Terrastack: Evaluating Branch Potential

1. Introduction

The objective of this analysis is to use biophysical and economic indicators to evaluate branch locations for potential demand in Maharashtra. Taking taluka headquarters as possible locations and estimating the catchment to be in a 25km radius, we use factors such as household density, infrastructure growth, and irrigation support to score branches for possible agri-loan and micro-enterprise loan demand. This framework is designed to guide branch expansion strategy, coupled with bureau data and competitor penetration.

A secondary objective was to evaluate existing branch networks. This allows institutions to make more effective decisions about operations — identifying causes for underperformance, exploring strategies at a village-level for lagging branches, and optimizing resource allocation.

2. Factor Analysis

A. Key Factors

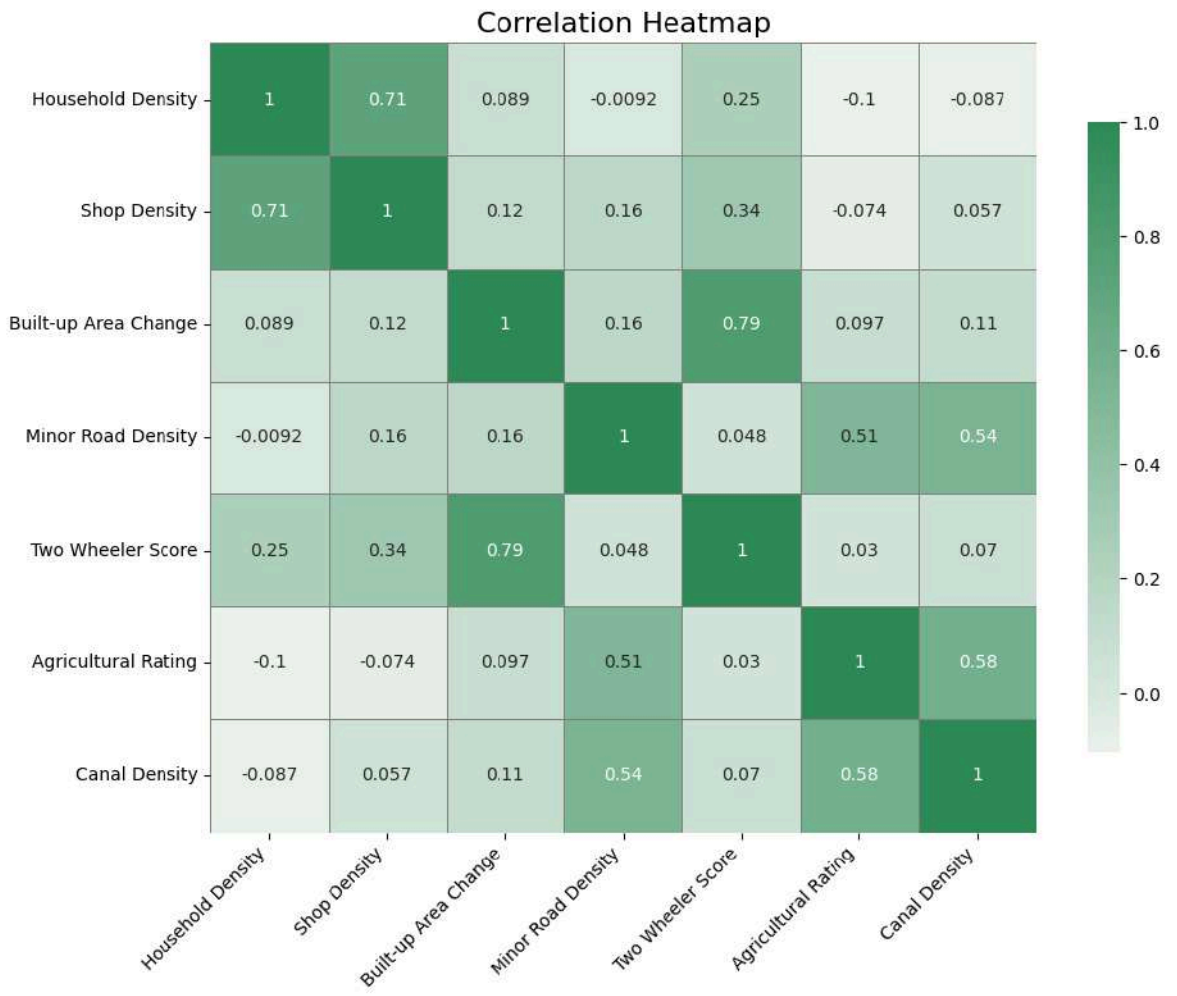
We evaluated various factors influencing the selection of a new branch location. All metrics have been computed within a 25 km radius of the taluka headquarters. Each metric is standardized on a scale from 0 to 10.

