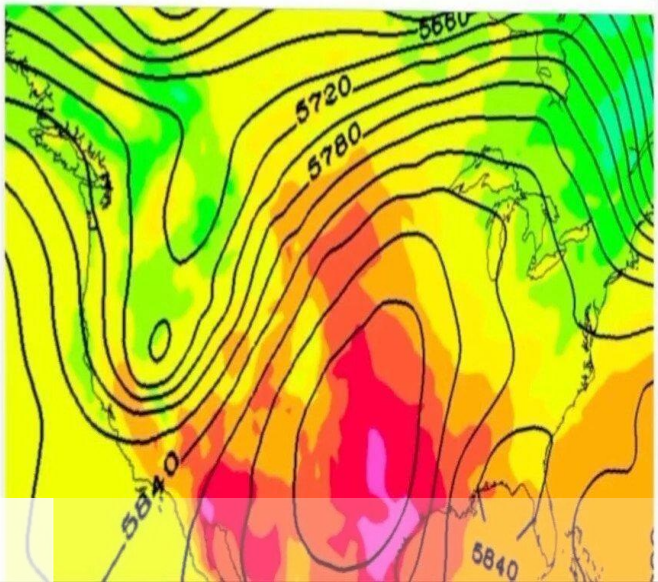
Heat wave

Prohibitory orders in place; teachers, children made to remove hijab before entering school at several locations



Advancing Heat Resilience

SLIIT
Discover Your Future

Group ID - 2023-24-

Meet Our Team

IT20142728
Ranawaka.T.D

IT20145552
Dissanayaka. D. M. S. M

IT20652500
B.N.S. Gunadasa

IT201455
T.M.S.B. Thelv

Introduction.

Why Heatwave resilience is important?

- **Public health protection**
  Even WHO has declared set of instructions to follow during heatwave conditions.

- **Provide Agricultural Resilience**
  forecast soil moisture and recommend suitable crops which helps to farmers to mitigate the impact .

Introduction.

Why HeatGuard is important?

- **Early warning system**
  Most people are not aware whether they are in a heatwave condition.This will help to reduce series health impacts

- **Public health protection**
  Make people aware about heatwaves which brings significant risk to public health s heat stroke,dehydration and heat exhaustion.

- **Provide Agricultural Resilience**
  forecast soil moisture and recommend suitable crops which helps to farmers to mitigate t impact .

Introduction.

Though Out App,

- We do risk communication to the users and asses their functionalities and engagement with exposure to heat.

- The background research begins with examines the various impacts on different sectors such as public health , agricultural , environmental etc…

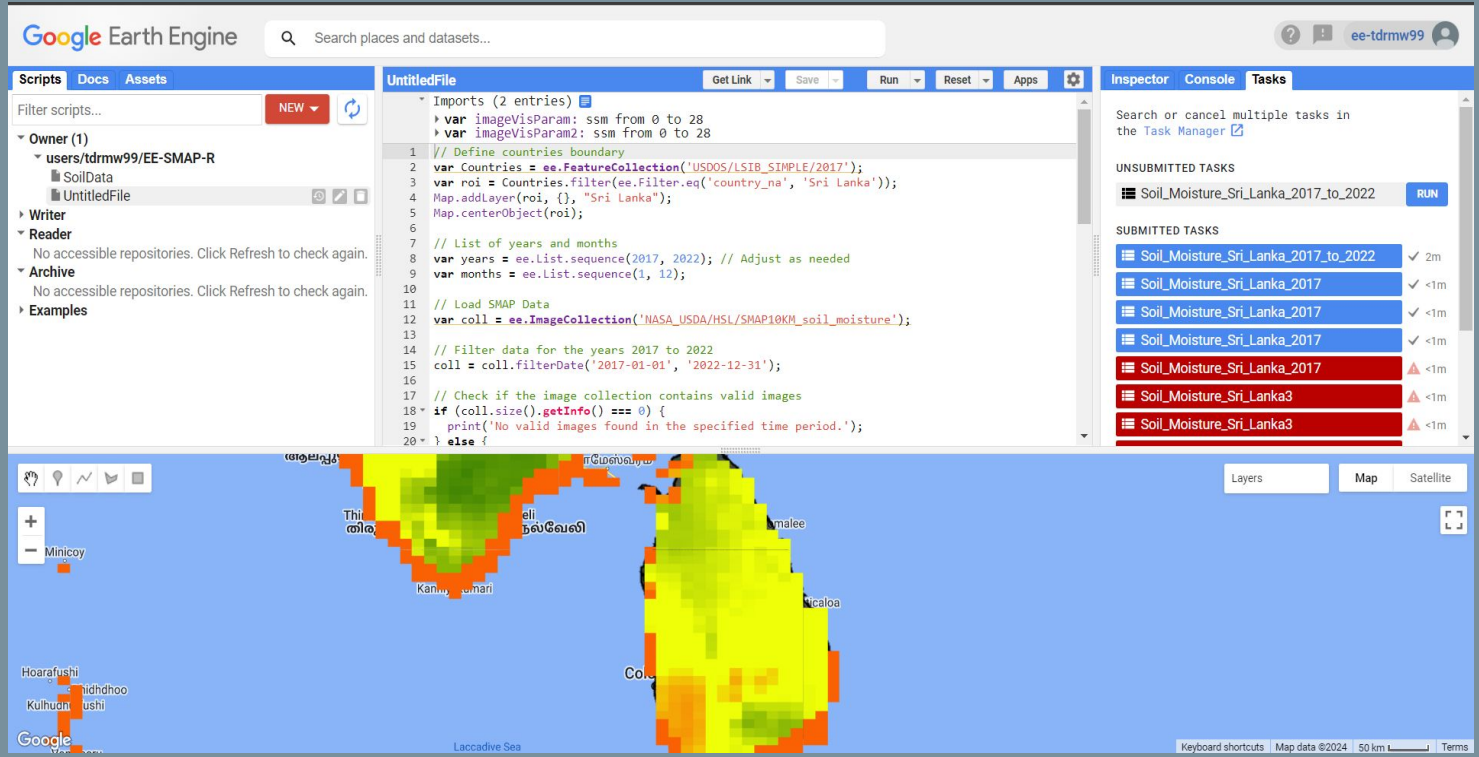
Research Problems.

- How the data driven decision making can apply to predict heatwaves.
- How to forecast soil moisture and predict crops for mitigate the impacts for yields.
- How to apply data driven decision making to mitigate health risks.

