", sans-serif;
}

h3 {
    color: #484a46;
    font: 700 1.375rem/1.75rem "Montserrat", sans-serif;
}

h4 {
    color: #484a46;
    font: 700 1.25rem/1.625rem "Montserrat", sans-serif;
}

h5 {
    color: #484a46;
    font: 700 1.125rem/1.5rem "Montserrat", sans-serif;
}

h6 {
    color: #484a46;
    font: 700 1rem/1.375rem "Montserrat", sans-serif;
}

a {
    color: #787976;
    text-decoration: underline;
}

a:hover {
    color: #787976;
    text-decoration: underline;
}

a.green {
    color: #14bf98;
}

a.white,
.white {
    color: #dfe5ec;
}

.testimonial-text {
    font-style: italic;
}
```

```
}

.testimonial-author {
  font: 700 1rem/1.375rem "Montserrat", sans-serif;
}

strong {
  color: #484a46;
}

.section-title {
  color: #14bf98;
  font: 500 0.8125rem/1.125rem "Montserrat", sans-serif;
}

.mod-title {
  color: #14bf98;
  font-size: xx-large;
}

.btn-solid-reg {
  display: inline-block;
  padding: 1.1875rem 1.875rem 1.1875rem 1.875rem;
  border: 0.125rem solid #14bf98;
  border-radius: 0.25rem;
  background-color: #14bf98;
  color: #fff;
  font: 700 0.75rem/0 "Montserrat", sans-serif;
  text-decoration: none;
  transition: all 0.2s;
}

.btn-solid-reg:hover {
  background-color: transparent;
  color: #14bf98;
  text-decoration: none;
}

.btn-solid-lg {
  display: inline-block;
  padding: 1.375rem 2.125rem 1.375rem 2.125rem;
  border: 0.125rem solid #14bf98;
  border-radius: 0.25rem;
  background-color: #14bf98;
  color: #fff;
}
```

```
font: 700 0.75rem/0 "Montserrat", sans-serif;
text-decoration: none;
transition: all 0.2s;
}

.btn-solid-lg:hover {
  background-color: transparent;
  color: #14bf98;
  text-decoration: none;
}

.btn-outline-reg {
  display: inline-block;
  padding: 1.1875rem 1.875rem 1.1875rem 1.875rem;
  border: 0.125rem solid #787976;
  border-radius: 0.25rem;
  background-color: transparent;
  color: #787976;
  font: 700 0.75rem/0 "Montserrat", sans-serif;
  text-decoration: none;
  transition: all 0.2s;
}

.btn-outline-reg:hover {
  background-color: #787976;
  color: #fff;
  text-decoration: none;
}

.btn-outline-lg {
  display: inline-block;
  padding: 1.375rem 2.125rem 1.375rem 2.125rem;
  border: 0.125rem solid #787976;
  border-radius: 0.25rem;
  background-color: transparent;
  color: #787976;
  font: 700 0.75rem/0 "Montserrat", sans-serif;
  text-decoration: none;
  transition: all 0.2s;
}

.btn-outline-lg:hover {
  background-color: #787976;
  color: #fff;
  text-decoration: none;
}
```



```
}

.btn-outline-sm {
  display: inline-block;
  padding: 1rem 1.625rem 0.9375rem 1.625rem;
  border: 0.125rem solid #787976;
  border-radius: 0.25rem;
  background-color: transparent;
  color: #787976;
  font: 700 0.75rem/0 "Montserrat", sans-serif;
  text-decoration: none;
  transition: all 0.2s;
}

.btn-outline-sm:hover {
  background-color: #787976;
  color: #fff;
  text-decoration: none;
}

.form-group {
  position: relative;
  margin-bottom: 1.25rem;
}

.form-group.has-error.has-danger {
  margin-bottom: 0.625rem;
}

.form-group.has-error.has-danger .help-block.with-errors ul {
  margin-top: 0.375rem;
}

.label-control {
  position: absolute;
  top: 0.61rem;
  left: 1.375rem;
  color: black;
  opacity: 1;
  font: 350 0.700rem/1.375rem "Open Sans", sans-serif;
  cursor: text;
  transition: all 0.2s ease;
}
```

```

/* IE10+ hack to solve lower label text position compared to the rest of the
browsers */
@media screen and (-ms-high-contrast: active), screen and (-ms-high-contrast:
none) {
    .label-control {
        top: 0.9375rem;
    }
}

.form-control-input:focus + .label-control,
.form-control-input:notEmpty + .label-control,
.form-control-textarea:focus + .label-control,
.form-control-textarea:notEmpty + .label-control {
    top: 0.125rem;
    opacity: 1;
    font-size: 0.75rem;
    font-weight: 500;
}

.form-control-input,
.form-control-select {
    display: block; /* needed for proper display of the label in Firefox, IE,
Edge */
    width: 100%;
    height: 70px;
    padding-top: 1rem;
    padding-bottom: 0.2rem;
    padding-left: 1.3125rem;
    border: 1px solid #dadada;
    border-radius: 0.15rem;
    background-color: #fff;
    color: #787976;
    font: 400 0.875rem/1.375rem "Open Sans", sans-serif;
    transition: all 0.2s;
    -webkit-appearance: none; /* removes inner shadow on form inputs on ios
safari */
}

.form-control-select {
    padding-top: 0.5rem;
    padding-bottom: 0.5rem;
    height: 2rem;
}

```

```

/* IE10+ hack to solve lower label text position compared to the rest of the
browsers */
@media screen and (-ms-high-contrast: active), screen and (-ms-high-contrast:
none) {
    .form-control-input {
        padding-top: 1rem;
        padding-bottom: 0.5rem;
        line-height: 1rem;
    }

    .form-control-select {
        padding-top: 0.875rem;
        padding-bottom: 0.75rem;
        height: 3.125rem;
        line-height: 2.125rem;
    }
}

select {
    /* you should keep these first rules in place to maintain cross-browser
behavior */
    -webkit-appearance: none;
    -moz-appearance: none;
    -ms-appearance: none;
    -o-appearance: none;
    appearance: none;
    background-image: url('../images/down-arrow.png');
    background-position: 96% 50%;
    background-repeat: no-repeat;
    outline: none;
}

select::-ms-expand {
    display: none; /* removes the ugly default down arrow on select form field in
IE11 */
}

.form-control-textarea {
    display: block; /* used to eliminate a bottom gap difference between Chrome
and IE/FF */
    width: 100%;
    height: 5rem; /* used instead of html rows to normalize height between Chrome
and IE/FF */
    padding-top: 1 rem;
    padding-left: 1.3125rem;
}

```

```
border: 1px solid #dadada;
border-radius: 0.25rem;
background-color: #fff;
color: #787976;
font: 400 1rem/1.5625rem "Open Sans", sans-serif;
transition: all 0.2s;
}

.form-control-input:focus,
.form-control-select:focus,
.form-control-textarea:focus {
  border: 1px solid #a1a1a1;
  outline: none; /* Removes blue border on focus */
}

.form-control-input:hover,
.form-control-select:hover,
.form-control-textarea:hover {
  border: 1px solid #a1a1a1;
}

.checkbox {
  font: 400 0.875rem/1.375rem "Open Sans", sans-serif;
}

input[type='checkbox'] {
  vertical-align: -15%;
  margin-right: 0.375rem;
}

/* IE10+ hack to raise checkbox field position compared to the rest of the browsers */
@media screen and (-ms-high-contrast: active), screen and (-ms-high-contrast: none) {
  input[type='checkbox'] {
    vertical-align: -9%;
  }
}

.form-control-submit-button {
  display: inline-block;
  width: 100%;
  height: 3.125rem;
  border: 0.125rem solid #14bf98;
  border-radius: 0.25rem;
}
```

```

background-color: #14bf98;
color: #fff;
font: 500 0.75rem/1rem "Montserrat", sans-serif;
cursor: pointer;
transition: all 0.2s;
text-align:center;
padding-top:0.5rem;
}

.form-control-submit-button:hover {
background-color: transparent;
color: #14bf98;
}

.form-control-submit-button-1 {
display: inline-block;
margin-left: 350px;
width: 200%;
height: 5.125rem;
border: 1rem solid #14bf98;
border-radius: 0.25rem;
background-color: #14bf98;
color: #fff;
font: 70000 0.75rem/1rem "Montserrat", sans-serif;
cursor: pointer;
transition: all 0.2s;
text-align:center;
padding-top:0.5rem;
}

.form-control-submit-button-1:hover {
background-color: transparent;
color: #14bf98;
}

/* Form Success And Error Message Formatting */
#lmsgSubmit.h3.text-center.tada.animated,
#cmmsgSubmit.h3.text-center.tada.animated,
#pmsgSubmit.h3.text-center.tada.animated,
#lmsgSubmit.h3.text-center,
#cmmsgSubmit.h3.text-center,
#pmsgSubmit.h3.text-center {
display: block;
margin-bottom: 0;
}

```

```

    color: #b93636;
    font: 400 1.125rem/1rem "Open Sans", sans-serif;
}

.help-block.with-errors .list-unstyled {
    color: #787976;
    font-size: 0.75rem;
    line-height: 1.125rem;
    text-align: left;
}

.help-block.with-errors ul {
    margin-bottom: 0;
}

/* end of form success and error message formatting */

/* Form Success And Error Message Animation - Animate.css */
@-webkit-keyframes tada {
    from {
        -webkit-transform: scale3d(1, 1, 1);
        -ms-transform: scale3d(1, 1, 1);
        transform: scale3d(1, 1, 1);
    }
    10%, 20% {
        -webkit-transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
        -ms-transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
        transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
    }
    30%, 50%, 70%, 90% {
        -webkit-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
        -ms-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
        transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
    }
    40%, 60%, 80% {
        -webkit-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
        -ms-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
        transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
    }
    to {
        -webkit-transform: scale3d(1, 1, 1);
        -ms-transform: scale3d(1, 1, 1);
        transform: scale3d(1, 1, 1);
    }
}

```

```

@keyframes tada {
  from {
    -webkit-transform: scale3d(1, 1, 1);
    -ms-transform: scale3d(1, 1, 1);
    transform: scale3d(1, 1, 1);
  }
  10%, 20% {
    -webkit-transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
    -ms-transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
    transform: scale3d(.9, .9, .9) rotate3d(0, 0, 1, -3deg);
  }
  30%, 50%, 70%, 90% {
    -webkit-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
    -ms-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
    transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, 3deg);
  }
  40%, 60%, 80% {
    -webkit-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
    -ms-transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
    transform: scale3d(1.1, 1.1, 1.1) rotate3d(0, 0, 1, -3deg);
  }
  to {
    -webkit-transform: scale3d(1, 1, 1);
    -ms-transform: scale3d(1, 1, 1);
    transform: scale3d(1, 1, 1);
  }
}