Indicator name	Explanation
Household Density	• Measures the total number of households in a 25km radius. • A high score indicates a dense population and a **significant potential customer base**.
Built-Up Area Change	• Measures the expansion of built-up area over the last decade in a 25km radius. • A high score indicates **overall development and growth** in a region.
Shop Density	• Measures the total number of shops of different categories in a 25km radius. • It assesses a region's **commercial density** to gauge its potential for future growth.
Minor Road Density	• Measures the density of minor roads in a 25km radius. • It represents **connectivity** within the given region, essential for easy access to the branch and general infrastructure support
Canal Density	• Measures the total length of canals in a 25km radius. • A high score signifies greater **agricultural productivity** and **economic stability**, driven by reliable irrigation.
Two-wheeler Score	• Measures the percentage of two-wheeler owners in a 25km radius.

	• A high score represents **general affluence** in the given region.
Agricultural Rating	• A composite score measuring general agricultural productivity in a 25km radius. It incorporates slope gradient, water endowment index, soil composition (clay content), and terrain characteristics. • A high score represents **agricultural productivity** in the given region.

B. Correlation Analysis

Understanding the relationships between various factors gives us insight into gauging the importance of each, and it is important to verify if our indices are grounded in reality. Shown below is a correlation matrix of our indices.



Correlation Heatmap between the Key Factors

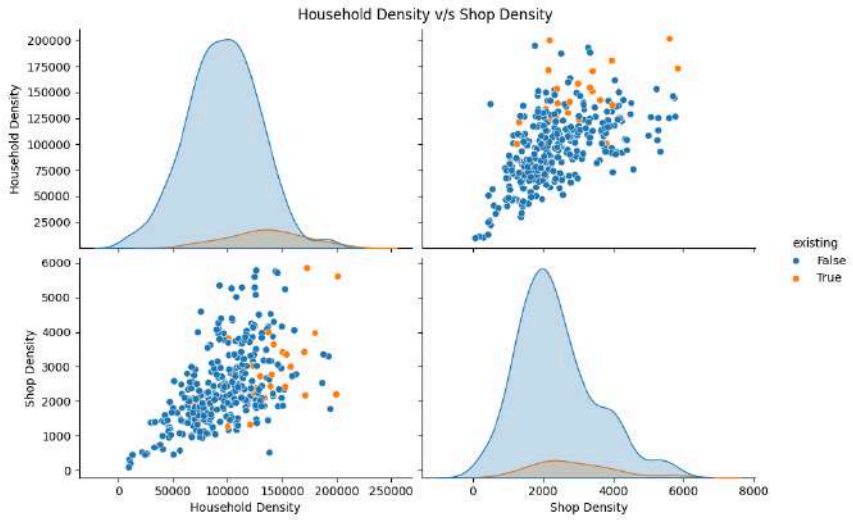
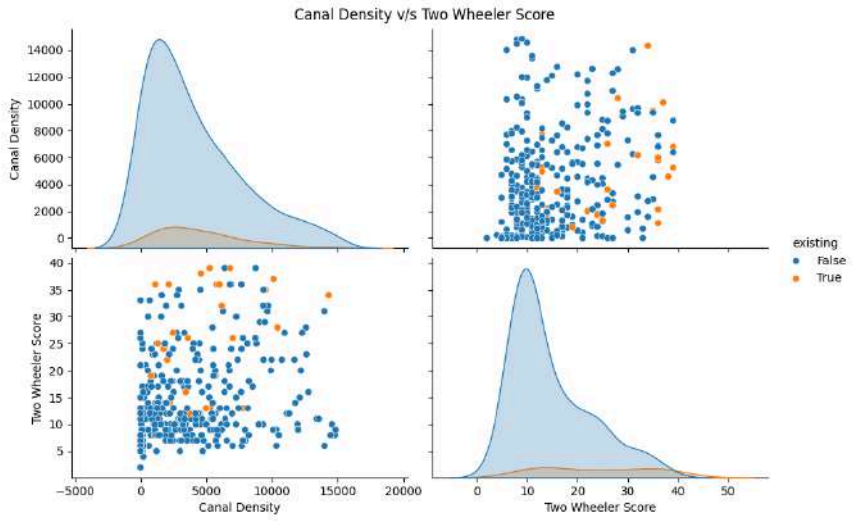
High-correlation pairs include:

- High Correlation (0.79) between the two-wheeler score and the built-up area score. This is an interesting correlation — higher population affluence correlating with higher growth suggests that development and wealth accumulation are tightly linked in rural Maharashtra. This warrants further investigation.

- High Correlation (0.71) between household density and shop density. This is expected, as commercial activity naturally concentrates in more populated areas.
- High Correlation (0.58) between canal density and the agricultural rating. This is expected, as the presence of a strong irrigation network generally implies higher agricultural output.
- High Correlation (0.54)between minor road density and canal density. This correlation is reinforced by the similar correlation (0.51) between minor road density and agricultural rating — road networks generally develop near regions with high agricultural output to facilitate transport of produce.

C. Pairwise Analysis

We made pairwise plots for the factors, separating existing branches from potential new locations. This helps us understand patterns in the placement of current branches and discover hidden relations between pairs of features. Outliers have been removed for clarity. Given below is a table of key pairwise plots and their inferences.

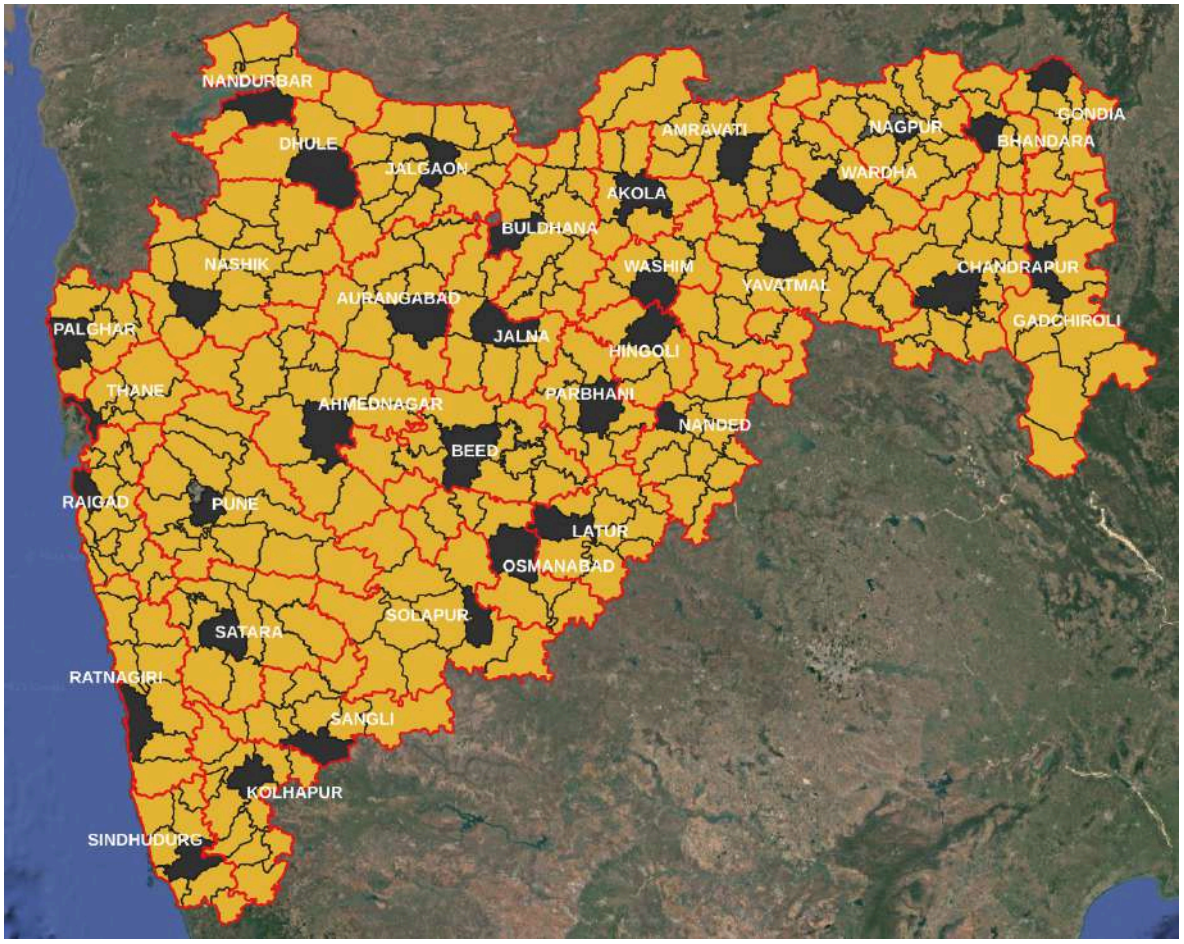
Pairwise Plots	Inferences
	• The current model used to choose branch locations by this NBFC gives **more weightage to households than to shops**. • Our prediction model for Business-centric branches gives **more importance to shops**.
	• The current model used to choose branch locations by this NBFC gives **more weightage to two-wheeler scores than to canal density**. • Our prediction model for Business-centric branches gives **more importance to the two-wheeler score**, whereas the Agricultural-centric branches give more weightage to canal density.

