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FIBRE COMPETITIVE
INTENSITY MODEL

Fibre Uptake Prediction Application(APP)

**FIBER COMPETITIVE INTENSIVE MODEL –
UGANDA**





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Meet the Team



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Introduction

Goal

A Machine Learning (ML) driven application (app) that predicts the uptake of fiber optic connections in Uganda.

Uganda

- **District:** is unit of analysis, Government backbone terrestrial fibre distributed without last mile connectivity
- **Telcos:** higher revenue potential, better customer retention, reduced maintenance costs, scalability, and future-proofing.

2 %

Fiber penetration



Problem statement

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COMPANY GOALS

- To increase revenues,
- To effectively plan resources and infrastructure ,
- To increase customer base

CONSTRAINTS

- High deployment costs,
- limited resources to deploy,
- limited penetration

TOOLS

- Limited data-driven & quantitative tools to support their fiber roll-out plans .
- Current solutions mainly focus on cost calculations (Comsof, Netadmin,...)

We need tools to identify possible expansion areas



Solution

1

Predictive Analysis (Predictor)

- uses data and statistical algorithm to forecast the uptake of fiber optic connections in different regions of Uganda.
- considers various demographic factors to provide accurate predictions.

2

Interactive Dashboard

- allows exploration of predicted uptake of fiber optic connections in different regions of Uganda.
- allows users to interact with the data and adjust parameters to simulate different scenarios.

3

Visualization

- present the predicted uptake of fiber optic connections in an easy-to-understand format.
- Map which shows attractive fiber roll-out areas on different levels of granularity



Solution Map/Architecture

Tools

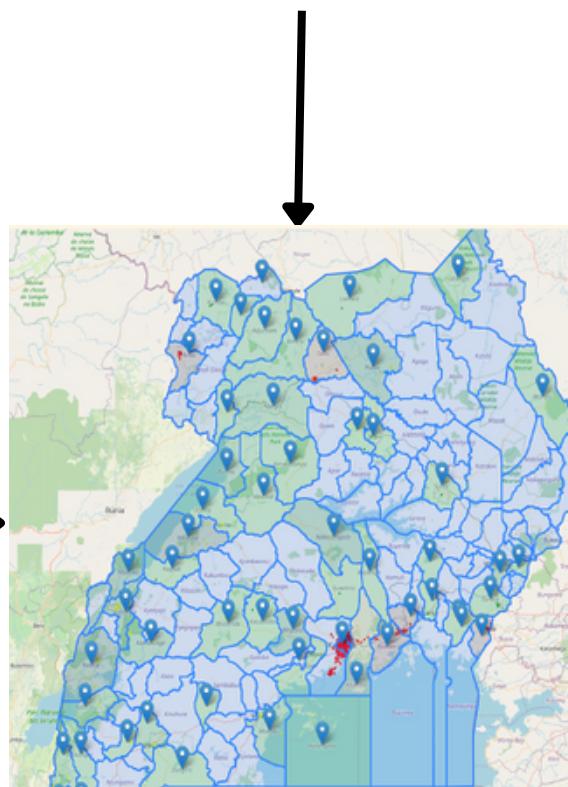
- Python & libraries
- Jupyter IDEs : Anaconda nav, VS Code and Google Collab