.tada {
  -webkit-animation-name: tada;
  animation-name: tada;
}

.animated {
  -webkit-animation-duration: 1s;
  animation-duration: 1s;
  -webkit-animation-fill-mode: both;
  animation-fill-mode: both;
}

/* end of form success and error message animation - Animate.css */

/* Fade-move Animation For Lightbox - Magnific Popup */
/* at start */
.my-mfp-slide-bottom .zoom-anim-dialog {
  opacity: 0;
}

```

```

    transition: all 0.2s ease-out;
    -webkit-transform: translateY(-1.25rem) perspective(37.5rem) rotateX(10deg);
    -ms-transform: translateY(-1.25rem) perspective(37.5rem) rotateX(10deg);
    transform: translateY(-1.25rem) perspective(37.5rem) rotateX(10deg);
}

/* animate in */
.my-mfp-slide-bottom.mfp-ready .zoom-anim-dialog {
    opacity: 1;
    -webkit-transform: translateY(0) perspective(37.5rem) rotateX(0);
    -ms-transform: translateY(0) perspective(37.5rem) rotateX(0);
    transform: translateY(0) perspective(37.5rem) rotateX(0);
}

/* animate out */
.my-mfp-slide-bottom.mfp-removing .zoom-anim-dialog {
    opacity: 0;
    -webkit-transform: translateY(-0.625rem) perspective(37.5rem) rotateX(10deg);
    -ms-transform: translateY(-0.625rem) perspective(37.5rem) rotateX(10deg);
    transform: translateY(-0.625rem) perspective(37.5rem) rotateX(10deg);
}

/* dark overlay, start state */
.my-mfp-slide-bottom.mfp-bg {
    opacity: 0;
    transition: opacity 0.2s ease-out;
}

/* animate in */
.my-mfp-slide-bottom.mfp-ready.mfp-bg {
    opacity: 0.8;
}

/* animate out */
.my-mfp-slide-bottom.mfp-removing.mfp-bg {
    opacity: 0;
}

/* end of fade-move animation for lightbox - magnific popup */

/* Fade Animation For Image Slider - Magnific Popup */
@-webkit-keyframes fadeIn {
    from {
        opacity: 0;
    }
    to {
        opacity: 1;
    }
}

```



```

    }
}

@keyframes fadeIn {
    from {
        opacity: 0;
    }
    to {
        opacity: 1;
    }
}

.fadeIn {
    -webkit-animation: fadeIn 0.6s;
    animation: fadeIn 0.6s;
}

@-webkit-keyframes fadeOut {
    from {
        opacity: 1;
    }
    to {
        opacity: 0;
    }
}

@keyframes fadeOut {
    from {
        opacity: 1;
    }
    to {
        opacity: 0;
    }
}

.fadeOut {
    -webkit-animation: fadeOut 0.8s;
    animation: fadeOut 0.8s;
}

/* end of fade animation for image slider - magnific popup */

/*****
/*      02. Preloader      */
*****/

```

```
.spinner-wrapper {
  position: fixed;
  z-index: 999999;
  top: 0;
  right: 0;
  bottom: 0;
  left: 0;
  background: #113448;
}

.spinner {
  position: absolute;
  top: 50%; /* centers the loading animation vertically one the screen */
  left: 50%; /* centers the loading animation horizontally one the screen */
  width: 3.75rem;
  height: 1.25rem;
  margin: -0.625rem 0 0 -1.875rem; /* is width and height divided by two */
  text-align: center;
}

.spinner > div {
  display: inline-block;
  width: 1rem;
  height: 1rem;
  border-radius: 100%;
  background-color: #fff;
  -webkit-animation: sk-bouncedelay 1.4s infinite ease-in-out both;
  animation: sk-bouncedelay 1.4s infinite ease-in-out both;
}

.spinner .bounce1 {
  -webkit-animation-delay: -0.32s;
  animation-delay: -0.32s;
}

.spinner .bounce2 {
  -webkit-animation-delay: -0.16s;
  animation-delay: -0.16s;
}

@-webkit-keyframes sk-bouncedelay {
  0%, 80%, 100% { -webkit-transform: scale(0); }
  40% { -webkit-transform: scale(1.0); }
}
```

```

@keyframes sk-bouncedelay {
  0%, 80%, 100% {
    -webkit-transform: scale(0);
    -ms-transform: scale(0);
    transform: scale(0);
  } 40% {
    -webkit-transform: scale(1.0);
    -ms-transform: scale(1.0);
    transform: scale(1.0);
  }
}

/*****
 *      03. Navigation      */
*****/
.navbar-custom {
  padding-top: 0.375rem;
  padding-bottom: 0.375rem;
  background-color: #113448;
  box-shadow: 0 0.0625rem 0.375rem 0 rgba(0, 0, 0, 0.1);
  font: 600 0.875rem/0.875rem "Open Sans", sans-serif;
  transition: all 0.2s;
}

.navbar-custom .navbar-brand {
  font-size: 0;
}

.navbar-custom .navbar-brand.logo-image img {
  width: 7.0625rem;
  height: 2rem;
  -webkit-backface-visibility: hidden;
}

.navbar-custom .navbar-brand.logo-text {
  margin-top: 0.25rem;
  margin-bottom: 0.25rem;
  font: 700 2.25rem/1.5rem "Montserrat", sans-serif;
  color: #fff;
  text-decoration: none;
}

.navbar-custom .navbar-nav {
  margin-top: 0.75rem;
}

```

```

    margin-bottom: 0.5rem;
}

.navbar-custom .nav-item .nav-link {
    padding: 0.625rem 0.75rem 0.625rem 0.75rem;
    color: #fff;
    text-decoration: none;
    transition: all 0.2s ease;
}

.navbar-custom .nav-item .nav-link:hover,
.navbar-custom .nav-item .nav-link.active {
    color: #14bf98;
}

/* Dropdown Menu */
.navbar-custom .dropdown:hover > .dropdown-menu {
    display: block; /* this makes the dropdown menu stay open while hovering it */
    min-width: auto;
    animation: fadeDropdown 0.2s; /* required for the fade animation */
}

@keyframes fadeDropdown {
    0% {
        opacity: 0;
    }

    100% {
        opacity: 1;
    }
}

.navbar-custom .dropdown-toggle:focus { /* removes dropdown outline on focus */
    outline: 0;
}

.navbar-custom .dropdown-menu {
    margin-top: 0;
    border: none;
    border-radius: 0.25rem;
    background-color: #113448;
}

.navbar-custom .dropdown-item {

```

```

    color: #fff;
    text-decoration: none;
}

.navbar-custom .dropdown-item:hover {
    background-color: #113448;
}

.navbar-custom .dropdown-item .item-text {
    font: 600 0.875rem/0.875rem "Open Sans", sans-serif;
}

.navbar-custom .dropdown-item:hover .item-text {
    color: #14bf98;
}

.navbar-custom .dropdown-items-divide-hr {
    width: 100%;
    height: 1px;
    margin: 0.75rem auto 0.75rem auto;
    border: none;
    background-color: #b5bcc4;
    opacity: 0.2;
}
/* end of dropdown menu */

.navbar-custom .social-icons {
    display: none;
}

.navbar-custom .navbar-toggler {
    border: none;
    color: #fff;
    font-size: 2rem;
}

.navbar-custom button[aria-expanded='false'] .navbar-toggler-awesome.fas.fa-
times{
    display: none;
}

.navbar-custom button[aria-expanded='false'] .navbar-toggler-awesome.fas.fa-bars{
    display: inline-block;
}

```

```

.navbar-custom button[aria-expanded='true'] .navbar-toggler-awesome.fas.fa-bars{
  display: none;
}

.navbar-custom button[aria-expanded='true'] .navbar-toggler-awesome.fas.fa-times{
  display: inline-block;
  margin-right: 0.125rem;
}

/*****
/*      04. Header      */
*****/
.header {
  background: linear-gradient(rgba(0, 0, 0, 0.3), rgba(0, 0, 0, 0.5)),
url('../images/loanapp.png') center center no-repeat;
  background-size: cover;
}

.header .header-content {
  padding-top: 8rem;
  padding-bottom: 2.125rem;
  text-align: center;
}

.header .text-container {
  margin-bottom: 3rem;
}

.header h1 {
  margin-bottom: 0.5rem;
  color: #fff;
}

.header .p-large {
  margin-bottom: 2rem;
  color: #dfe5ec;
}

.header .btn-solid-lg {
  margin-right: 0.5rem;
  margin-bottom: 1.25rem;
}

```

```

/*****/
/*    05. Intro    */
/*****/
.basic-1 {
    padding-top: 6.5rem;
    padding-bottom: 3rem;
}

.basic-1 .text-container {
    margin-bottom: 3rem;
}

.basic-1 .section-title {
    margin-bottom: 0.5rem;
}

.basic-1 h2 {
    margin-bottom: 1.375rem;
}

.basic-1 .testimonial-author {
    color: #484a46;
}

/* Hover Animation */
.basic-1 .image-container {
    overflow: hidden;
    border-radius: 0.25rem;
}

.basic-1 .image-container img {
    margin: 0;
    border-radius: 0.25rem;
    transition: all 0.3s;
}

.basic-1 .image-container:hover img {
    -moz-transform: scale(1.15);
    -webkit-transform: scale(1.15);
    transform: scale(1.15);
}
/* end of hover animation */

/*****/

```

```

/*      06. Description      */
/*****/

.cards-1 {
    padding-top: 3rem;
    padding-bottom: 2.875rem;
}

.cards-1 .card {
    margin-bottom: 2.5rem;
    border: none;
    text-align: center;
}

.cards-1 .fa-stack {
    width: 6rem;
    height: 6rem;
    margin-right: auto;
    margin-bottom: 1rem;
    margin-left: auto;
    line-height: 6rem;
    text-align: left;
}

.cards-1 .fa-stack .hexagon {
    position: absolute;
    width: 6rem;
    height: 6rem;
    background: url('../images/hexagon-green.svg') center center no-repeat;
    background-size: 6rem 6rem;
}

.cards-1 .fa-stack-1x {
    color: #fff;
    font-size: 2rem;
}

.cards-1 .card-body {
    padding: 0;
}

.cards-1 .card-title {
    margin-bottom: 0.625rem;
}

```



```
/* **** */
/*      07. Services      */
/* **** */

.cards-2 {
  padding-top: 6.625rem;
  padding-bottom: 1.25rem;
  background-color: #fbfbfb;
}