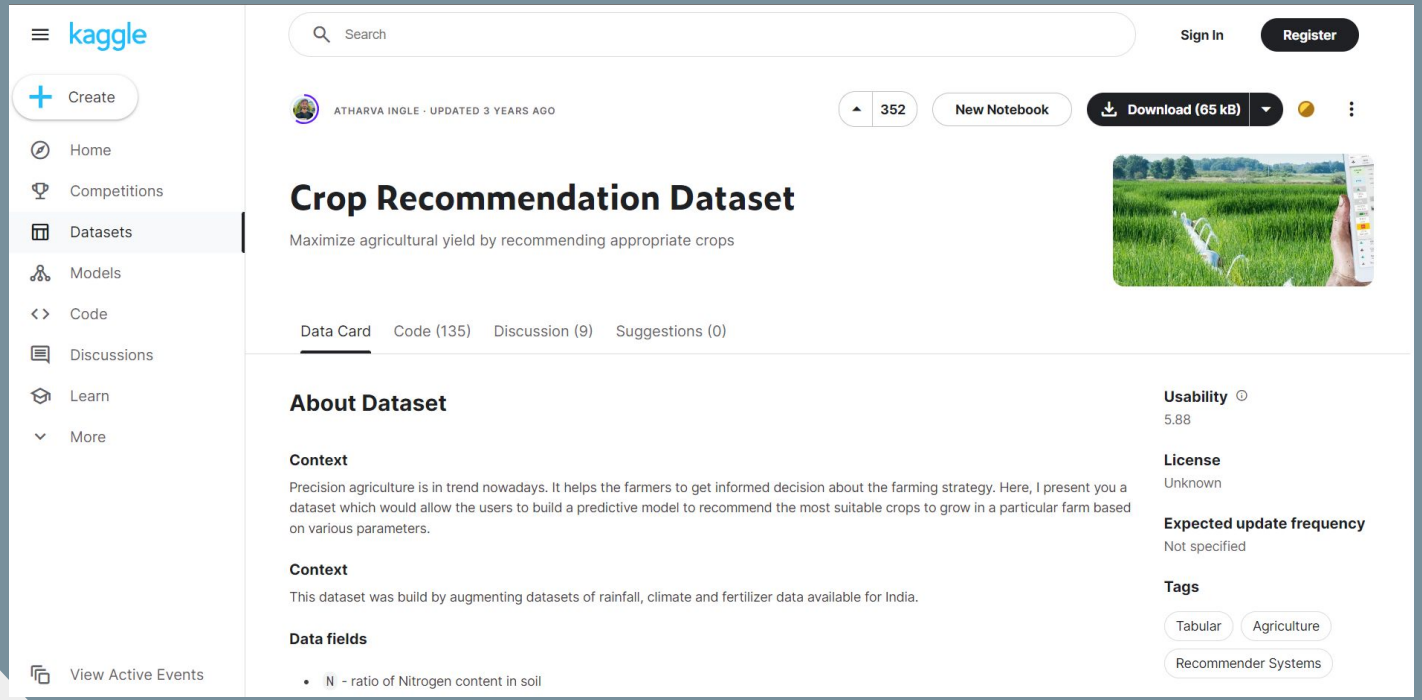
Background Research.

- **Heatwave Phenomenon:** Defines heatwaves, explores their effects on health, agriculture, infrastructure, and the environment.
- **Existing Research and Solutions:** Reviews previous studies on heatwave prediction, monitoring, and mitigation, identifying gaps and issues.
- **Mobile Applications for Heatwave Resilience:** Investigates the role of mobile apps in heatwave resilience, assessing features and user involvement strategies.

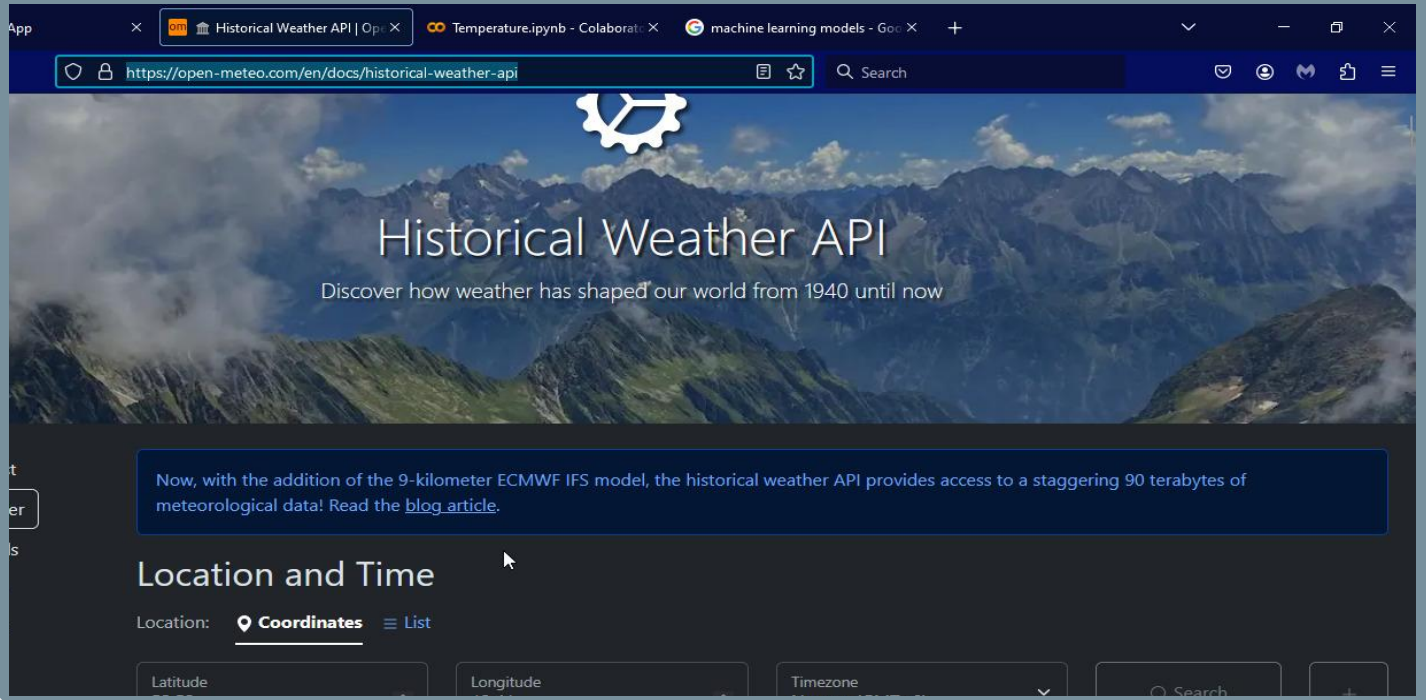
Data Collection



Data Collection



Data Collection



Ranawaka . T . D
IT 20142728

Specialization - Information Technology

SubTopic: Soil Moisture Forecasting and Crop R

Introduction to Soil Moisture Forecastin and Crop Recommendation

Definition and Importance:

- Soil moisture forecasting predicts soil water levels based on weather and soil data, he farmers plan irrigation efficiently.