3. Methodology for Selection

We analyzed all 355 taluka headquarters in Maharashtra. Our branch ratings are divided into two categories — business-centered and agriculture-centered. Each category uses a different set of factors with varying importance. Based on these, we have created two ratings for branch selection, on a scale of 0 to 10.

A. Removal of District Headquarters Talukas

We excluded talukas containing district headquarters from the scoring, as these urban centers create outlier effects and bias ratings for surrounding talukas.



Representation of Talukas containing District Headquarters

B. Filters Applied

We first filtered potential locations based on the following threshold criteria:

- Household Density - Only headquarters with **more than 100,000 households** within a 25 km radius are considered. This results in **191 out of 355** headquarters being included.

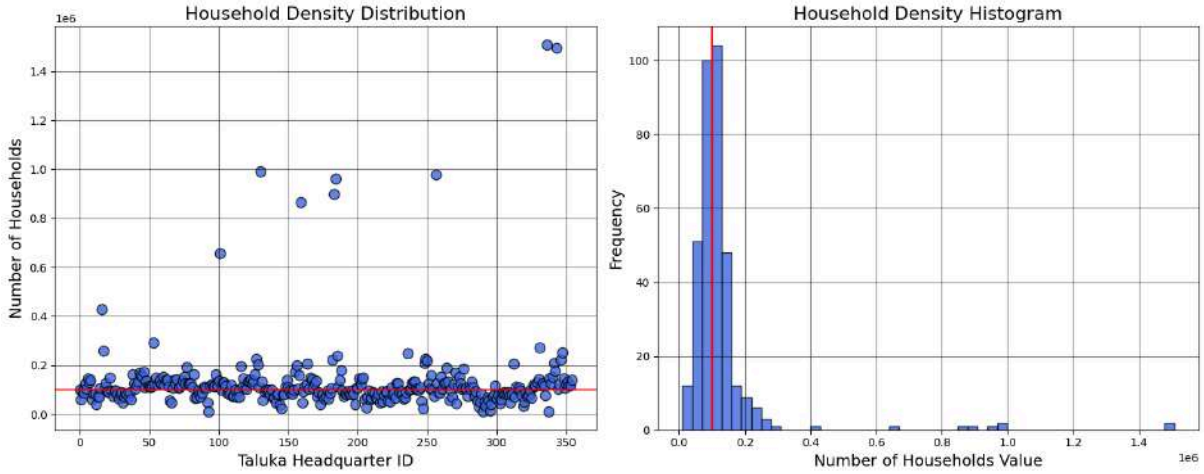


Figure 2: Density Distribution and Histogram for Household Density

- Existing branches -Only headquarters without an existing branch from the partner network are considered.This results in **162 out of 191** headquarters being included.