.cards-2 .section-title {
  margin-bottom: 0.5rem;
  text-align: center;
}

.cards-2 h2 {
  margin-bottom: 3.25rem;
  text-align: center;
}

.cards-2 .card {
  margin-bottom: 5.625rem;
  border: none;
  background-color: transparent;
}

.cards-2 .card-image img {
  border-top-left-radius: 0.375rem;
  border-top-right-radius: 0.375rem;
}

.cards-2 .card-body {
  padding: 2.25rem 2rem 2.125rem 2rem;
  border: 1px solid #ebe8e8;
  border-bottom-left-radius: 0.375rem;
  border-bottom-right-radius: 0.375rem;
  background-color: #fff;
}

.cards-2 h3 {
  margin-bottom: 0.75rem;
  text-align: center;
}

.cards-2 .list-unstyled {
```

```

    margin-bottom: 1.5rem;
}

.cards-2 .list-unstyled .fas {
    color: #14bf98;
    font-size: 0.5rem;
    line-height: 1.375rem;
}

.cards-2 .list-unstyled .media-body {
    margin-left: 0.625rem;
}

.cards-2 .price {
    margin-bottom: 0.25rem;
    color: #484a46;
    font: 700 1rem/1.5rem "Montserrat", sans-serif;
    text-align: center;
}

.cards-2 .price span {
    color: #14bf98;
}

.cards-2 .button-container {
    margin-top: -1.375rem;
    text-align: center;
}

.cards-2 .btn-solid-reg:hover {
    background-color: #fff;
}

/****
08. Details 1
****/

.accordion .area-1 {
    height: 27rem;
    background: url('../images/header-background.jpg') center center no-repeat;
    background-size: cover;
}

.accordion .accordion-container {
    max-width: 90%;
}

```

```
margin-right: auto;
margin-left: auto;
padding-top: 6.375rem;
padding-bottom: 1.5rem;
}

.accordion h2 {
  margin-bottom: 1.625rem;
}

.accordion .item {
  margin-bottom: 2rem;
}

.accordion h4 {
  margin-bottom: 0;
}

.accordion span[aria-expanded="true"] .circle-numbering,
.accordion span[aria-expanded="false"] .circle-numbering {
  display: inline-block;
  width: 2.25rem;
  height: 2.25rem;
  margin-right: 0.875rem;
  border: 0.125rem solid #14bf98;
  border-radius: 50%;
  background-color: #14bf98;
  color: #fff;
  font: 700 1rem/2.125rem "Montserrat", sans-serif;
  text-align: center;
  vertical-align: middle;
  cursor: pointer;
  transition: all 0.2s ease;
}

.accordion span[aria-expanded="false"] .circle-numbering {
  border: 0.125rem solid #484a46;
  background-color: transparent;
  color: #484a46;
}

.accordion .item:hover span[aria-expanded="false"] .circle-numbering {
  border: 0.125rem solid #14bf98;
  color: #14bf98;
}
```

```

.accordion .accordion-title {
  display: inline-block;
  width: 70%;
  margin-top: 0.125rem;
  margin-bottom: 0.25rem;
  color: #484a46;
  font: 700 1.25rem/1.75rem "Montserrat", sans-serif;
  vertical-align: middle;
  cursor: pointer;
  transition: all 0.2s ease;
}

.accordion .item:hover .accordion-title {
  color: #14bf98;
}

.accordion span[aria-expanded="true"] .accordion-title {
  color: #14bf98;
}

.accordion .accordion-body {
  margin-left: 3.125rem;
}

/*****
/*      09. Details 2      */
*****/

.tabs .tabs-container {
  max-width: 90%;
  margin-right: auto;
  margin-left: auto;
  padding-top: 2rem;
  padding-bottom: 5.75rem;
}

.tabs .nav-tabs {
  justify-content: center;
  margin-bottom: 1.125rem;
  border-bottom: none;
}

.tabs .nav-link {
  margin-right: 1.625rem;
}

```

```
margin-bottom: 0.875rem;
padding: 0;
border: none;
border-radius: 0.25rem;
color: #c1cace;
font: 700 1.375rem/1.375rem "Montserrat", sans-serif;
text-decoration: none;
transition: all 0.2s ease;
}

.tabs .nav-link:hover,
.tabs .nav-link.active {
  color: #14bf98;
}

.tabs .nav-link .fas {
  margin-right: 0.125rem;
  font-size: 0.875rem;
  vertical-align: 20%;
}

.tabs #tab-1 .progress-container {
  margin-top: 1.5rem;
}

.tabs #tab-1 .progress-container .title {
  margin-bottom: 0.25rem;
  color: #484a46;
  font: 600 0.875rem/1.25rem "Open Sans", sans-serif;
}

.tabs #tab-1 .progress {
  height: 1.375rem;
  margin-bottom: 1.125rem;
  border-radius: 0.125rem;
  background-color: #f9fafc;
}

.tabs #tab-1 .progress-bar {
  display: block;
  padding-left: 1.5rem;
  border-radius: 0.125rem;
  background: linear-gradient(to bottom right, #14bf98, #1bd1a7);
}
```

```
.tabs #tab-1 .progress-bar.first {
  width: 100%;
}

.tabs #tab-1 .progress-bar.second {
  width: 75%;
}

.tabs #tab-1 .progress-bar.third {
  width: 90%;
}

.tabs #tab-2 .list-unstyled {
  margin-top: 1.75rem;
  margin-bottom: 0;
  vertical-align: top;
}

.tabs #tab-2 .list-unstyled .media {
  margin-bottom: 2rem;
}

.tabs #tab-2 .list-unstyled .media-bullet {
  color: #14bf98;
  font-weight: 600;
  font-size: 2rem;
  line-height: 2rem;
}

.tabs #tab-2 .list-unstyled .media-body {
  margin-left: 0.875rem;
}

.tabs #tab-3 .list-unstyled .fas {
  color: #14bf98;
  font-size: 0.5rem;
  line-height: 1.375rem;
}

.tabs #tab-3 .list-unstyled .media-body {
  margin-left: 0.625rem;
}

.tabs #tab-3 .list-unstyled {
  margin-bottom: 1.75rem;
}
```

```

}

.tabs .area-2 {
    height: 27rem;
    background: url('../images/loan_img.jpg') center center no-repeat;
    background-size: cover;
}

/*****
/*      10. Testimonials      */
*****/

.slider {
    padding-top: 6.375rem;
    padding-bottom: 6.5rem;
    background-color: #fbfbfb;
}

.slider h2 {
    margin-bottom: 0.75rem;
    text-align: center;
}

.slider .slider-container {
    position: relative;
}

.slider .swiper-container {
    position: static;
    width: 90%;
    text-align: center;
}

.slider .swiper-button-prev:focus,
.slider .swiper-button-next:focus {
    /* even if you can't see it chrome you can see it on mobile device */
    outline: none;
}

.slider .swiper-button-prev {
    left: -0.5rem;
    background-image: url("data:image/svg+xml;charset=utf-8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2028%2044'%3E%3Cpath%20d%3D'M0%2C22L22%2C0L2.1%2C2.1L4.2%2C22L19.9%2C19.9L22%2C44L0%2C22L0%2C22L0%2C22z'%20fill%3D'%23787976'%2F%3E%3C%2Fsvg%3E");

```

```

        background-size: 1.125rem 1.75rem;
    }

    .slider .swiper-button-next {
        right: -0.5rem;
        background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2028
%2044'%3E%3Cpath%20d%3D'M27%2C22L27%2C22L5%2C44L-2.1-
2.1L22.8%2C22L2.9%2C2.1L5%2C0L27%2C22L27%2C22z'%20fill%3D'%23787976'%2F%3E%3C%2Fs
vg%3E");
        background-size: 1.125rem 1.75rem;
    }

    .slider .card {
        position: relative;
        border: none;
        background-color: transparent;
    }

    .slider .card-image {
        width: 6rem;
        height: 6rem;
        margin-right: auto;
        margin-bottom: 0.25rem;
        margin-left: auto;
        border-radius: 50%;
    }

    .slider .card .card-body {
        padding-bottom: 0;
    }

    .slider .testimonial-text {
        margin-bottom: 0.625rem;
    }

    .slider .testimonial-author {
        color: #484a46;
    }

    /*****/
    /*      11. Call Me      */
    /*****/

    .form-1 {

```



```
padding-top: 6.625rem;
padding-bottom: 5.625rem;
background-color: #153e52;
}

.form-1 .text-container {
  margin-bottom: 4rem;
}

.form-1 .section-title {
  margin-bottom: 0.5rem;
}

.form-1 h2 {
  margin-bottom: 1.375rem;
  color: #fff;
}

.form-1 .list-unstyled .fas {
  color: #14bf98;
  font-size: 0.5rem;
  line-height: 1.375rem;
}

.form-1 .list-unstyled .media-body {
  margin-left: 0.625rem;
}

.form-1 .label-control {
  color: #fff;
}

.form-1 .form-control-input,
.form-1 .form-control-select {
  border: 1px solid #39728f;
  background-color: #2a5d77;
  color: #fff;
}

.form-1 .form-control-textarea {
  border: 1px solid #39728f;
  background-color: #2a5d77;
  color: #fff;
}
```

```

.form-1 .form-control-input:focus,
.form-1 .form-control-input:hover,
.form-1 .form-control-select:focus,
.form-1 .form-control-select:hover,
.form-1 .form-control-textarea:focus,
.form-1 .form-control-textarea:hover {
    border: 1px solid #fff;
}

#lmsgSubmit.h3.text-center.tada.animated,
#lmsgSubmit.h3.text-center {
    color: #fff;
}

.form-1 .help-block.with-errors .list-unstyled {
    color: #dfe5ec;
}

/*****
/*      12. Projects      */
*****/
.filter {
    padding-top: 6.5rem;
    padding-bottom: 7rem;
}

.filter .section-title {
    margin-bottom: 0.5rem;
}

.filter h2,
.filter .section-title {
    text-align: center;
}

.filter h2 {
    margin-bottom: 3.25rem;
}

.filter .button-group {
    text-align: center;
}

.filter .button-group a {

```

```

display: inline-block;
margin-right: 0.1875rem;
margin-bottom: 0.5rem;
margin-left: 0.1875rem;
padding: 0.3125rem 1.375rem 0.25rem 1.375rem;
border-radius: 0.25rem;
background-color: #f1f4f7;
color: #7b7e85;
font: 700 0.75rem/1.25rem "Montserrat", sans-serif;
cursor: pointer;
transition: all 0.2s ease;
}