Ookla data



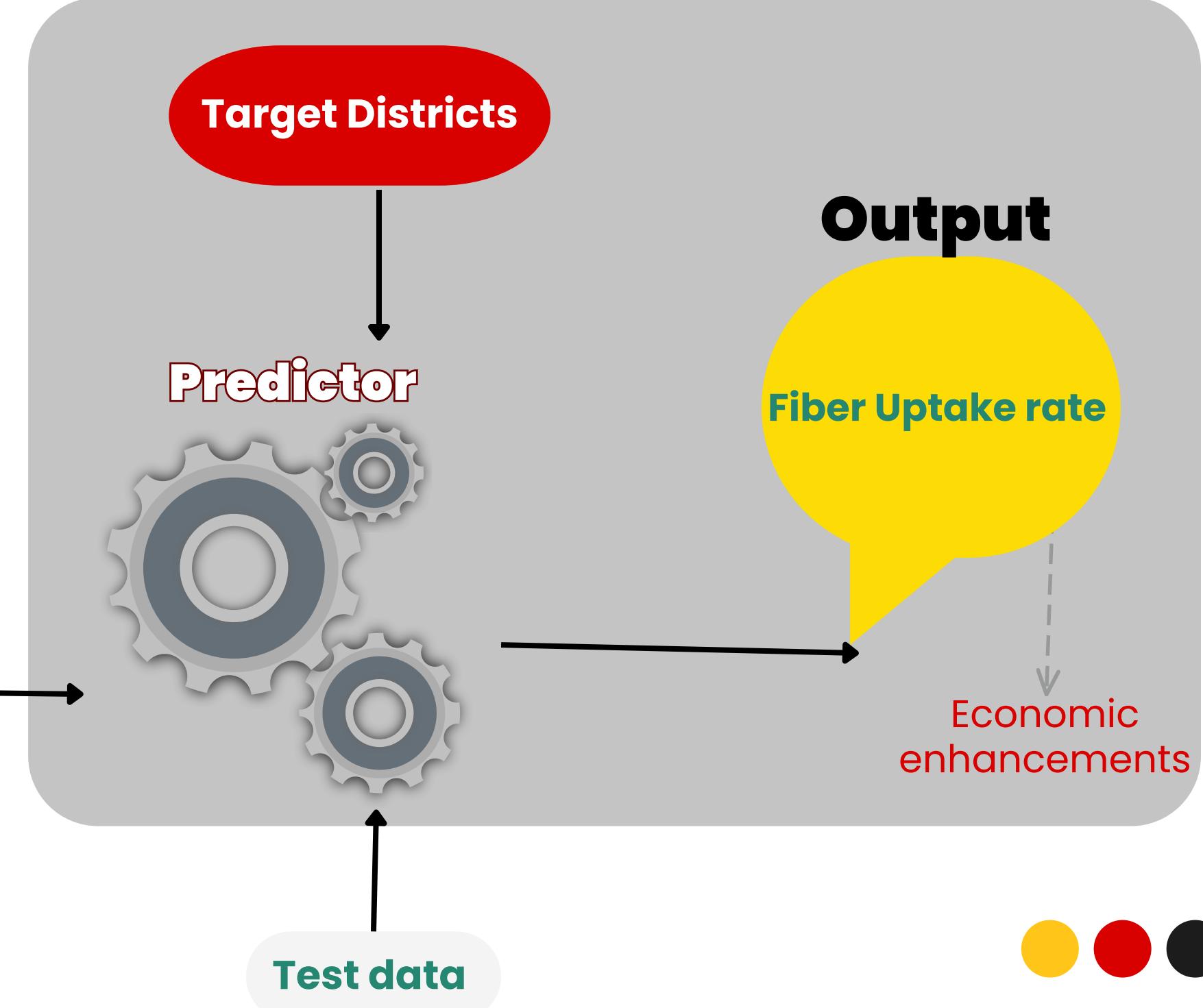
Demographic Data

Region	3.166913e-04
Population	7.710678e-08
Total_households	-3.592515e-07
Population_density	-5.452934e-06
Zonning	2.076203e-03
Avg_Age	6.624691e-03
literacy_rate_%	4.452618e-04
people_per_household	-2.646921e-03
Employment_rate	-3.130791e-04
speed_test_count	6.399054e-05