- Built-up Area- Only headquarters with a built-up area of more than 3,000,000 m² within a 25 km radius are considered. This absolute area threshold ensures a minimum level of development, complementing the Built-Up Area Change factor which measures growth trajectory. This results in **149 out of 162** headquarters being included.

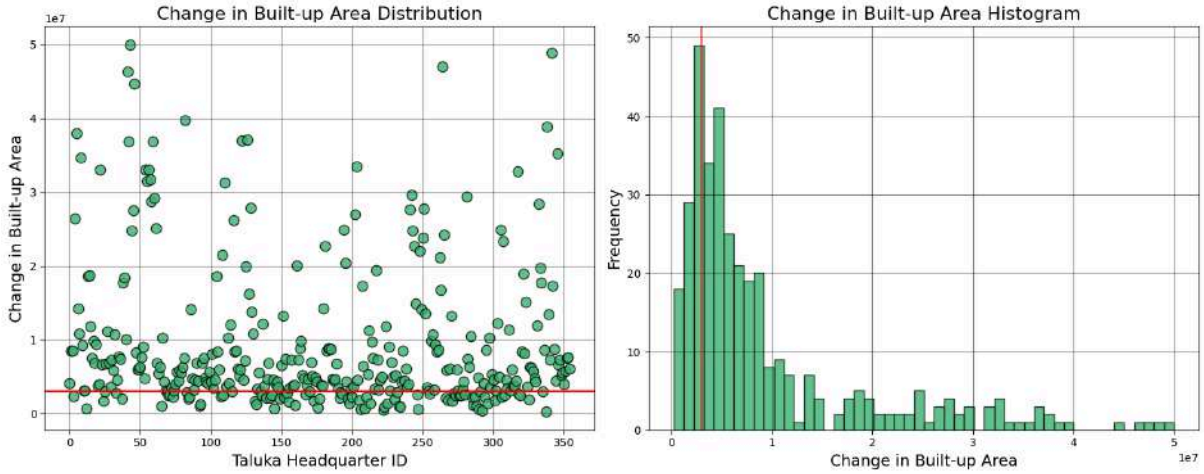


Figure 2: Density Distribution and Histogram for Builtup Area

- Minor Road Density - Only headquarters with a length of minor roads **more than 1,700,000 m** within a 25 km radius are considered. This results in **131 out of 149** headquarters being included.