.filter .button-group a:hover {
    background-color: #14bf98;
    color: #fff;
}

.filter .button-group a.button.is-checked {
    background-color: #14bf98;
    color: #fff;
}

.filter .grid {
    margin-top: 1.25rem;
    border-radius: 0.375rem;
}

/* Hover Animation */
.filter .element-item {
    position: relative;
    float: left;
    overflow: hidden;
    width: 50%;
    background-color: #000; /* to hide 1px white margin in IE */
}

.filter .element-item img {
    max-width: 100%;
    margin: 0;
    transition: all 0.3s;
}

.filter .element-item:hover img {
    -moz-transform: scale(1.15);

```

```

        -webkit-transform: scale(1.15);
        transform: scale(1.15);
    }
    /* end of hover animation */

    .filter .element-item .element-item-overlay {
        position: absolute;
        z-index: 2;
        top: 0;
        left: 0;
        width: 100%;
        height: 100%;
        background-color: rgba(0, 0, 0, 0.4);
        opacity: 1;
        text-align: center;
        transition: all 0.3s;
    }

    .filter .element-item .element-item-overlay span {
        position: absolute;
        z-index: 3;
        top: 42%;
        right: 0;
        left: 0;
        color: #fff;
        font: 700 1.125rem/1.625rem "Montserrat", sans-serif;
    }

    /******
    /*      13. Project Lightboxes      */
    /******

    .lightbox-basic {
        position: relative;
        max-width: 62.5rem;
        margin: 2.5rem auto;
        padding: 1.5625rem;
        border-radius: 0.25rem;
        background: #fff;
        text-align: left;
    }

    .lightbox-basic img {
        margin-right: auto;
        margin-bottom: 2rem;
    }

```

```
    margin-left: auto;
    border-radius: 0.25rem;
}

.lightbox-basic .line-heading {
    width: 3rem;
    height: 1px;
    margin-top: 0;
    margin-bottom: 0.625rem;
    margin-left: 0;
    border: none;
    background-color: #14bf98;
}

.lightbox-basic h6 {
    margin-bottom: 2rem;
}

.lightbox-basic .testimonial-container {
    margin-top: 1.75rem;
    margin-bottom: 2.125rem;
    padding: 1.125rem 1.5rem 1.125rem 1.5rem;
    border-radius: 0.25rem;
    background-color: #fbfbfb;
}

.lightbox-basic .testimonial-text {
    margin-bottom: 0.5rem;
}

.lightbox-basic .testimonial-author {
    margin-bottom: 0;
}

.lightbox-basic .btn-solid-reg,
.lightbox-basic .btn-outline-reg {
    margin-right: 0.375rem;
    margin-bottom: 1rem;
}

.lightbox-basic a.mfp-close.as-button {
    position: relative;
    width: auto;
    height: auto;
    margin-right: 0.5rem;
}
```

```

        color: #484a46;
        opacity: 1;
    }

    .lightbox-basic a.mfp-close.as-button:hover {
        color: #f2f2f2;
    }

    .lightbox-basic button.mfp-close.x-button {
        position: absolute;
        top: -0.375rem;
        right: -0.375rem;
        width: 2.75rem;
        height: 2.75rem;
    }

    /***** */
    /*      14. Team      */
    /***** */

    .basic-2 {
        padding-top: 6.375rem;
        padding-bottom: 3.375rem;
        background-color: #fbfbfb;
        text-align: center;
    }

    .basic-2 h2 {
        margin-bottom: 0.75rem;
    }

    .basic-2 .team-member {
        display: inline-block;
        max-width: 13rem;
        margin-right: 1.5rem;
        margin-bottom: 3.5rem;
        margin-left: 1.5rem;
    }

    /* Hover Animation */
    .basic-2 .image-wrapper {
        overflow: hidden;
        margin-bottom: 1.5rem;
    }

```

```
.basic-2 .image-wrapper img {
  margin: 0;
  transition: all 0.3s;
}

.basic-2 .image-wrapper:hover img {
  -moz-transform: scale(1.15);
  -webkit-transform: scale(1.15);
  transform: scale(1.15);
}
/* end of hover animation */

.basic-2 .team-member .p-large {
  margin-bottom: 0.25rem;
}

.basic-2 .team-member .job-title {
  margin-bottom: 0.75rem;
  color: #484a46;
  font: 700 1rem/1.375rem "Montserrat", sans-serif;
}

.basic-2 .fa-stack {
  width: 1.75rem;
  height: 1.75rem;
  margin-right: 0.125rem;
  margin-left: 0.125rem;
}

.basic-2 .fa-stack .hexagon {
  position: absolute;
  left: 0;
  width: 1.75rem;
  height: 1.75rem;
  background: url('../images/hexagon-green.svg') center center no-repeat;
  background-size: 1.75rem 1.75rem;
  transition: all 0.2s ease;
}

.basic-2 .fa-stack:hover .hexagon {
  background: url('../images/hexagon-white.svg') center center no-repeat;
  background-size: 1.75rem 1.75rem;
}

.basic-2 .fa-stack-1x {
```

```

    font-size: 0.6875rem;
    line-height: 1.75rem;
    color: #fff;
    transition: all 0.2s ease;
}

.basic-2 .fa-stack:hover .fa-stack-1x {
    color: #14bf98;
}

/*****
/*      15. About      */
*****/

.counter {
    padding-top: 6.875rem;
    padding-bottom: 5.25rem;
}

.counter .image-container {
    margin-bottom: 3rem;
}

.counter .image-container img {
    border-radius: 0.25rem;
}

.counter .section-title {
    margin-bottom: 0.5rem;
}

.counter h2 {
    margin-bottom: 1.375rem;
}

.counter .list-unstyled {
    margin-bottom: 1.5rem;
}

.counter .list-unstyled .fas {
    color: #14bf98;
    font-size: 0.5rem;
    line-height: 1.375rem;
}

```



```

.counter .list-unstyled .media-body {
    margin-left: 0.625rem;
}

.counter #counter {
    text-align: center;
}

.counter #counter .cell {
    display: inline-block;
    width: 9.5rem;
    margin-bottom: 0.75rem;
}

.counter #counter .counter-value {
    display: inline-block;
    margin-bottom: 0.125rem;
    color: #14bf98;
    font: 700 2.875rem/3.25rem "Montserrat", sans-serif;
    vertical-align: middle;
}

.counter #counter .counter-info {
    display: inline-block;
    margin-left: 0.5rem;
    font-size: 0.875rem;
    line-height: 1.25rem;
    vertical-align: middle;
}

/*****
/*      16. Contact      */
*****/

.form-2 {
    padding-top: 6.625rem;
    padding-bottom: 5.625rem;
    background-color: #fbfbfb;
}

.form-2 .text-container {
    margin-bottom: 3rem;
}

.form-2 .section-title {

```

```
    margin-bottom: 0.5rem;
  }

.form-2 h2 {
  margin-bottom: 1.375rem;
}

.form-2 .list-unstyled {
  margin-bottom: 2.25rem;
  font-size: 1rem;
  line-height: 1.625rem;
}

.form-2 .list-unstyled .fas,
.form-2 .list-unstyled .fab {
  margin-right: 0.5rem;
  font-size: 0.875rem;
  color: #14bf98;
}

.form-2 .list-unstyled .fa-phone {
  vertical-align: 3%;
}

.form-2 h3 {
  margin-bottom: 1rem;
}

.form-2 .fa-stack {
  margin-right: 0.25rem;
  margin-bottom: 0.75rem;
  margin-left: 0.125rem;
  width: 3.25rem;
  height: 3.25rem;
}

.form-2 .fa-stack .hexagon {
  position: absolute;
  width: 3.25rem;
  height: 3.25rem;
  background: url('../images/hexagon-green.svg') center center no-repeat;
  background-size: 3.25rem 3.25rem;
  transition: all 0.2s ease;
}
```

```

.form-2 .fa-stack:hover .hexagon {
    background: url('../images/hexagon-white.svg') center center no-repeat;
    background-size: 3.25rem 3.25rem;
}

.form-2 .fa-stack-1x {
    font-size: 1.5rem;
    line-height: 3.25rem;
    color: #fff;
    transition: all 0.2s ease;
}

.form-2 .fa-stack:hover .fa-stack-1x {
    color: #14bf98;
}

/*****
/*      17. Footer      */
*****/
.footer {
    padding-top: 5rem;
    background-color: #113448;
}

.footer .text-container {
    margin-bottom: 2.25rem;
}

.footer h4 {
    margin-bottom: 0.75rem;
    color: #fff;
}

.footer p,
.footer ul {
    font-size: 0.875rem;
    line-height: 1.375rem;
}

/*****
/*      18. Copyright      */
*****/
.copyright {

```

```

padding-top: 1rem;
padding-bottom: 0.5rem;
background-color: #113448;
text-align: center;
}

.copyright p,
.copyright a {
    color: #dfe5ec;
    text-decoration: none;
}

/*****
/*      19. Back To Top Button      */
*****/
a.back-to-top {
    position: fixed;
    z-index: 999;
    right: 0.75rem;
    bottom: 0.75rem;
    display: none;
    width: 2.625rem;
    height: 2.625rem;
    border-radius: 1.875rem;
    background: #14bf98 url("../images/up-arrow.png") no-repeat center 47%;
    background-size: 1.125rem 1.125rem;
    text-indent: -9999px;
}

a:hover.back-to-top {
    background-color: #13aa87;
}

/*****
/*      20. Extra Pages      */
*****/
.ex-header {
    padding-top: 5rem;
    padding-bottom: 2rem;
    background-color: #153e52;
    text-align: center;
}

```

```
.ex-header h1 {
  color: #fff;
}

.ex-basic-1 {
  padding-top: 2rem;
  padding-bottom: 0.875rem;
  background-color: #fbfbfb;
}

.ex-basic-1 .breadcrumbs {
  margin-bottom: 1rem;
}

.ex-basic-1 .breadcrumbs .fa {
  margin-right: 0.5rem;
  margin-left: 0.625rem;
}

.ex-basic-2 {
  padding-bottom: 4rem;
}

.ex-basic-2 h3 {
  margin-bottom: 1rem;
}

.ex-basic-2 .text-container {
  margin-bottom: 3.625rem;
}

.ex-basic-2 .text-container.last {
  margin-bottom: 0;
}

.ex-basic-2 .list-unstyled .fas {
  color: #14bf98;
  font-size: 0.5rem;
  line-height: 1.375rem;
}