Model training

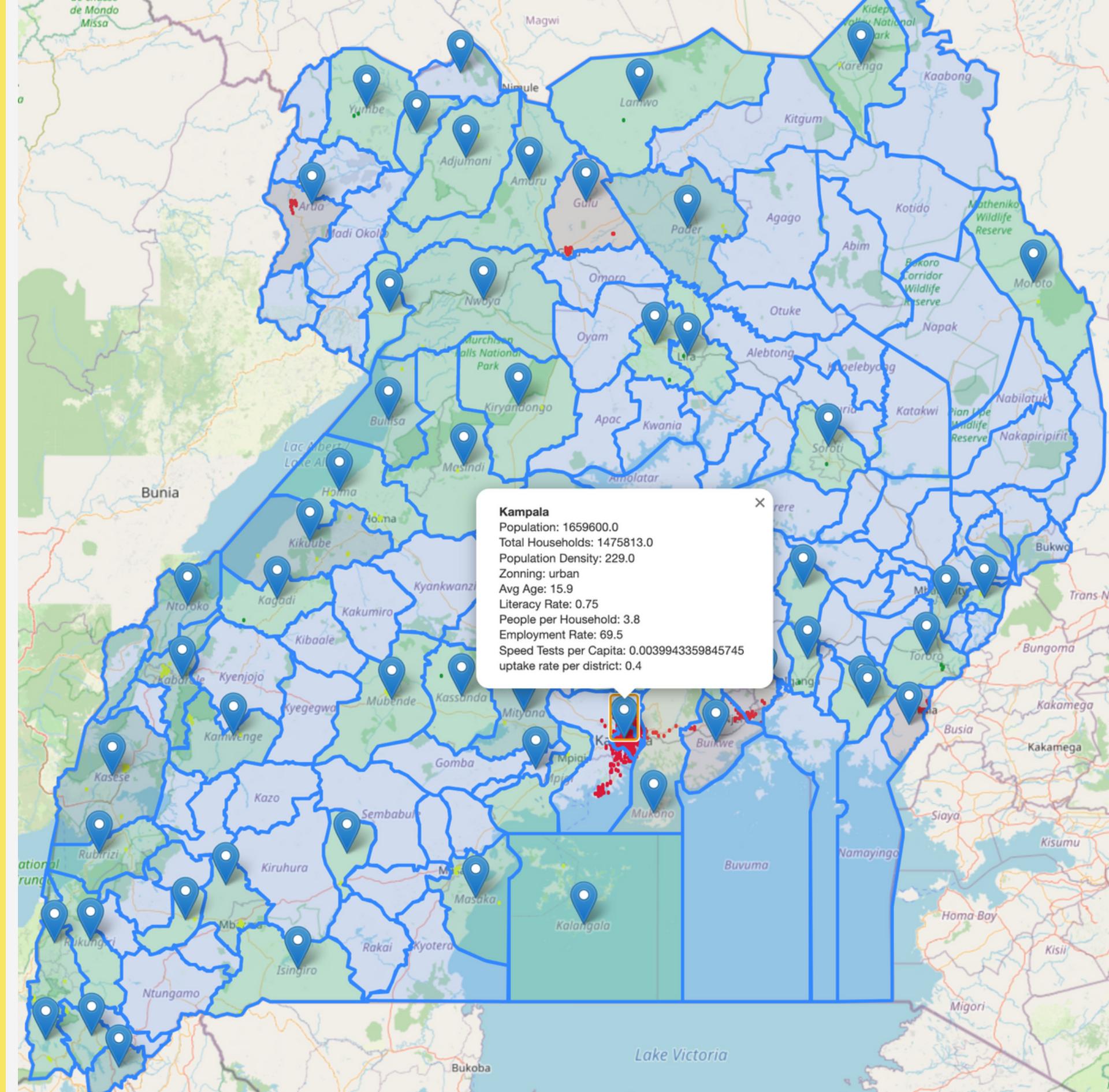
Streamlit and AWS



Output

Assumptions

1. Ookla data was the best proxy for fiber uptake rates in Uganda
 - a. Out of 135 districts, only 58 had Ookla activity (green and red areas)
 - b. The highest uptake was in districts in red
2. 55/100 people use internet (UCC)
3. Uptake rates are relative to fiber access



Overlay of Ookla data and demographic data on Ugandan map

Model Performance

	Training MSE	Test MSE	R SQUARED Training	R SQUARED Test
Linear Reg	5.635450	10.779658	0.809637	-7.071478
Ridge	4.986896	34.529979	0.828445	-8.062576
LASSO	4.901638	35.688019	0.831378	-8.366510
Reg Tree	1.102667	3.307949	0.962067	0.131811
Random Forest	5.406775	1.057153	0.814001	0.722545
LASSO SEL COLUMNS	5.361394	32.920565	0.815562	-7.640177
Random Forest sel cols	4.186429	1.238373	0.855982	0.674982

So far Random Forest Model Seems to have generated the most consistent result and therefore has performed better

the "Random Forest" model has a low mse train and test gat and the best R sqaured



Model features

LINEAR MODEL

Important features:

- Total households 0.050259,
- Wealth Index 0.023501,
- Population Density 0.0138,
- Literacy Rate. 0.014068,
- Eastern Region 0.009756

NON-LINEAR MODEL

Important features:

- Total households 0.05544,
- Wealth Index 0.98945
- People per household 0.00067,
- Literacy Rate. 0.00054,
- Employment Rate- 0.00336

Based on the random forest model
the following are the selected
features:

1. "GDP_per_capita"
2. "relative wealth index"
- 3."people_per_household"
- 4."Total_households",
5. "literacy_rate_%"
- 6."poverty_index", and
- 7."Zonning"



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The App

Predictor

Predictor App

Total_households:

0.00

rwl:

0.00

Population_density:

0.00

Literacy_rate_%

0.00

'Eastern'

0.00

Prediction:

0	0
0	-0.0448



what we learnt

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1. Understanding the challenges
2. Data and methodology
3. Problem solving skills
4. Data analysis and predictive modelling
5. Application development





Improvements



Usability

1. Improve app with interactive dashboard
2. Unify the map visual with the predictor

Usefulness

1. More granular data (Municipalities, wards)
2. Add economic outputs such as revenue expected and ROI
3. Improve on assumptions



Thank You

Time for Some questions