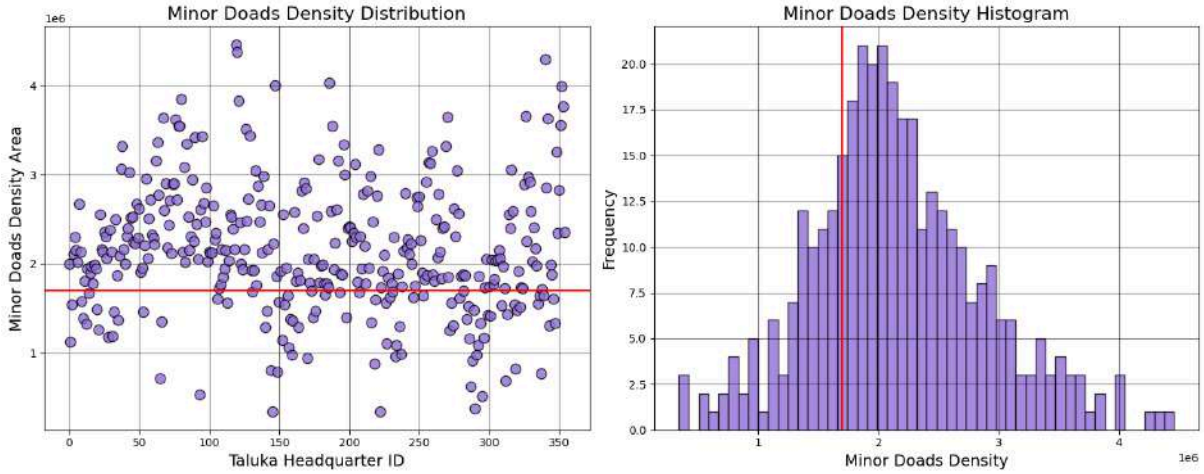
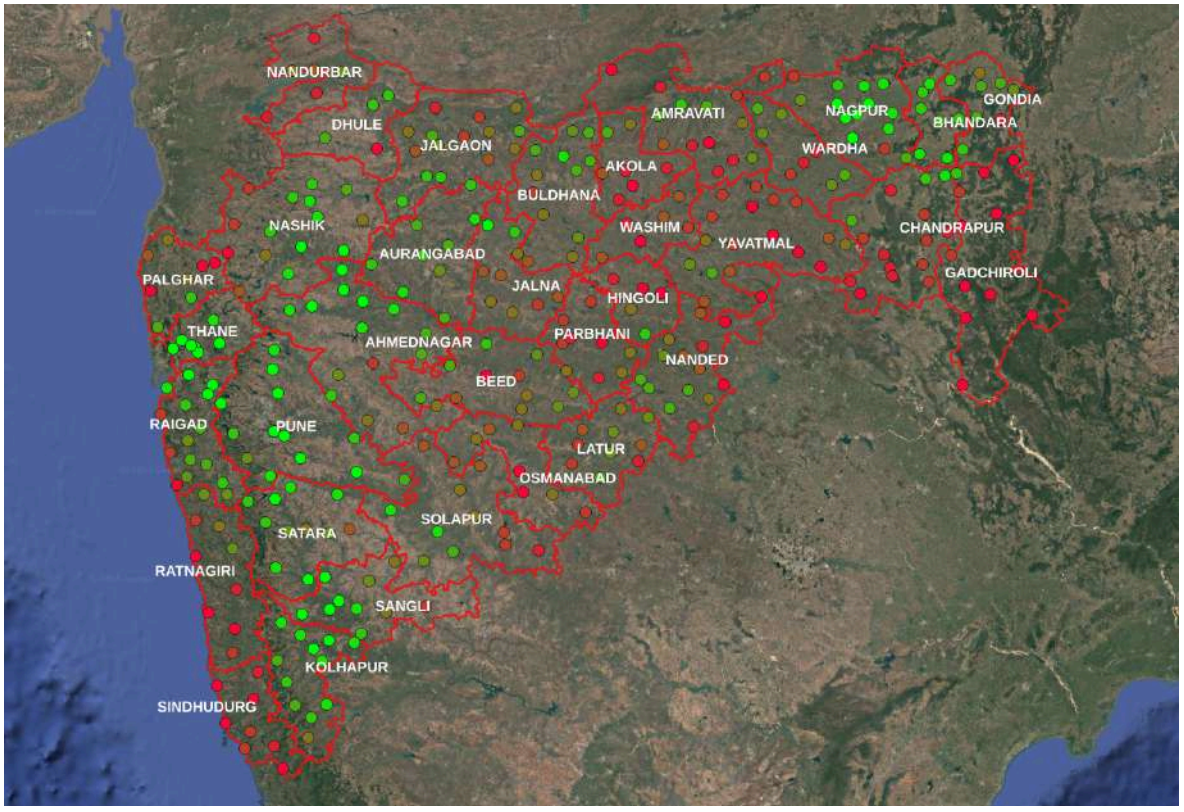


Figure 3: Density Distribution and Histogram for Minor Road Density

C. Business-Centered Rating

This is the “business loan” rating given to a branch - the key factors included in this score aim to capture potential for micro-enterprise lending.