.ex-basic-2 .list-unstyled .media-body {
  margin-left: 0.625rem;
}
```

```

.ex-basic-2 .form-container {
    margin-top: 2.5rem;
}

.ex-basic-2 .btn-outline-reg {
    margin-top: 1.75rem;
}

/*****
/*      21. Media Queries      */
*****/
/* Min-width width 768px */
@media (min-width: 768px) {

    /* General Styles */
    .p-heading {
        width: 85%;
        margin-right: auto;
        margin-left: auto;
    }
    /* end of general styles */

    /* Navigation */
    .navbar-custom {
        padding: 2.125rem 1.5rem 2.125rem 2rem;
        box-shadow: none;
        background: transparent;
    }

    .navbar-custom .navbar-brand.logo-text {
        color: #fff;
    }

    .navbar-custom .navbar-nav {
        margin-top: 0;
        margin-bottom: 0;
    }

    .navbar-custom .nav-item .nav-link {
        padding: 0.25rem 0.75rem 0.25rem 0.75rem;
    }

    .navbar-custom .nav-item .nav-link:hover,

```

```
.navbar-custom .nav-item .nav-link.active {
  color: #14bf98;
}

.navbar-custom.top-nav-collapse {
  padding: 0.375rem 1.5rem 0.375rem 2rem;
  box-shadow: 0 0.0625rem 0.375rem 0 rgba(0, 0, 0, 0.1);
  background-color: #113448;
}

.navbar-custom.top-nav-collapse .navbar-brand.logo-text {
  color: #fff;
}

.navbar-custom.top-nav-collapse .nav-item .nav-link {
  color: #fff;
}

.navbar-custom.top-nav-collapse .nav-item .nav-link:hover,
.navbar-custom.top-nav-collapse .nav-item .nav-link.active {
  color: #14bf98;
}

.navbar-custom .dropdown-menu {
  padding-top: 1rem;
  padding-bottom: 1rem;
  border-top: 0.75rem solid rgba(0, 0, 0, 0);
  border-radius: 0.25rem;
  box-shadow: 0 0.25rem 0.375rem 0 rgba(0, 0, 0, 0.03);
}

.navbar-custom.top-nav-collapse .dropdown-menu {
  border-top: 0.125rem solid rgba(0, 0, 0, 0);
}

.navbar-custom .dropdown-item {
  padding-top: 0.25rem;
  padding-bottom: 0.25rem;
}

.navbar-custom .dropdown-items-divide-hr {
  width: 84%;
}

/* end of navigation */
```

```

/* Header */
.header .header-content {
  padding-top: 13rem;
  padding-bottom: 7.5rem;
}

.header h1 {
  font: 700 3.5rem/4rem "Montserrat", sans-serif;
}
/* end of header */

/* Details 1 */
.accordion .accordion-container {
  max-width: 70%;
}
/* end of details 1 */

/* Details 2 */
.tabs .tabs-container {
  max-width: 70%;
}

.tabs #tab-2 .list-unstyled {
  display: inline-block;
  width: 45%;
  margin-top: 0;
}

.tabs #tab-2 .list-unstyled.first {
  margin-right: 2rem;
}
/* end of details 2 */

/* Testimonials */
.slider .swiper-button-prev {
  left: 1rem;
  width: 1.375rem;
  background-size: 1.375rem 2.125rem;
}

.slider .swiper-button-next {
  right: 1rem;
}

```



```

        width: 1.375rem;
        background-size: 1.375rem 2.125rem;
    }
    /* end of testimonials */

    /* Projects */
    .filter .element-item {
        width: 25%;
    }

    .filter .element-item .element-item-overlay {
        opacity: 0;
        transition: opacity 0.3s ease;
    }

    .filter .element-item:hover .element-item-overlay {
        opacity: 1;
    }
    /* end of projects */

    /* About */
    .counter #counter {
        text-align: left;
    }

    .counter #counter .cell {
    }
    /* end of about */

    /* Contact */
    .form-2 .list-unstyled li {
        display: inline-block;
        margin-right: 1rem;
    }

    .form-2 .list-unstyled .address {
        display: block;
    }
    /* end of contact */

    /* Extra Pages */
    .ex-header {

```

```

        padding-top: 5rem;
        padding-bottom: 2rem;
    }

    .ex-basic-2 .form-container {
        margin-top: 0.5rem;
    }
    /* end of extra pages */
}
/* end of min-width width 768px */

/* Min-width width 992px */
@media (min-width: 992px) {

    /* General Styles */
    .p-heading {
        width: 65%;
    }
    /* end of general styles */

    /* Navigation */
    .navbar-custom .social-icons {
        display: block;
        margin-left: 0.5rem;
    }

    .navbar-custom .fa-stack {
        margin-left: 0.375rem;
        font-size: 0.8125rem;
    }

    .navbar-custom .fa-stack .hexagon {
        width: 1.625rem;
        height: 1.625rem;
        position: absolute;
        background: url('../images/hexagon-green.svg') center center no-repeat;
        background-size: 1.625rem 1.625rem;
        transition: all 0.2s ease;
    }

    .navbar-custom .fa-stack:hover .hexagon {
        background: url('../images/hexagon-white.svg') center center no-repeat;
        background-size: 1.625rem 1.625rem;
    }

```

```

}

.navbar-custom .fa-stack-1x {
  font-size: 0.6875rem;
  line-height: 1.625rem;
  color: #fff;
  transition: all 0.2s ease;
}

.navbar-custom .fa-stack:hover .fa-stack-1x {
  color: #14bf98;
}
/* end of navigation */

/* Header */
.header .header-content {
  padding-top: 14rem;
  padding-bottom: 15rem;
}

.header .text-container {
  margin-top: 6.5rem;
}
/* end of header */

/* Intro */
.basic-1 {
  padding-top: 6.875rem;
}

.basic-1 .text-container {
  margin-bottom: 0;
}
/* end of intro */

/* Description */
.cards-1 .card {
  display: inline-block;
  max-width: 17.5rem;
  text-align: left;
  vertical-align: top;
}

```

```

.cards-1 div.card:nth-child(3n+2) {
    margin-right: 2.5rem;
    margin-left: 2.5rem;
}
/* end of description */

/* Services */
.cards-2 .card {
    max-width: 18.25rem;
    display: inline-block;
    vertical-align: top;
}

.cards-2 .col-lg-12 div.card:nth-child(3n+2) {
    margin-right: 1.25rem;
    margin-left: 1.25rem;
}
/* end of services */

/* Details 1 */
.accordion {
    height: 34.625rem;
}

.accordion .area-1 {
    width: 50%;
    height: 100%;
    display: inline-block;
}

.accordion .area-2 {
    width: 50%;
    height: 100%;
    display: inline-block;
    vertical-align: top;
}

.accordion .accordion-container {
    max-width: 88%;
    margin-left: 2rem;
    padding-bottom: 0;
}

```

```
.accordion .accordion-title {
    width: 85%;
}
/* end of details 1 */

/* Details 2 */
.tabs {
    height: 36.125rem;
}

.tabs .area-1 {
    width: 50%;
    height: 100%;
    display: inline-block;
    vertical-align: top;
}

.tabs .area-2 {
    width: 50%;
    height: 100%;
    display: inline-block;
}

.tabs .tabs-container {
    max-width: 88%;
    margin-left: 2rem;
    padding-top: 6.75rem;
    padding-bottom: 0;
}

.tabs .nav-tabs {
    justify-content: flex-start;
}
/* end of details 2 */

/* Call Me */
.form-1 {
    padding-top: 7rem;
}

.form-1 .text-container {
    margin-bottom: 0;
}
```

```

}
/* end of call me */

/* Project Lightboxes */
.lightbox-basic img {
    margin-bottom: 0;
}

.lightbox-basic h3 {
    margin-top: 0.375rem;
}

.lightbox-basic .btn-solid-reg,
.lightbox-basic .btn-outline-reg {
    margin-bottom: 0;
}
/* end of project lightboxes */

/* Team */
.basic-2 .team-member {
    width: 12.75rem;
    max-width: 100%;
    margin-right: 0.75rem;
    margin-left: 0.75rem;
}
/* end of team */

/* About */
.counter .image-container {
    margin-bottom: 0;
}
/* end of about */

/* Contact */
.form-2 {
    padding-top: 6.875rem;
}

.form-2 .text-container {
    margin-bottom: 0;
}
/* end of contact */

```

```
/* Extra Pages */
.ex-header h1 {
    width: 80%;
    margin-right: auto;
    margin-left: auto;
}

.ex-basic-2 {
    padding-bottom: 5rem;
}
/* end of extra pages */
}
/* end of min-width width 992px */

/* Min-width width 1200px */
@media (min-width: 1200px) {

    /* General Styles */
    .p-heading {
        width: 55%;
    }
    /* end of general styles */

    /* Navigation */
    .navbar-custom {
        padding-right: 5rem;
        padding-left: 5rem;
    }

    .navbar-custom.top-nav-collapse {
        padding-right: 5rem;
        padding-left: 5rem;
    }
    /* end of navigation */

    /* Header */
    .header .header-content {
        padding-top: 14.75rem;
        padding-bottom: 17.5rem;
    }
}
```

```

/* end of header */

/* Intro */
.basic-1 .text-container {
    margin-top: 1.875rem;
    margin-right: 3rem;
}
/* end of intro */

/* Description */
.cards-1 .card {
    max-width: 21rem;
}

.cards-1 div.card:nth-child(3n+2) {
    margin-right: 2.875rem;
    margin-left: 2.875rem;
}
/* end of description */

/* Services */
.cards-2 .card {
    max-width: 20.875rem;
}

.cards-2 .card-body {
    padding: 2.25rem 2.5rem 2.125rem 2.5rem;
}

.cards-2 .col-lg-12 div.card:nth-child(3n+2) {
    margin-right: 3rem;
    margin-left: 3rem;
}
/* end of services */

/* Details 1 */
.accordion .accordion-container {
    max-width: 28rem;
    margin-left: 5rem;
}
/* end of details 1 */

```



```

/* Details 2 */
.tabs .tabs-container {
    max-width: 28rem;
    margin-right: 5rem;
    margin-left: auto;
}

.tabs #tab-2 .media-wrapper.first {
    margin-right: 2rem;
}
/* end of details 2 */

/* Call Me */
.form-1 .text-container {
    margin-top: 1.375rem;
    margin-right: 1.75rem;
    margin-left: 3rem
}

.form-1 form {
    margin-left: 1.75rem;
    margin-right: 3rem
}
/* end of call me */

/* Projects */
.filter .element-item {
    width: 17.3125rem; /* to eliminate grid overflow problem on hard refresh
*/
    height: 16.875rem;
}