- Crop recommendation suggests the best crops to plant, considering soil moisture, cli and soil type. This approach enhances productivity, conserves water, and boosts resi to climate change, supporting sustainable and profitable farming practices.

- We took the soil moisture values for 28cm to 100cm in soil. This is the the range of r
  level in soil. Soil moisture is taken as volumetric measure

- According to the dataset we can identify the behaviour of soil moisture vary with
  temperature.

Research Question

- How to forecast soil moisture accurately ?
- How can machine learning models improve their accuracy and dependability of predicting crops ?
- How to implement a system that cultivators can monitor soil moisture for their crops ?

Research Gap

Features	HeatAlert+	Crisis24 Horizon Mbile	HeatGuard
Recommend Crops	✗	✗	✓
Soil moisture Forecasting	✗	✗	✓
Support for Sri Lanka	✗	✓	✓

Novelty

- Integrating Soil moisture forecasting with crop prediction.
- There isn’t a mobile app that supports for Sri Lankan geography acc

Main Objective

- Create a system for monitoring soil moisture accurately and real time to effectively manage water requirements.

Sub Objectives

- Use machine learning models to predict crops according to soil moisture levels.

Technologies

Tools and Algorithms

- **Algorithm** :RandomForestRegressor / RandomForestCla
- **Develop Mobile Application** : Flutter
- **Model Trainer**: google colab
- **Languages**: Dart

Methodology

Data Collection:

- Data collection forms the cornerstone of accurate soil moisture forecasting and effective crop recommendations

Methodology

Data Sources:

- **Meteorological Data:** Historical and real-time weather data, including rainfall, temperature humidity, and solar radiation, obtained from national meteorological agencies and satellite
- **Soil Data:** Soil moisture levels, soil type, texture, and organic content sourced from field s agricultural research institutions, and remote sensing technologies.
- **Crop Data:** Information on crop types, growth stages, water requirements, and yield data from agricultural databases and farmer records.
- **Geographical Data:** Topography, land use, and irrigation infrastructure data derived from remote sensing sources.

Methodology

Model Development:

Developing accurate soil moisture forecasting models and crop recommendation algorithms in several key steps.

Forecasting Models:

- **Data Preprocessing**
- **Model Selection**
- **Training and Validation**

Methodology

Validation Procedures:

Validation ensures the reliability and practical applicability of the soil moisture forecasts and c
recommendations

Validation Methods:

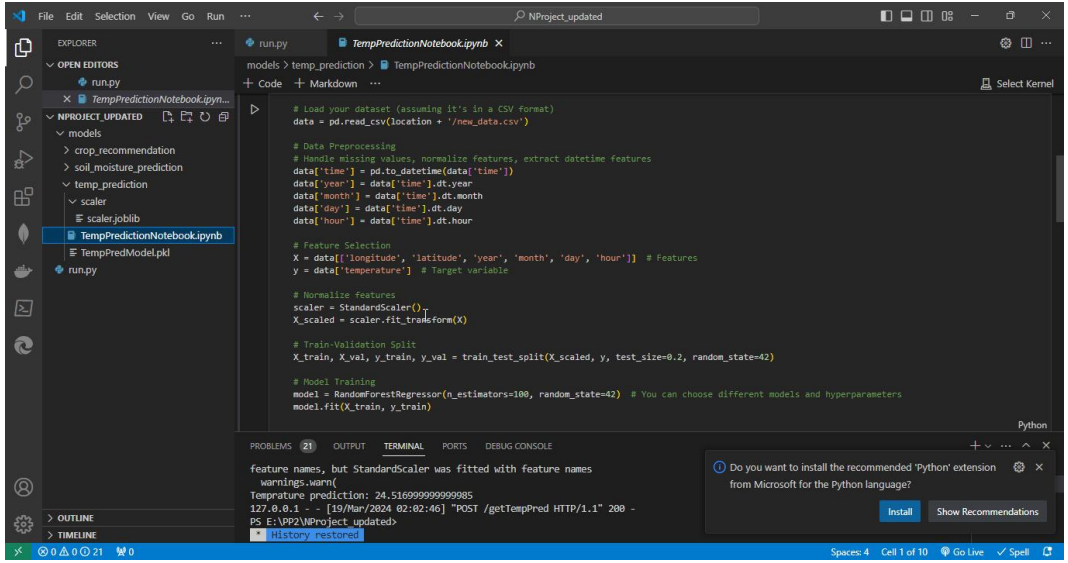
- **Cross-Validation**
- **Field Trials**
- **Stakeholder Feedback**

Methodology

Steps in App Development:

- **Design Phase:** Create intuitive and user-friendly interfaces. Focus on ease of naviga accessibility for farmers with varying levels of technological proficiency.
- **Development Phase:** Code the application using technologies. Integrate GIS mappir functionalities to visualize soil moisture data and crop recommendations.
- **Data Integration:** Connect the app to databases and APIs providing real-time weathe data. Ensure seamless integration and accurate data representation
- **Testing Phase:** Conduct rigorous testing to identify and resolve bugs.

Completion of the project



What’s to be done

- Integrate components.
- Connecting ioT device for data input.

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Dissanayaka. D. M. S. M

IT 20145552

Specialization - Information Technology

SubTopic: Heat Vulnerability Index (HVI) Specifi

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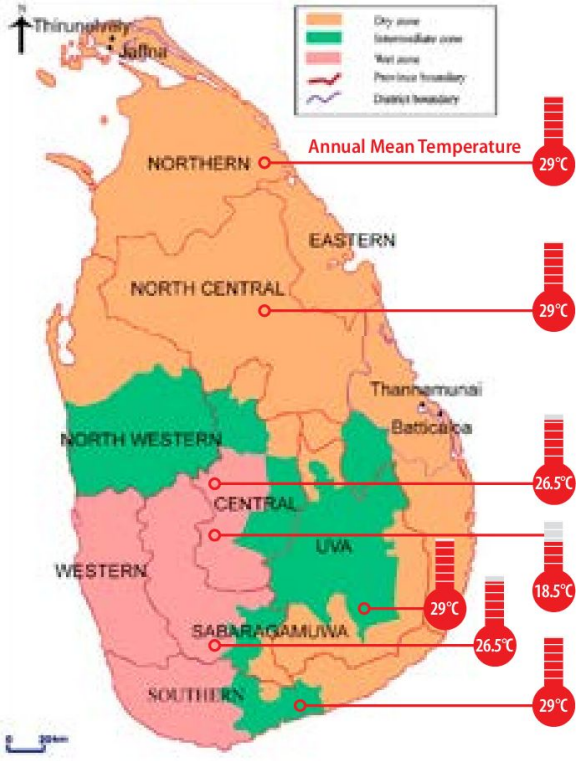
Research Question

- What are the key elements contributing to vulnerability to heat-rela risks in different **geographical areas**?
- How can machine learning algorithms be effectively utilized to process large datasets related to **heatwaves**?
- What are the most suitable data sources for developing a **heatwa** system?