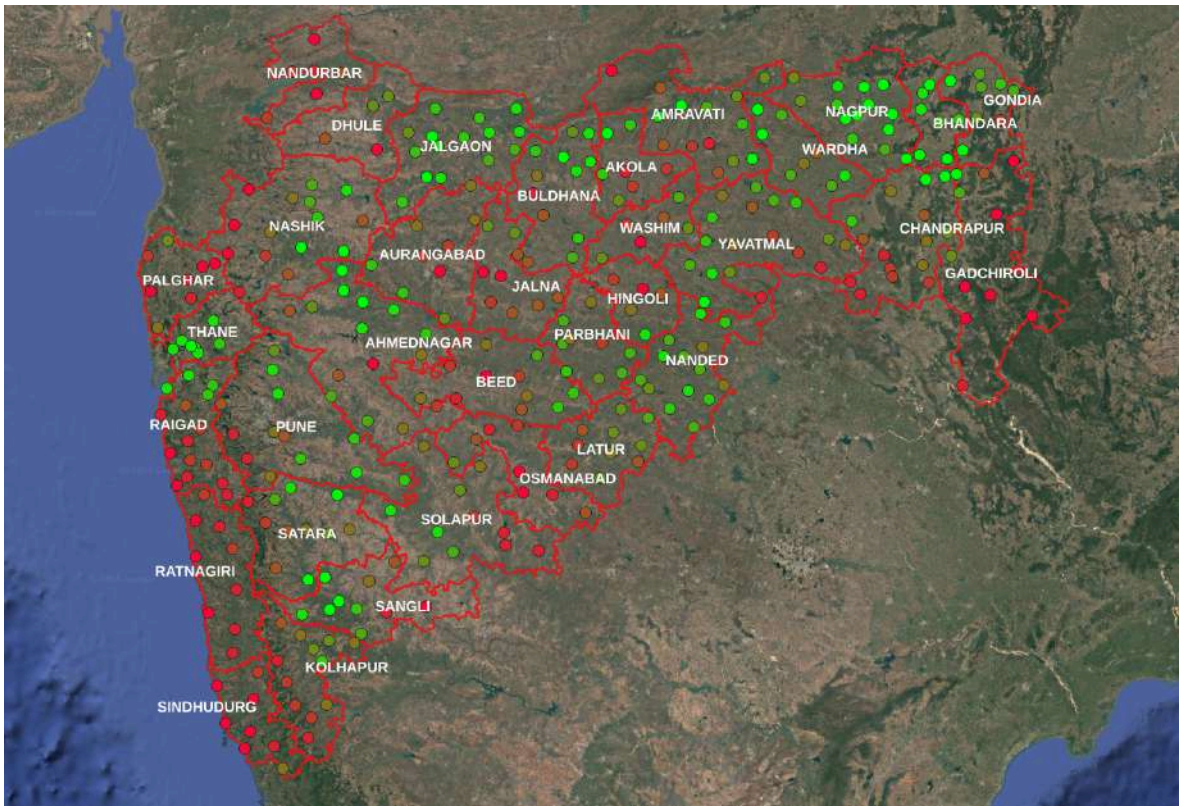
Visualization of taluka headquarters in Maharashtra coloured by business rating - from dark red (0-1) to dark green (9-10)

The factors used to calculate it are-

Indicator Name	Weightage in the Rating
Household Density	10%
Built-up Area Score	30%
Shop Density	40%
Minor Road Density	10%
Two-wheeler Score	10%

Shop Density is the most important feature given the **focus on micro-enterprise lending.** Built-up Area score is also significant as it indicates economic growth, which drives an **increase in the number of businesses**.

D. Agriculture-Centered Rating
This is the rating given to a branch more focused on providing agricultural loans to farmers.



Visualization of taluka headquarters in Maharashtra coloured by agricultural rating - from dark red (0-1) to dark green (9-10)

The factors used to calculate it are-

Indicator Name	Weightage in the Rating
Household Density	40%
Agricultural Score	40%
Canal Density	10%
Minor Road Density	10%

4. Analysis of Existing Branches

This section analyzes existing branches and presents their ratings.

A. Agricultural Rating

Top-performing branches for agriculture-centric operations:

District	Taluka	Agricultural Rating
Ahmednagar	Kopargaon	7.07
Sangli	Palus	7.00
Satara	Karad	6.65
Buldhana	Nandura	6.51
Satara	Phaltan	6.49

Underperforming branches for agriculture-centric operations:

District	Taluka	Agricultural Rating	Major Reason
Kolhapur	Bhudargad	3.91	Low roads score and agricultural suitability
Ahmednagar	Parner	4.59	Low household score
Nashik	Nandgaon	4.70	Low canal score
Ahmednagar	Akola	4.80	Low canal score
Dhule	Sakri	4.83	Low household score

B. Business Rating

Top-performing branches for business-centric operations:

District	Taluka	Business Rating
Pune	Khed	9.2
Sangli	Palus	9.2
Satara	Karad	8.7
Kolhapur	Hatkanangle	8.7
Ahmednagar	Kopargaon	8.7

Underperforming branches for business-centric operations:

District	Taluka	Business Rating	Major Reason
Jalgaon	Chopda	3.3	Low shop score
Jalgaon	Yawal	4.4	Low built-up area score
Jalgaon	Raver	5.0	Low built-up area and minor roads score
Nashik	Nandgaon	5.4	Low shop score
Jalgaon	Bodvad	5.4	Low built-up change score

5. Recommended Locations for New Branches

A. Agricultural Branches

District	Taluka	Agricultural Rating
Nagpur	Kamptee	7.45
Sangli	Kadegaon	7.14
Bhandara	Lakhandur	7.13
Gadchiroli	Desaiganjvadasa	6.99
Nagpur	Parseoni	6.96
Chandrapur	Brahmapuri	6.94
Bhandara	Pauni	6.84
Sangli	Walwa	6.80
Bhandara	Tumsar	6.79

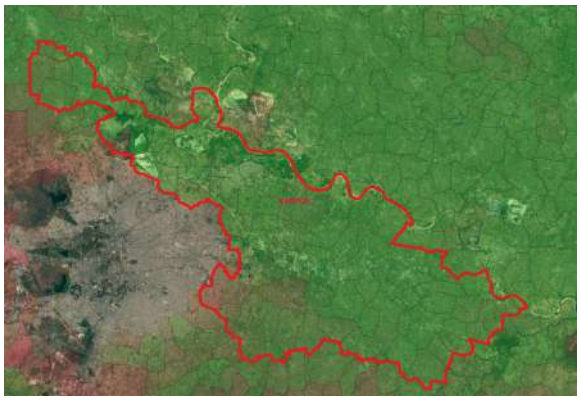
Nagpur	Mauda	6.76

B. Business Branches

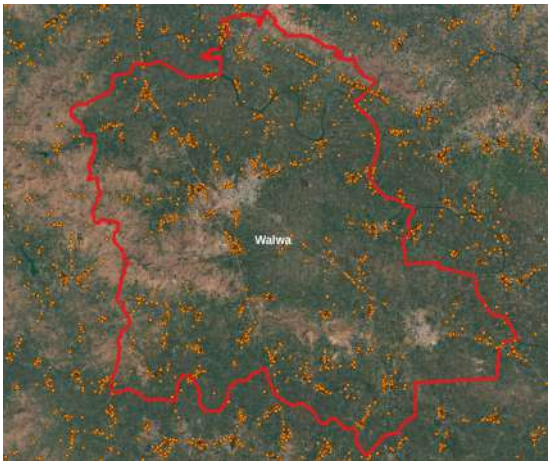
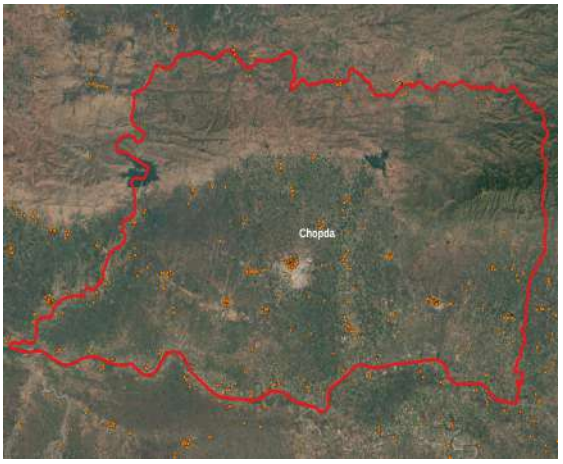
District	Taluka	Business Rating
Sangli	Walwa	9.2
Sangli	Kadegaon	9.2
Nagpur	Kamptee	8.9
Nagpur	Hingna	8.8
Sangli	Shirala	8.7
Nagpur	Nagpur Rural	8.6
Nagpur	Kalameshwar	8.5
Satara	Wai	8.2
Sangli	Tasgaon	8.0
Satara	Khandala	8.0

6. Visual Examples

A. Agricultural Rating: Kamptee (Nagpur) v/s Bhudargad (Kolhapur)

	
Kamptee Agricultural Suitability	**Bhudargad Agricultural Suitability**

B. Business Branches: Walwa (Sangli) v/s Chopda (Jalgaon)

	
Walwa Shops	**Chopda Shops**