.filter .element-item .element-item-overlay span {
    top: 45%;
}
/* end of projects */

/* Team */
.basic-2 .team-member {
    width: 14.375rem;
    margin-right: 1.375rem;
    margin-left: 1.375rem;

```

```

}
/* end of team */

/* About */
.counter {
    padding-bottom: 6.125rem;
}

.counter .image-container {
    margin-right: 1.5rem;
}

.counter .text-container {
    margin-top: 0.375rem;
    margin-right: 2.5rem;
    margin-left: 2rem;
}
/* end of about */

/* Contact */
.form-2 .text-container {
    margin-top: 0.875rem;
    margin-right: 1.5rem;
}

.form-2 form {
    margin-left: 1.5rem;
}
/* end of contact */

/* Footer */
.footer .text-container.about {
    margin-right: 5rem;
}
/* end of footer */

/* Extra Pages */
.ex-header h1 {
    width: 60%;
    margin-right: auto;
    margin-left: auto;
}

```

```

    }

    .ex-basic-2 .form-container {
        margin-left: 1.75rem;
    }
    /* end of extra pages */
}
/* end of min-width width 1200px */

/* Min-width width 1600px */
@media (min-width: 1600px) {

    /* Navigation */
    .navbar-custom {
        padding-right: 12rem;
        padding-left: 12rem;
    }

    .navbar-custom.top-nav-collapse {
        padding-right: 12rem;
        padding-left: 12rem;
    }
    /* end of navigation */
}
/* end of min-width width 1200px */

```

/static/css/swiper.css:

```

/**
 * Swiper 4.4.6
 * Most modern mobile touch slider and framework with hardware accelerated
transitions
 * http://www.idangero.us/swiper/
 *
 * Copyright 2014-2018 Vladimir Kharlampidi
 *
 * Released under the MIT License
 *
 * Released on: December 19, 2018
 */
.swiper-container {
    margin: 0 auto;
    position: relative;
    overflow: hidden;

```

```
list-style: none;
padding: 0;
/* Fix of Webkit flickering */
z-index: 1;
}
.swiper-container-no-flexbox .swiper-slide {
  float: left;
}
.swiper-container-vertical > .swiper-wrapper {
  -webkit-box-orient: vertical;
  -webkit-box-direction: normal;
  -webkit-flex-direction: column;
  -ms-flex-direction: column;
  flex-direction: column;
}
.swiper-wrapper {
  position: relative;
  width: 100%;
  height: 100%;
  z-index: 1;
  display: -webkit-box;
  display: -webkit-flex;
  display: -ms-flexbox;
  display: flex;
  -webkit-transition-property: -webkit-transform;
  transition-property: -webkit-transform;
  -o-transition-property: transform;
  transition-property: transform;
  transition-property: transform, -webkit-transform;
  -webkit-box-sizing: content-box;
  box-sizing: content-box;
}
.swiper-container-android .swiper-slide,
.swiper-wrapper {
  -webkit-transform: translate3d(0px, 0, 0);
  transform: translate3d(0px, 0, 0);
}
.swiper-container-multirow > .swiper-wrapper {
  -webkit-flex-wrap: wrap;
  -ms-flex-wrap: wrap;
  flex-wrap: wrap;
}
.swiper-container-free-mode > .swiper-wrapper {
  -webkit-transition-timing-function: ease-out;
  -o-transition-timing-function: ease-out;
```

```

    transition-timing-function: ease-out;
    margin: 0 auto;
}
.swiper-slide {
    -webkit-flex-shrink: 0;
    -ms-flex-negative: 0;
    flex-shrink: 0;
    width: 100%;
    height: 100%;
    position: relative;
    -webkit-transition-property: -webkit-transform;
    transition-property: -webkit-transform;
    -o-transition-property: transform;
    transition-property: transform;
    transition-property: transform, -webkit-transform;
}
.swiper-slide-invisible-blank {
    visibility: hidden;
}
/* Auto Height */
.swiper-container-autoheight,
.swiper-container-autoheight .swiper-slide {
    height: auto;
}
.swiper-container-autoheight .swiper-wrapper {
    -webkit-box-align: start;
    -webkit-align-items: flex-start;
    -ms-flex-align: start;
    align-items: flex-start;
    -webkit-transition-property: height, -webkit-transform;
    transition-property: height, -webkit-transform;
    -o-transition-property: transform, height;
    transition-property: transform, height;
    transition-property: transform, height, -webkit-transform;
}
/* 3D Effects */
.swiper-container-3d {
    -webkit-perspective: 1200px;
    perspective: 1200px;
}
.swiper-container-3d .swiper-wrapper,
.swiper-container-3d .swiper-slide,
.swiper-container-3d .swiper-slide-shadow-left,
.swiper-container-3d .swiper-slide-shadow-right,
.swiper-container-3d .swiper-slide-shadow-top,

```

```

.swiper-container-3d .swiper-slide-shadow-bottom,
.swiper-container-3d .swiper-cube-shadow {
  -webkit-transform-style: preserve-3d;
  transform-style: preserve-3d;
}

.swiper-container-3d .swiper-slide-shadow-left,
.swiper-container-3d .swiper-slide-shadow-right,
.swiper-container-3d .swiper-slide-shadow-top,
.swiper-container-3d .swiper-slide-shadow-bottom {
  position: absolute;
  left: 0;
  top: 0;
  width: 100%;
  height: 100%;
  pointer-events: none;
  z-index: 10;
}

.swiper-container-3d .swiper-slide-shadow-left {
  background-image: -webkit-gradient(linear, right top, left top, from(rgba(0, 0, 0, 0.5)), to(rgba(0, 0, 0, 0)));
  background-image: -webkit-linear-gradient(right, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: -o-linear-gradient(right, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: linear-gradient(to left, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
}

.swiper-container-3d .swiper-slide-shadow-right {
  background-image: -webkit-gradient(linear, left top, right top, from(rgba(0, 0, 0, 0.5)), to(rgba(0, 0, 0, 0)));
  background-image: -webkit-linear-gradient(left, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: -o-linear-gradient(left, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: linear-gradient(to right, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
}

.swiper-container-3d .swiper-slide-shadow-top {
  background-image: -webkit-gradient(linear, left bottom, left top, from(rgba(0, 0, 0, 0.5)), to(rgba(0, 0, 0, 0)));
  background-image: -webkit-linear-gradient(bottom, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: -o-linear-gradient(bottom, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  background-image: linear-gradient(to top, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
}

```

```

    background-image: linear-gradient(to top, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  }
  .swiper-container-3d .swiper-slide-shadow-bottom {
    background-image: -webkit-gradient(linear, left top, left bottom, from(rgba(0, 0, 0, 0.5)), to(rgba(0, 0, 0, 0)));
    background-image: -webkit-linear-gradient(top, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
    background-image: -o-linear-gradient(top, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
    background-image: linear-gradient(to bottom, rgba(0, 0, 0, 0.5), rgba(0, 0, 0, 0));
  }
  /* IE10 Windows Phone 8 Fixes */
  .swiper-container-wp8-horizontal,
  .swiper-container-wp8-horizontal > .swiper-wrapper {
    -ms-touch-action: pan-y;
    touch-action: pan-y;
  }
  .swiper-container-wp8-vertical,
  .swiper-container-wp8-vertical > .swiper-wrapper {
    -ms-touch-action: pan-x;
    touch-action: pan-x;
  }
  .swiper-button-prev,
  .swiper-button-next {
    position: absolute;
    top: 50%;
    width: 27px;
    height: 44px;
    margin-top: -22px;
    z-index: 10;
    cursor: pointer;
    background-size: 27px 44px;
    background-position: center;
    background-repeat: no-repeat;
  }
  .swiper-button-prev.swiper-button-disabled,
  .swiper-button-next.swiper-button-disabled {
    opacity: 0.35;
    cursor: auto;
    pointer-events: none;
  }
  .swiper-button-prev,
  .swiper-container-rtl .swiper-button-next {

```

```

    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M0%2C22L22%2C0L2.1%2C2.1L4.2%2C22L19.9%2C19.9L22%2C44L0%2
C22L0%2C22L0%2C22z'%20fill%3D'%23007aff'%2F%3E%3C%2Fsvg%3E");
    left: 10px;
    right: auto;
}
.swiper-button-next,
.swiper-container-rtl .swiper-button-prev {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M27%2C22L27%2C22L5%2C44L-2.1-
2.1L22.8%2C22L2.9%2C2.1L5%2C0L27%2C22L27%2C22z'%20fill%3D'%23007aff'%2F%3E%3C%2Fs
vg%3E");
    right: 10px;
    left: auto;
}
.swiper-button-prev.swiper-button-white,
.swiper-container-rtl .swiper-button-next.swiper-button-white {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M0%2C22L22%2C0L2.1%2C2.1L4.2%2C22L19.9%2C19.9L22%2C44L0%2
C22L0%2C22L0%2C22z'%20fill%3D'%23ffffff'%2F%3E%3C%2Fsvg%3E");
}
.swiper-button-next.swiper-button-white,
.swiper-container-rtl .swiper-button-prev.swiper-button-white {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M27%2C22L27%2C22L5%2C44L-2.1-
2.1L22.8%2C22L2.9%2C2.1L5%2C0L27%2C22L27%2C22z'%20fill%3D'%23ffffff'%2F%3E%3C%2Fs
vg%3E");
}
.swiper-button-prev.swiper-button-black,
.swiper-container-rtl .swiper-button-next.swiper-button-black {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M0%2C22L22%2C0L2.1%2C2.1L4.2%2C22L19.9%2C19.9L22%2C44L0%2
C22L0%2C22L0%2C22z'%20fill%3D'%23000000'%2F%3E%3C%2Fsvg%3E");
}
.swiper-button-next.swiper-button-black,
.swiper-container-rtl .swiper-button-prev.swiper-button-black {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F2000%2Fsvg'%20viewBox%3D'0%200%2027
%2044'%3E%3Cpath%20d%3D'M27%2C22L27%2C22L5%2C44L-2.1-

```