Research Gap

Inability to obtain information on heat wave resolution and the inability to obtain information simultaneously as a **single Location (District).**

Research Gap



Research Gap

Features	HeatAlert+	Crisis24 Horizon
Prediction Crops (Recommend)	✔	✘
Suggest Irrigation levels	✔	✘
Heat Wave Prediction	✔	✘
Support for Sri Lanka	✔	✘

Main Objective

- Develop machine learning algorithms capable of accurately analyzing heat waves datasets to identify localized vulnerability patterns to heat waves related risks in Sri Lanka

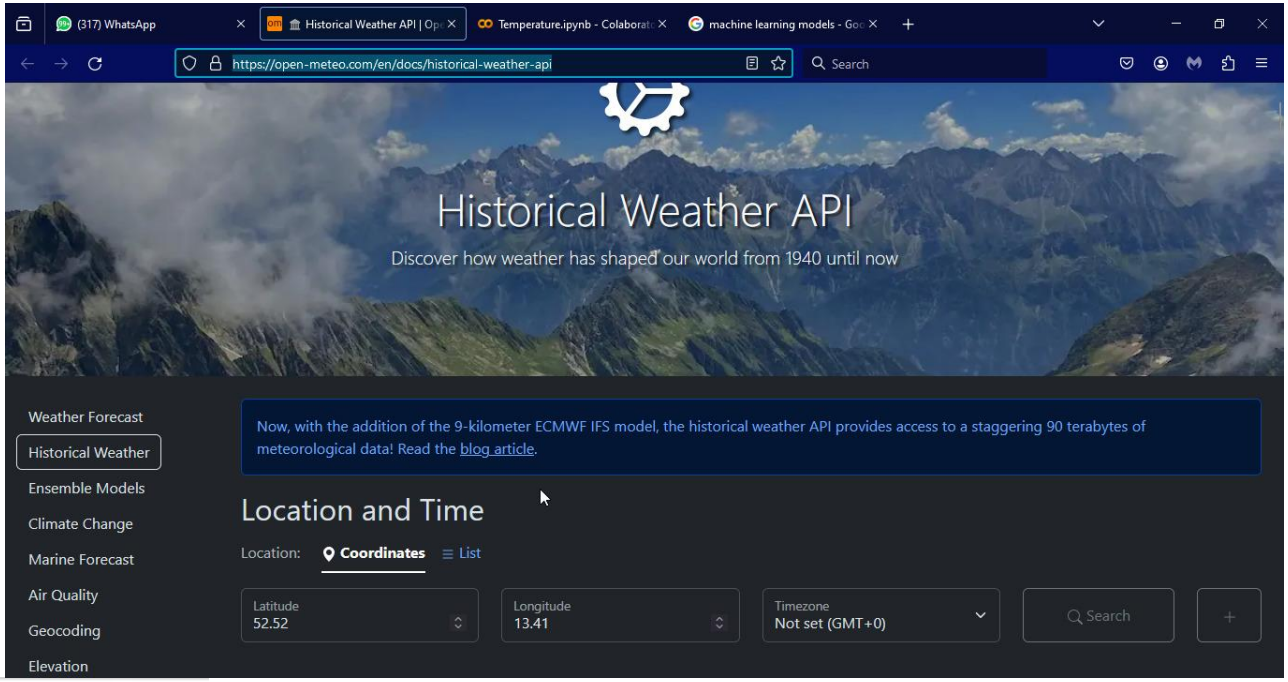
Technologies Tools and Algorithms

- **Algorithm** :RandomForestRegressor
- **Develop Mobile Application** : Flutter
- **Model Trainer**: google colab
- **Languages**: Dart

Project Evidence

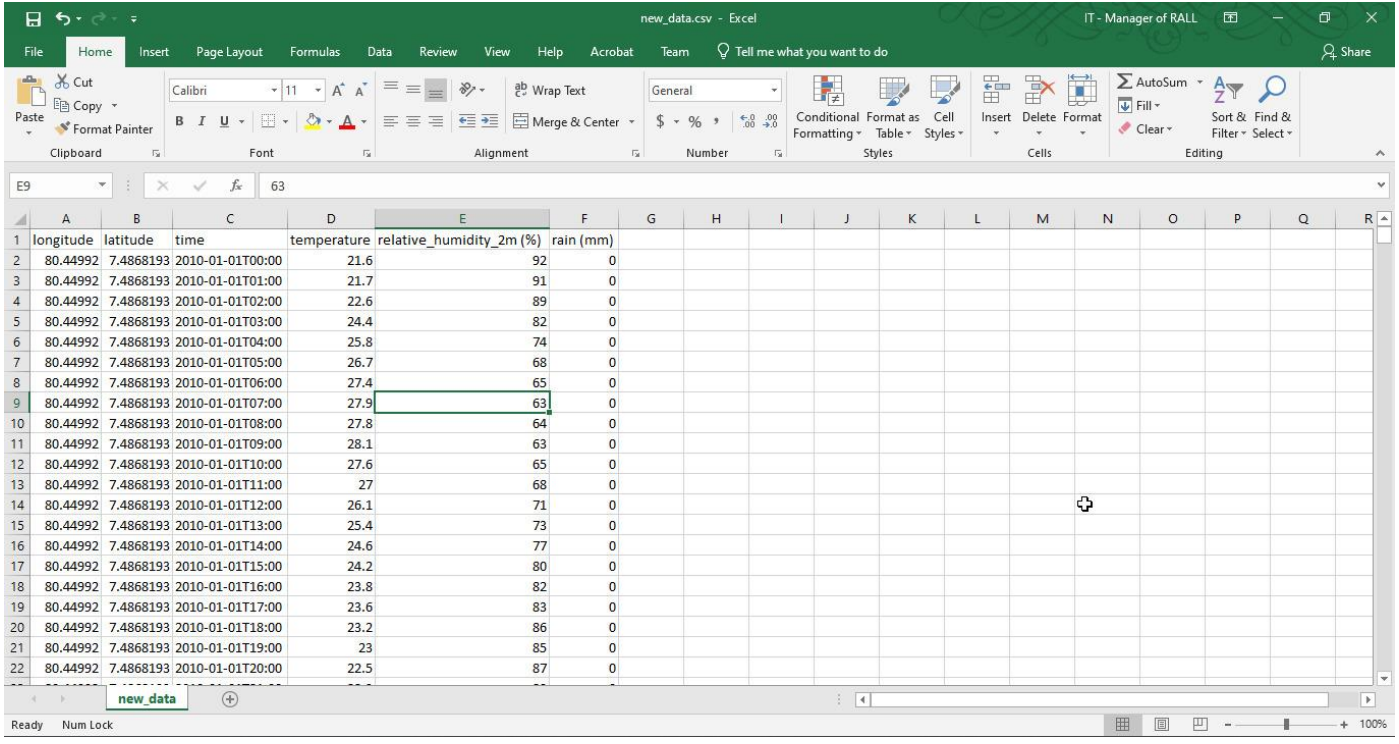
- Dataset given from that link:

  https://open-meteo.com/en/docs/historical-weather-api



Project Evidence

- Dataset:



new_data.csv - Excel

	A	B	C	D	E	F
1	longitude	latitude	time	temperature	relative_humidity_2m (%)	rain (mm)
2	80.44992	7.4868193	2010-01-01T00:00	21.6	92	0
3	80.44992	7.4868193	2010-01-01T01:00	21.7	91	0
4	80.44992	7.4868193	2010-01-01T02:00	22.6	89	0
5	80.44992	7.4868193	2010-01-01T03:00	24.4	82	0
6	80.44992	7.4868193	2010-01-01T04:00	25.8	74	0
7	80.44992	7.4868193	2010-01-01T05:00	26.7	68	0
8	80.44992	7.4868193	2010-01-01T06:00	27.4	65	0
9	80.44992	7.4868193	2010-01-01T07:00	27.9	63	0
10	80.44992	7.4868193	2010-01-01T08:00	27.8	64	0
11	80.44992	7.4868193	2010-01-01T09:00	28.1	63	0
12	80.44992	7.4868193	2010-01-01T10:00	27.6	65	0
13	80.44992	7.4868193	2010-01-01T11:00	27	68	0
14	80.44992	7.4868193	2010-01-01T12:00	26.1	71	0
15	80.44992	7.4868193	2010-01-01T13:00	25.4	73	0
16	80.44992	7.4868193	2010-01-01T14:00	24.6	77	0
17	80.44992	7.4868193	2010-01-01T15:00	24.2	80	0
18	80.44992	7.4868193	2010-01-01T16:00	23.8	82	0
19	80.44992	7.4868193	2010-01-01T17:00	23.6	83	0
20	80.44992	7.4868193	2010-01-01T18:00	23.2	86	0
21	80.44992	7.4868193	2010-01-01T19:00	23	85	0
22	80.44992	7.4868193	2010-01-01T20:00	22.5	87	0

Methodology

Data Collection:

- Data collection is the foundation of the HVI and he app, involving the aggregation of diverse dataset to capture the multifaceted nature of heat vulnerability.

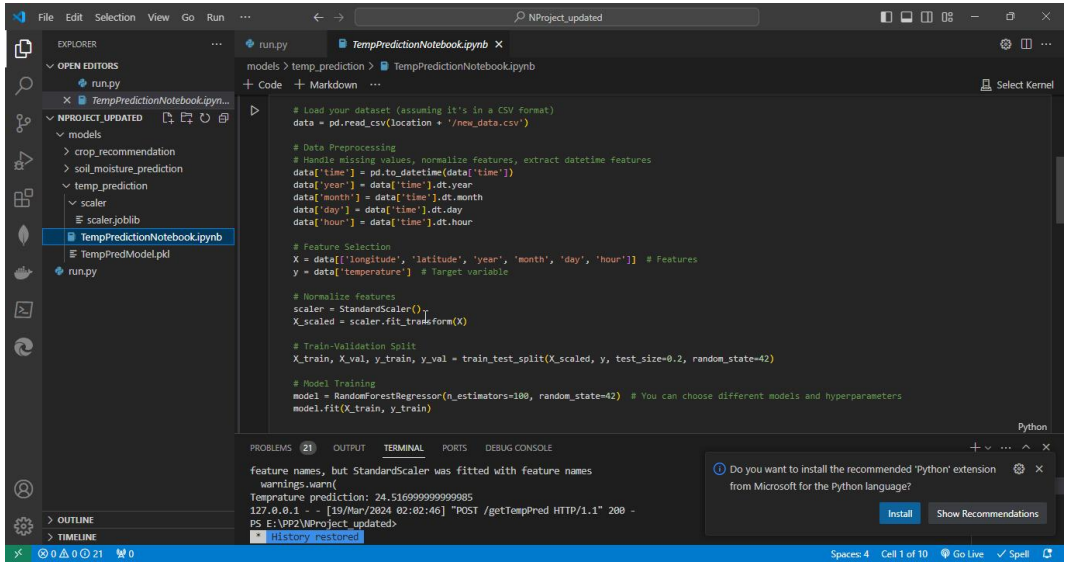
Methodology

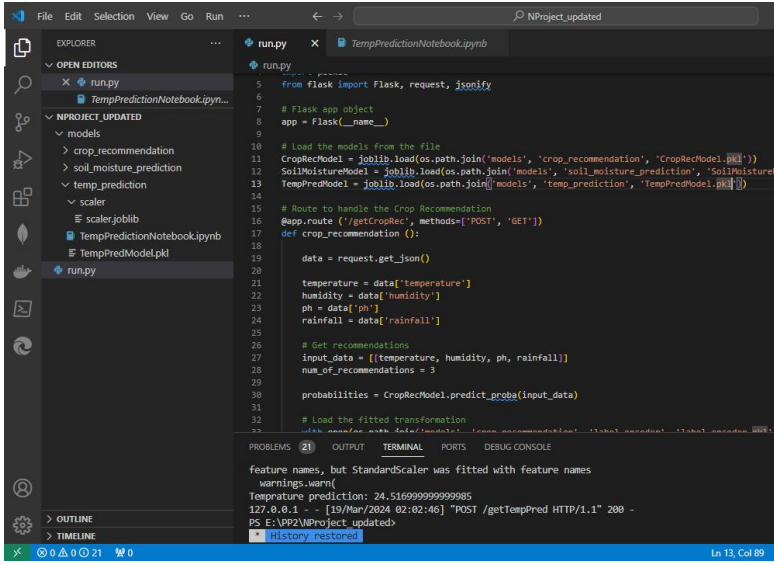
Data Sources:

- **Meteorological Data:** Temperature records, frequency, duration, and intensity of heatwav
  obtained from the Sri Lanka Meteorological Department.
- **Socioeconomic Data:** Census data on income levels, employment, education, and housi
  conditions sourced from the Department of Census and Statistics, Sri Lanka.
- **Demographic Data:** Information on population density, age distribution, and health status
  collected from national health surveys and census reports.
- **Environmental Data:** Land use, vegetation cover, and urban heat island effect data derive
  remote sensing (satellite imagery) and geographic information systems (GIS).