```

2.1L22.8%2C22L2.9%2C2.1L5%2C0L27%2C22L27%2C22z'%20fill%3D'%23000000'%2F%3E%3C%2Fs
vg%3E");
}
.swiper-button-lock {
  display: none;
}
.swiper-pagination {
  position: absolute;
  text-align: center;
  -webkit-transition: 300ms opacity;
  -o-transition: 300ms opacity;
  transition: 300ms opacity;
  -webkit-transform: translate3d(0, 0, 0);
  transform: translate3d(0, 0, 0);
  z-index: 10;
}
.swiper-pagination.swiper-pagination-hidden {
  opacity: 0;
}
/* Common Styles */
.swiper-pagination-fraction,
.swiper-pagination-custom,
.swiper-container-horizontal > .swiper-pagination-bullets {
  bottom: 10px;
  left: 0;
  width: 100%;
}
/* Bullets */
.swiper-pagination-bullets-dynamic {
  overflow: hidden;
  font-size: 0;
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet {
  -webkit-transform: scale(0.33);
  -ms-transform: scale(0.33);
  transform: scale(0.33);
  position: relative;
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active {
  -webkit-transform: scale(1);
  -ms-transform: scale(1);
  transform: scale(1);
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active-main {
  -webkit-transform: scale(1);

```

```
-ms-transform: scale(1);
transform: scale(1);
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active-prev {
  -webkit-transform: scale(0.66);
  -ms-transform: scale(0.66);
  transform: scale(0.66);
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active-prev-prev {
  -webkit-transform: scale(0.33);
  -ms-transform: scale(0.33);
  transform: scale(0.33);
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active-next {
  -webkit-transform: scale(0.66);
  -ms-transform: scale(0.66);
  transform: scale(0.66);
}
.swiper-pagination-bullets-dynamic .swiper-pagination-bullet-active-next-next {
  -webkit-transform: scale(0.33);
  -ms-transform: scale(0.33);
  transform: scale(0.33);
}
.swiper-pagination-bullet {
  width: 8px;
  height: 8px;
  display: inline-block;
  border-radius: 100%;
  background: #000;
  opacity: 0.2;
}
button.swiper-pagination-bullet {
  border: none;
  margin: 0;
  padding: 0;
  -webkit-box-shadow: none;
  box-shadow: none;
  -webkit-appearance: none;
  -moz-appearance: none;
  appearance: none;
}
.swiper-pagination-clickable .swiper-pagination-bullet {
  cursor: pointer;
}
.swiper-pagination-bullet-active {
```

```

    opacity: 1;
    background: #007aff;
}
.swiper-container-vertical > .swiper-pagination-bullets {
    right: 10px;
    top: 50%;
    -webkit-transform: translate3d(0px, -50%, 0);
    transform: translate3d(0px, -50%, 0);
}
.swiper-container-vertical > .swiper-pagination-bullets .swiper-pagination-bullet
{
    margin: 6px 0;
    display: block;
}
.swiper-container-vertical > .swiper-pagination-bullets.swiper-pagination-
bullets-dynamic {
    top: 50%;
    -webkit-transform: translateY(-50%);
    -ms-transform: translateY(-50%);
    transform: translateY(-50%);
    width: 8px;
}
.swiper-container-vertical > .swiper-pagination-bullets.swiper-pagination-
bullets-dynamic .swiper-pagination-bullet {
    display: inline-block;
    -webkit-transition: 200ms top, 200ms -webkit-transform;
    transition: 200ms top, 200ms -webkit-transform;
    -o-transition: 200ms transform, 200ms top;
    transition: 200ms transform, 200ms top;
    transition: 200ms transform, 200ms top, 200ms -webkit-transform;
}
.swiper-container-horizontal > .swiper-pagination-bullets .swiper-pagination-
bullet {
    margin: 0 4px;
}
.swiper-container-horizontal > .swiper-pagination-bullets.swiper-pagination-
bullets-dynamic {
    left: 50%;
    -webkit-transform: translateX(-50%);
    -ms-transform: translateX(-50%);
    transform: translateX(-50%);
    white-space: nowrap;
}
.swiper-container-horizontal > .swiper-pagination-bullets.swiper-pagination-
bullets-dynamic .swiper-pagination-bullet {

```

```

    -webkit-transition: 200ms left, 200ms -webkit-transform;
    transition: 200ms left, 200ms -webkit-transform;
    -o-transition: 200ms transform, 200ms left;
    transition: 200ms transform, 200ms left;
    transition: 200ms transform, 200ms left, 200ms -webkit-transform;
}
.swiper-container-horizontal.swiper-container-rtl > .swiper-pagination-bullets-
dynamic .swiper-pagination-bullet {
    -webkit-transition: 200ms right, 200ms -webkit-transform;
    transition: 200ms right, 200ms -webkit-transform;
    -o-transition: 200ms transform, 200ms right;
    transition: 200ms transform, 200ms right;
    transition: 200ms transform, 200ms right, 200ms -webkit-transform;
}
/* Progress */
.swiper-pagination-progressbar {
    background: rgba(0, 0, 0, 0.25);
    position: absolute;
}
.swiper-pagination-progressbar .swiper-pagination-progressbar-fill {
    background: #007aff;
    position: absolute;
    left: 0;
    top: 0;
    width: 100%;
    height: 100%;
    -webkit-transform: scale(0);
    -ms-transform: scale(0);
    transform: scale(0);
    -webkit-transform-origin: left top;
    -ms-transform-origin: left top;
    transform-origin: left top;
}
.swiper-container-rtl .swiper-pagination-progressbar .swiper-pagination-
progressbar-fill {
    -webkit-transform-origin: right top;
    -ms-transform-origin: right top;
    transform-origin: right top;
}
.swiper-container-horizontal > .swiper-pagination-progressbar,
.swiper-container-vertical > .swiper-pagination-progressbar.swiper-pagination-
progressbar-opposite {
    width: 100%;
    height: 4px;
    left: 0;

```

```
    top: 0;
}
.swiper-container-vertical > .swiper-pagination-progressbar,
.swiper-container-horizontal > .swiper-pagination-progressbar.swiper-pagination-
progressbar-opposite {
    width: 4px;
    height: 100%;
    left: 0;
    top: 0;
}
.swiper-pagination-white .swiper-pagination-bullet-active {
    background: #ffffff;
}
.swiper-pagination-progressbar.swiper-pagination-white {
    background: rgba(255, 255, 255, 0.25);
}
.swiper-pagination-progressbar.swiper-pagination-white .swiper-pagination-
progressbar-fill {
    background: #ffffff;
}
.swiper-pagination-black .swiper-pagination-bullet-active {
    background: #000000;
}
.swiper-pagination-progressbar.swiper-pagination-black {
    background: rgba(0, 0, 0, 0.25);
}
.swiper-pagination-progressbar.swiper-pagination-black .swiper-pagination-
progressbar-fill {
    background: #000000;
}
.swiper-pagination-lock {
    display: none;
}
/* Scrollbar */
.swiper-scrollbar {
    border-radius: 10px;
    position: relative;
    -ms-touch-action: none;
    background: rgba(0, 0, 0, 0.1);
}
.swiper-container-horizontal > .swiper-scrollbar {
    position: absolute;
    left: 1%;
    bottom: 3px;
    z-index: 50;
}
```

```
    height: 5px;
    width: 98%;
}
.swiper-container-vertical > .swiper-scrollbar {
    position: absolute;
    right: 3px;
    top: 1%;
    z-index: 50;
    width: 5px;
    height: 98%;
}
.swiper-scrollbar-drag {
    height: 100%;
    width: 100%;
    position: relative;
    background: rgba(0, 0, 0, 0.5);
    border-radius: 10px;
    left: 0;
    top: 0;
}
.swiper-scrollbar-cursor-drag {
    cursor: move;
}
.swiper-scrollbar-lock {
    display: none;
}
.swiper-zoom-container {
    width: 100%;
    height: 100%;
    display: -webkit-box;
    display: -webkit-flex;
    display: -ms-flexbox;
    display: flex;
    -webkit-box-pack: center;
    -webkit-justify-content: center;
    -ms-flex-pack: center;
    justify-content: center;
    -webkit-box-align: center;
    -webkit-align-items: center;
    -ms-flex-align: center;
    align-items: center;
    text-align: center;
}
.swiper-zoom-container > img,
.swiper-zoom-container > svg,
```

```

.swiper-zoom-container > canvas {
  max-width: 100%;
  max-height: 100%;
  -o-object-fit: contain;
  object-fit: contain;
}
.swiper-slide-zoomed {
  cursor: move;
}
/* Preloader */
.swiper-lazy-preloader {
  width: 42px;
  height: 42px;
  position: absolute;
  left: 50%;
  top: 50%;
  margin-left: -21px;
  margin-top: -21px;
  z-index: 10;
  -webkit-transform-origin: 50%;
  -ms-transform-origin: 50%;
  transform-origin: 50%;
  -webkit-animation: swiper-preloader-spin 1s steps(12, end) infinite;
  animation: swiper-preloader-spin 1s steps(12, end) infinite;
}
.swiper-lazy-preloader:after {
  display: block;
  content: '';
  width: 100%;
  height: 100%;
  background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20viewBox%3D'0%200%20120%20120'%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F200
0%2Fsvg'%20xmlns%3Axlink%3D'http%3A%2F%2Fwww.w3.org%2F1999%2F xlink'%3E%3Cdefs%3E%
3Cline%20id%3D'1'%20x1%3D'60'%20x2%3D'60'%20y1%3D'7'%20y2%3D'27'%20stroke%3D'%236
c6c6c'%20stroke-width%3D'11'%20stroke-
linecap%3D'round'%2F%3E%3C%2Fdefs%3E%3Cg%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opaci
ty%3D'.27'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.27'%20transform%3D'r
otate(30%2060%2C60) '%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.27'%20tran
sform%3D'rotate(60%2060%2C60) '%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.
27'%20transform%3D'rotate(90%2060%2C60) '%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20op
acity%3D'.27'%20transform%3D'rotate(120%2060%2C60) '%2F%3E%3Cuse%20xlink%3Ahref%3D
'%231'%20opacity%3D'.27'%20transform%3D'rotate(150%2060%2C60) '%2F%3E%3Cuse%20xlin
k%3Ahref%3D'%231'%20opacity%3D'.37'%20transform%3D'rotate(180%2060%2C60) '%2F%3E%3
Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.46'%20transform%3D'rotate(210%2060%2C6
0) '%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.56'%20transform%3D'rotate(2

```