Completion of the Project

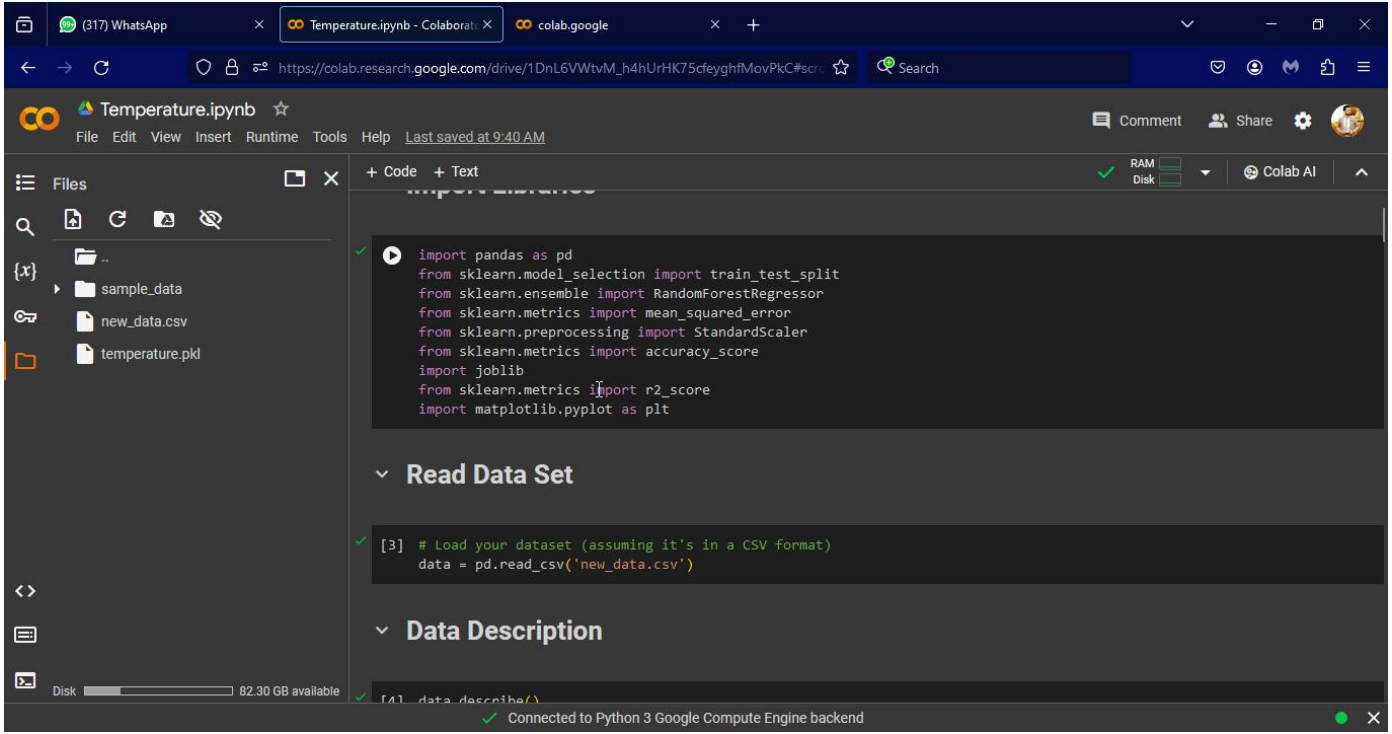
CODE EVIDENCE





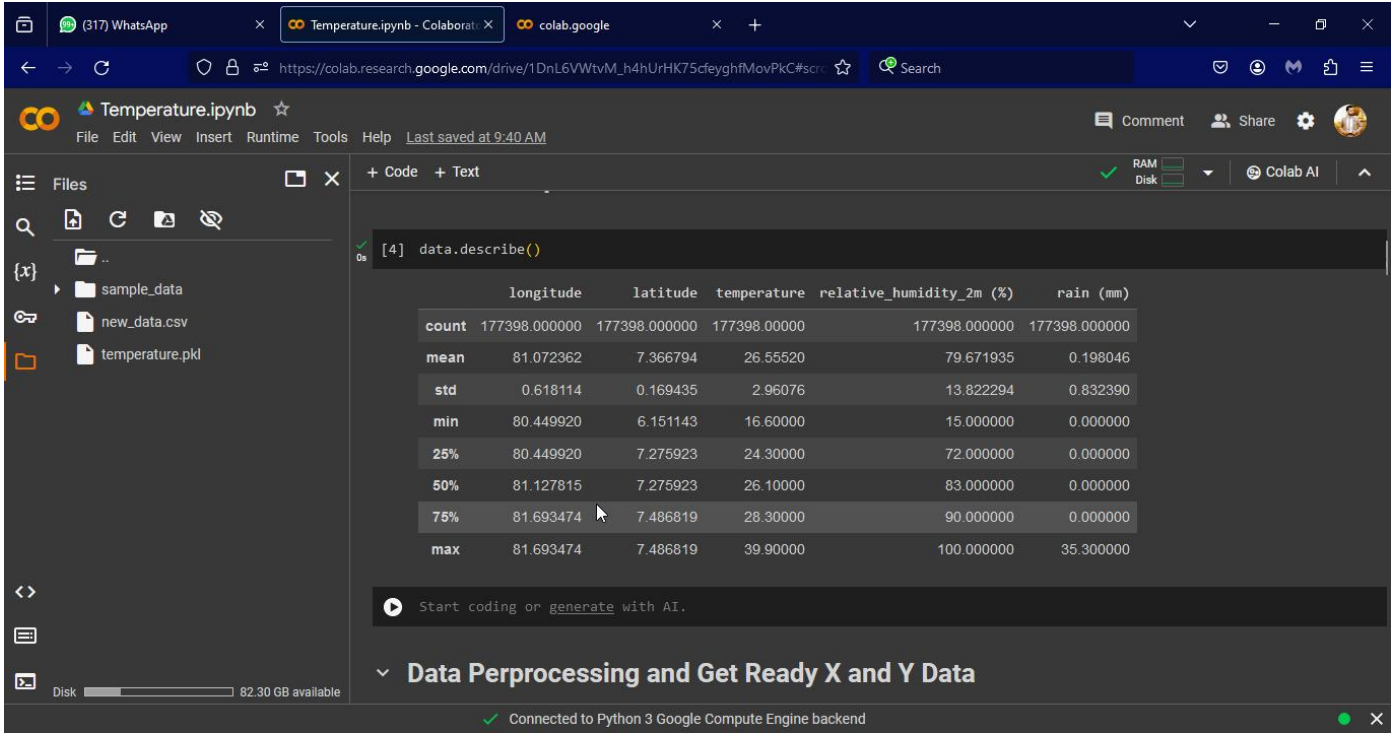
Completion of the Project

MODEL RUNNING



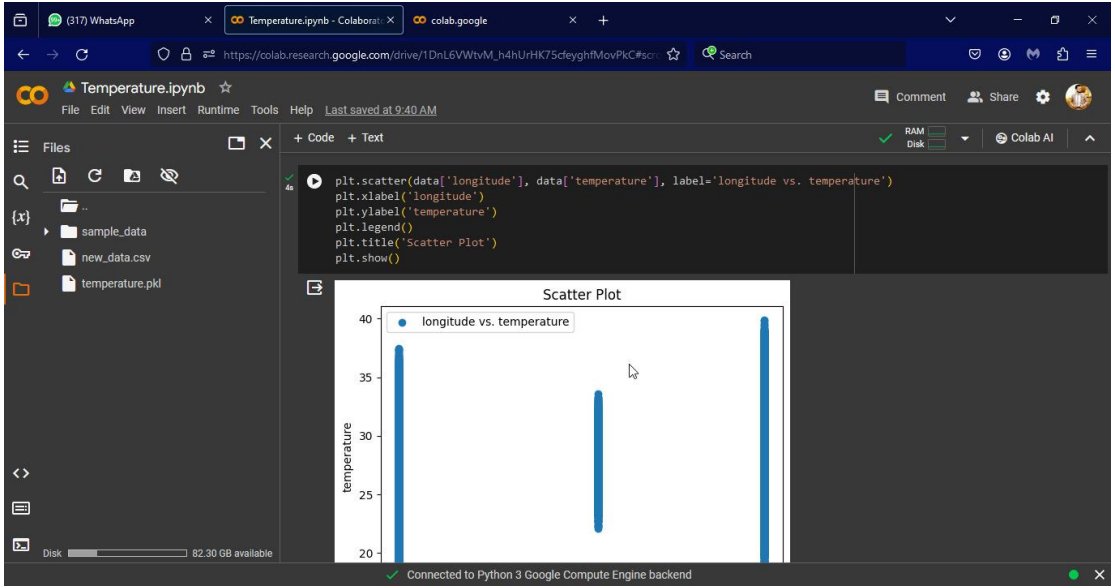
Completion of the Project

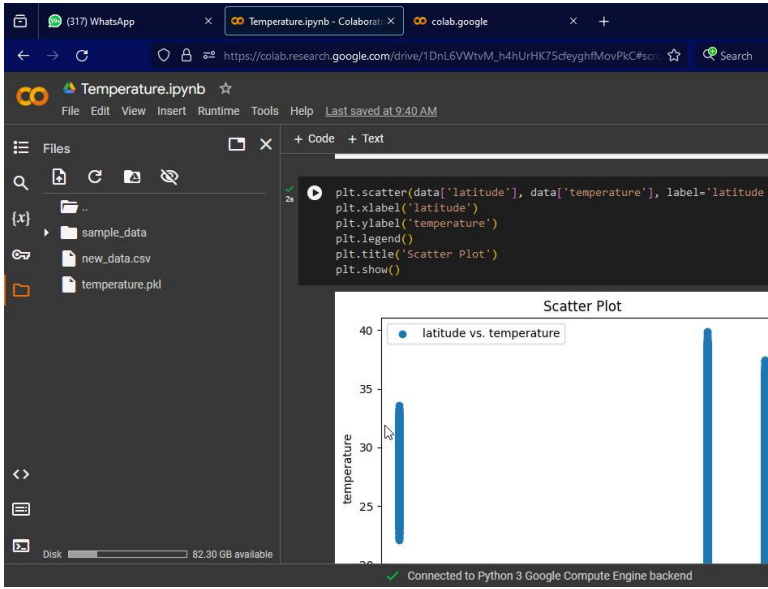
MODEL RUNNING



Completion of the Project

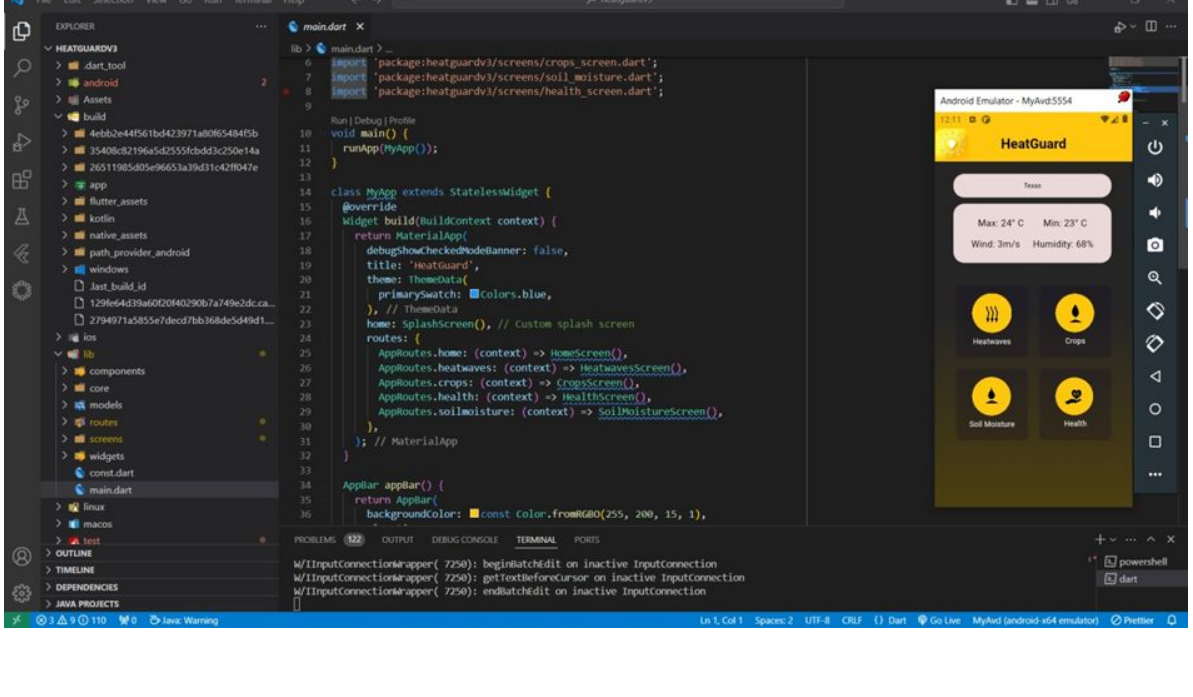
MODEL RUNNING





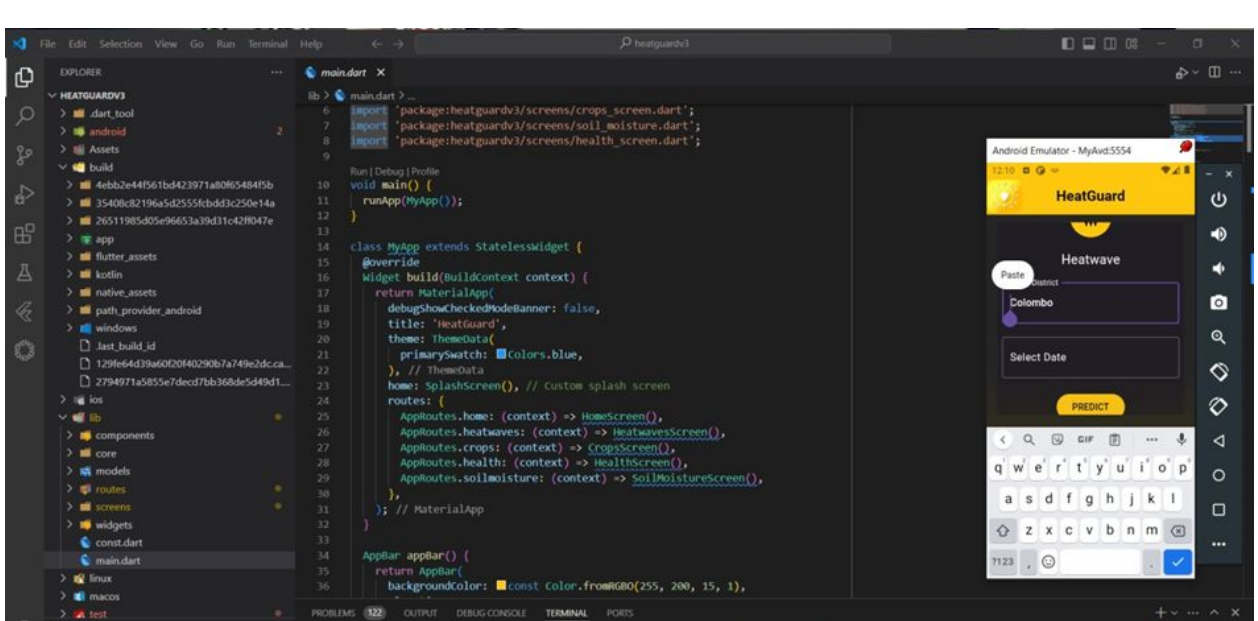
Completion of the Project

UI EVIDENCE



Completion of the Project

UI EVIDENCE



Completion of the Project

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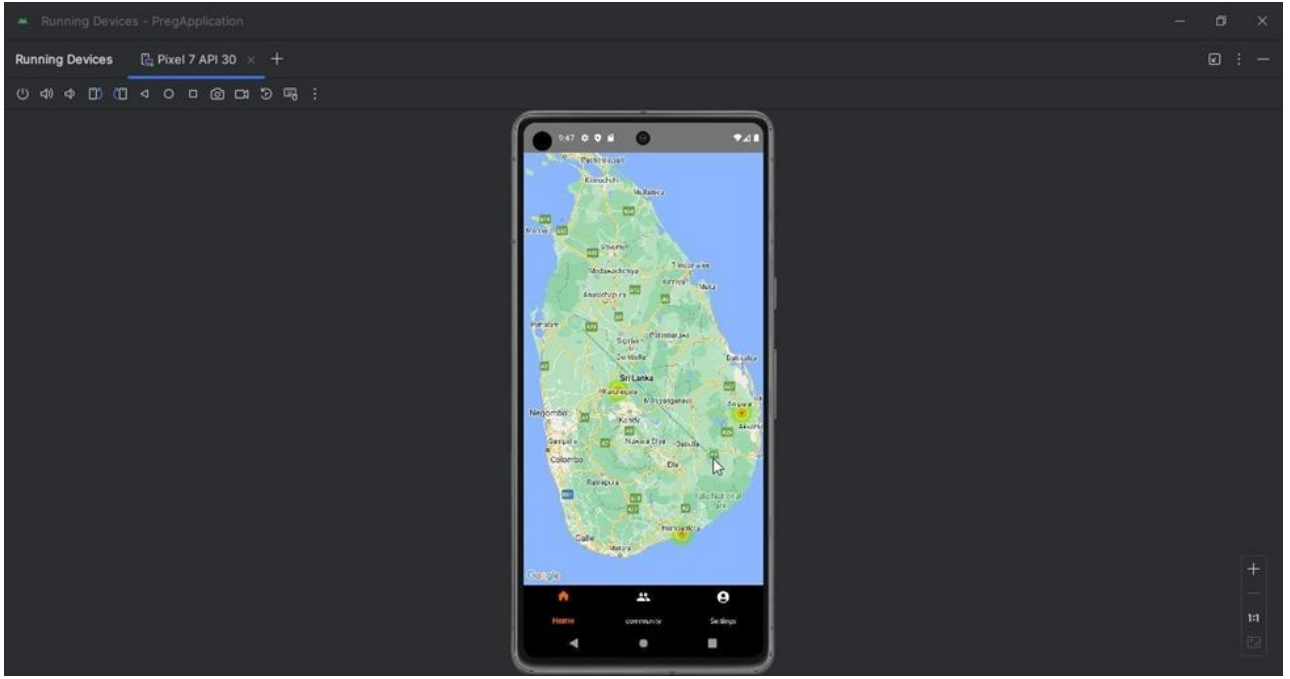

What’s to be done

- Finished develop the application.
- Ensure smooth communication between frontend and backend.
- Test the integrated system for functionality and performance.

Risk Mitigation

- Prioritize vital features to manage resource constraints effectively.
- Gather user feedback early on to streamline user interface design and reduce complexity.
- Implement robust security actions to protect user data from potential breaches.
- Maintain open communication with users
- Monitor and adjust project plans to mitigate taking off risks effectively.


Thank You