```

40%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.66'%20transform%
3D'rotate(270%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.75'%2
0transform%3D'rotate(300%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacit
y%3D'.85'%20transform%3D'rotate(330%2060%2C60)'%2F%3E%3C%2Fg%3E%3C%2Fsvg%3E");
    background-position: 50%;
    background-size: 100%;
    background-repeat: no-repeat;
}
.swiper-lazy-preloader-white:after {
    background-image: url("data:image/svg+xml;charset=utf-
8,%3Csvg%20viewBox%3D'0%200%20120%20120'%20xmlns%3D'http%3A%2F%2Fwww.w3.org%2F200
0%2Fsvg'%20xmlns%3Axlink%3D'http%3A%2F%2Fwww.w3.org%2F1999%2Fxmlns%3Exlink%3D'http%3A%2F%2Fwww.w3.org%2F1999%2F%3E%3Cdefs%3E%
3Cline%20id%3D'l'%20x1%3D'60'%20x2%3D'60'%20y1%3D'7'%20y2%3D'27'%20stroke%3D'%23f
ff'%20stroke-width%3D'11'%20stroke-
linecap%3D'round'%2F%3E%3C%2Fdefs%3E%3Cg%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opaci
ty%3D'.27'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.27'%20transform%3D'r
otate(30%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.27'%20tran
sform%3D'rotate(60%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.
27'%20transform%3D'rotate(90%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20op
acity%3D'.27'%20transform%3D'rotate(120%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D
'%231'%20opacity%3D'.27'%20transform%3D'rotate(150%2060%2C60)'%2F%3E%3Cuse%20xlin
k%3Ahref%3D'%231'%20opacity%3D'.37'%20transform%3D'rotate(180%2060%2C60)'%2F%3E%3
Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.46'%20transform%3D'rotate(210%2060%2C6
0)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.56'%20transform%3D'rotate(2
40%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.66'%20transform%
3D'rotate(270%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacity%3D'.75'%2
0transform%3D'rotate(300%2060%2C60)'%2F%3E%3Cuse%20xlink%3Ahref%3D'%231'%20opacit
y%3D'.85'%20transform%3D'rotate(330%2060%2C60)'%2F%3E%3C%2Fg%3E%3C%2Fsvg%3E");
}
@-webkit-keyframes swiper-preloader-spin {
    100% {
        -webkit-transform: rotate(360deg);
        transform: rotate(360deg);
    }
}
@keyframes swiper-preloader-spin {
    100% {
        -webkit-transform: rotate(360deg);
        transform: rotate(360deg);
    }
}
/* ally */
.swiper-container .swiper-notification {
    position: absolute;
    left: 0;

```



```
top: 0;
pointer-events: none;
opacity: 0;
z-index: -1000;
}
.swiper-container-fade.swiper-container-free-mode .swiper-slide {
  -webkit-transition-timing-function: ease-out;
  -o-transition-timing-function: ease-out;
  transition-timing-function: ease-out;
}
.swiper-container-fade .swiper-slide {
  pointer-events: none;
  -webkit-transition-property: opacity;
  -o-transition-property: opacity;
  transition-property: opacity;
}
.swiper-container-fade .swiper-slide .swiper-slide {
  pointer-events: none;
}
.swiper-container-fade .swiper-slide-active,
.swiper-container-fade .swiper-slide-active .swiper-slide-active {
  pointer-events: auto;
}
.swiper-container-cube {
  overflow: visible;
}
.swiper-container-cube .swiper-slide {
  pointer-events: none;
  -webkit-backface-visibility: hidden;
  backface-visibility: hidden;
  z-index: 1;
  visibility: hidden;
  -webkit-transform-origin: 0 0;
  -ms-transform-origin: 0 0;
  transform-origin: 0 0;
  width: 100%;
  height: 100%;
}
.swiper-container-cube .swiper-slide .swiper-slide {
  pointer-events: none;
}
.swiper-container-cube.swiper-container-rtl .swiper-slide {
  -webkit-transform-origin: 100% 0;
  -ms-transform-origin: 100% 0;
  transform-origin: 100% 0;
}
```

```

}
.swiper-container-cube .swiper-slide-active,
.swiper-container-cube .swiper-slide-active .swiper-slide-active {
  pointer-events: auto;
}
.swiper-container-cube .swiper-slide-active,
.swiper-container-cube .swiper-slide-next,
.swiper-container-cube .swiper-slide-prev,
.swiper-container-cube .swiper-slide-next + .swiper-slide {
  pointer-events: auto;
  visibility: visible;
}
.swiper-container-cube .swiper-slide-shadow-top,
.swiper-container-cube .swiper-slide-shadow-bottom,
.swiper-container-cube .swiper-slide-shadow-left,
.swiper-container-cube .swiper-slide-shadow-right {
  z-index: 0;
  -webkit-backface-visibility: hidden;
  backface-visibility: hidden;
}
.swiper-container-cube .swiper-cube-shadow {
  position: absolute;
  left: 0;
  bottom: 0px;
  width: 100%;
  height: 100%;
  background: #000;
  opacity: 0.6;
  -webkit-filter: blur(50px);
  filter: blur(50px);
  z-index: 0;
}
.swiper-container-flip {
  overflow: visible;
}
.swiper-container-flip .swiper-slide {
  pointer-events: none;
  -webkit-backface-visibility: hidden;
  backface-visibility: hidden;
  z-index: 1;
}
.swiper-container-flip .swiper-slide .swiper-slide {
  pointer-events: none;
}
.swiper-container-flip .swiper-slide-active,

```

```

.swiper-container-flip .swiper-slide-active .swiper-slide-active {
  pointer-events: auto;
}
.swiper-container-flip .swiper-slide-shadow-top,
.swiper-container-flip .swiper-slide-shadow-bottom,
.swiper-container-flip .swiper-slide-shadow-left,
.swiper-container-flip .swiper-slide-shadow-right {
  z-index: 0;
  -webkit-backface-visibility: hidden;
  backface-visibility: hidden;
}
.swiper-container-coverflow .swiper-wrapper {
  /* Windows 8 IE 10 fix */
  -ms-perspective: 1200px;
}

```

app.py:

```

import flask
import pickle
import pandas as pd
import numpy as np
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your
IBM Cloud account.
API_KEY = "dxP1HCGL9lgecETNiZGb7KHLTBHt166ozvcz999j_ML8"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token',
data={"apikey":
  API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' +
mltoken}

app = flask.Flask(__name__, template_folder='templates')
@app.route('/')
def main():
    return (flask.render_template('index.html'))

@app.route('/report')
def report():
    return (flask.render_template('report.html'))

@app.route('/jointreport')

```

```

def jointreport():
    return (flask.render_template('jointreport.html'))

@app.route("/Loan_Application", methods=['GET', 'POST'])
def Loan_Application():

    if flask.request.method == 'GET':
        return (flask.render_template('Loan_Application.html'))

    if flask.request.method == 'POST':

        #get input
        #gender as string
        genders_type = flask.request.form['genders_type']
        #marriage status as boolean YES: 1 , NO: 0
        marital_status = flask.request.form['marital_status']
        #Dependents: No. of people dependent on the applicant (0,1,2,3+)
        dependents = flask.request.form['dependents']

        #dependents = dependents_to_int[dependents.upper()]

        #education status as boolean Graduated, Not graduated.
        education_status = flask.request.form['education_status']
        #Self_Employed: If the applicant is self-employed or not (Yes, No)
        self_employment = flask.request.form['self_employment']
        #Applicant Income
        applicantIncome = float(flask.request.form['applicantIncome'] if
flask.request.form['applicantIncome'] else 0)
        #Co-Applciant Income
        coapplicantIncome = float(flask.request.form['coapplicantIncome'] if
flask.request.form['coapplicantIncome'] else 0)
        #loan amount as integer
        loan_amnt = float(flask.request.form['loan_amnt'] if
flask.request.form['loan_amnt'] else 0)
        #term as integer: from 10 to 365 days...
        term_d = int(flask.request.form['term_d'] if flask.request.form['term_d']
else 0)

        # credit_history
        credit_history = int(flask.request.form['credit_history'] if
flask.request.form['credit_history'] else 1)
        # property are
        property_area = flask.request.form['property_area']
        #property_area = property_area_to_int[property_area.upper()]

```

```

#create original output dict
output_dict = dict()
output_dict['ApplicantIncome'] = applicantIncome
output_dict['CoapplicantIncome'] = coapplicantIncome
output_dict['LoanAmount'] = loan_amnt
output_dict['Loan Amount Term']=term_d
output_dict['Credit History'] = credit_history
output_dict['Gender'] = 1 if genders_type=='MALE' else 0
output_dict['Marital Status'] = 1 if marital_status=='YES' else 0
output_dict['Education Level'] = 1 if education_status=='GRADUATED' else
0

output_dict['Dependents_0'] = 1 if dependents=='0' else 0
output_dict['Dependents_1'] = 1 if dependents=='1' else 0
output_dict['Dependents_2'] = 1 if dependents=='2' else 0
output_dict['Dependents_3+'] = 1 if dependents=='3+' else 0
output_dict['Self Employment'] = 1 if self_employment=='YES' else 0
output_dict['Property Area Rural'] = 1 if property_area=='RURAL' else 0
output_dict['Property Area Semirural'] = 1 if property_area=='SEMIRURAL'
else 0

output_dict['Property Area Urban'] = 1 if property_area=='URBAN' else 0

df = pd.DataFrame([output_dict])

df.ApplicantIncome = np.sqrt(df.ApplicantIncome)
df.CoapplicantIncome = np.sqrt(df.CoapplicantIncome)
df.LoanAmount = np.sqrt(df.LoanAmount)

# print(type(df.values.tolist()))
# print(df.values.tolist())
x = df.values.tolist()

payload_scoring = {"input_data": [{"fields": [['ApplicantIncome',
'CoapplicantIncome', 'LoanAmount', 'Loan_Amount_Term', 'Credit_History',
'Gender', 'Married', 'Education', 'Dependents_0', 'Dependents_1', 'Dependents_2',
'Dependents_3+', 'Self_Employed', 'Property_Area_Rural',
'Property_Area_Semiurban', 'Property_Area_Urban']], "values": x}]}

response_scoring = requests.post('https://us-
south.ml.cloud.ibm.com/ml/v4/deployments/17c96438-9f16-49ea-9f7d-
e90409d0e746/predictions?version=2022-11-18', json=payload_scoring,
headers={'Authorization': 'Bearer ' + mltoken})
print("Scoring response")
print(response_scoring.json())
pred = response_scoring.json()['predictions'][0]['values'][0][0]

```

```
print(pred)
if pred==1:
    res = '??Congratulations! your Loan Application has been Approved!??'
else:
    res = '??Unfortunately your Loan Application has been Denied??'

    #render form again and add prediction
    return flask.render_template('Loan_Application.html',
original_input=output_dict, result=res)

if __name__ == '__main__':
    app.run(debug=True)
```

### GitHub & Project Demo Link

Repository:

<https://github.com/IBM-EPBL/IBM-Project-20402-1659718562>

Video Demo:

<https://drive.google.com/file/d/1qwOnsU3l6wubPDDaOUN0aLEJ5UAhNm5/view?usp=sharing>