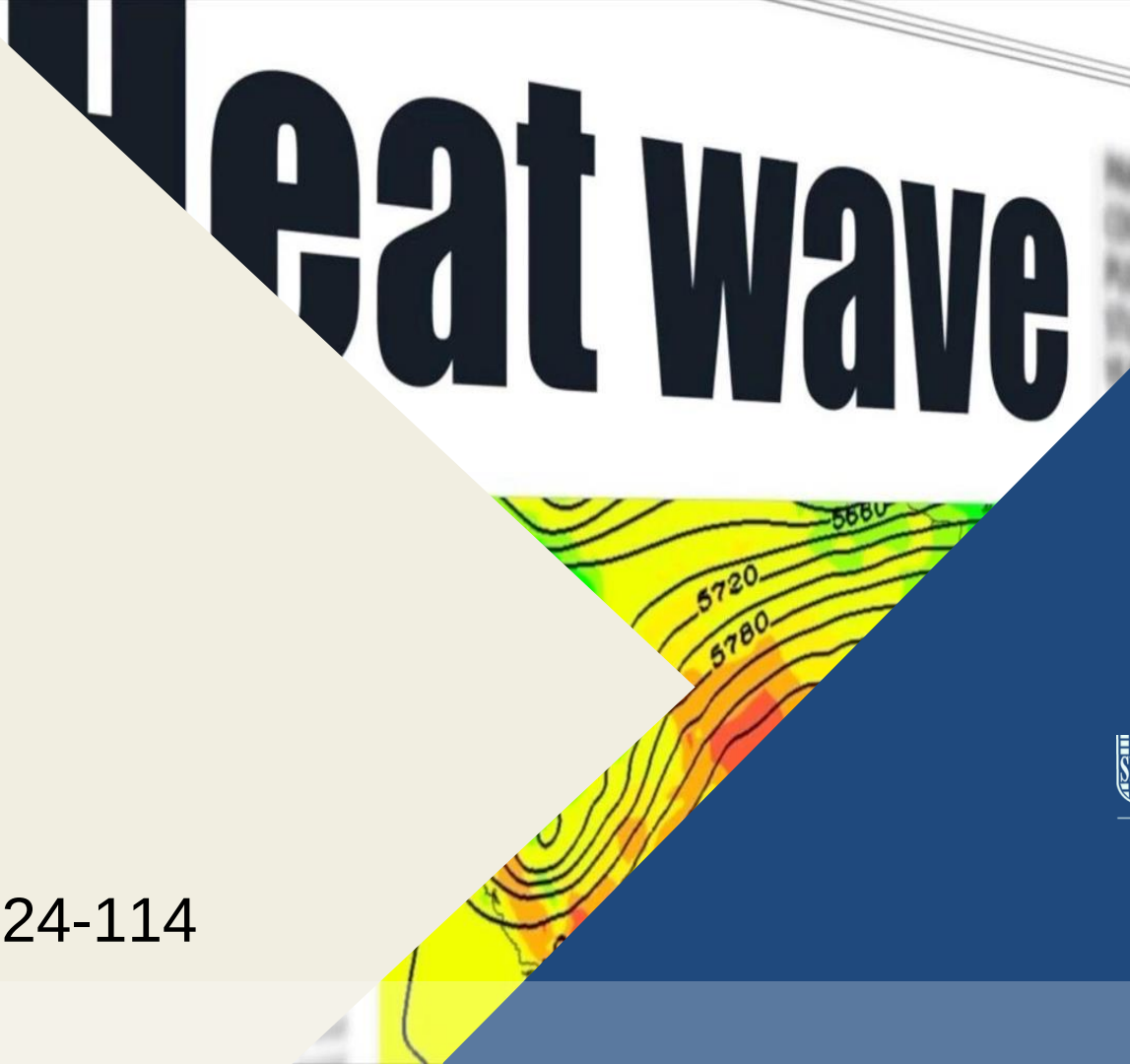
Advancing Heat Resilience



Group ID - 2023-24-114

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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 such as heat stroke,dehydration and heat exhaustion.

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

Introduction.

Through Our 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…

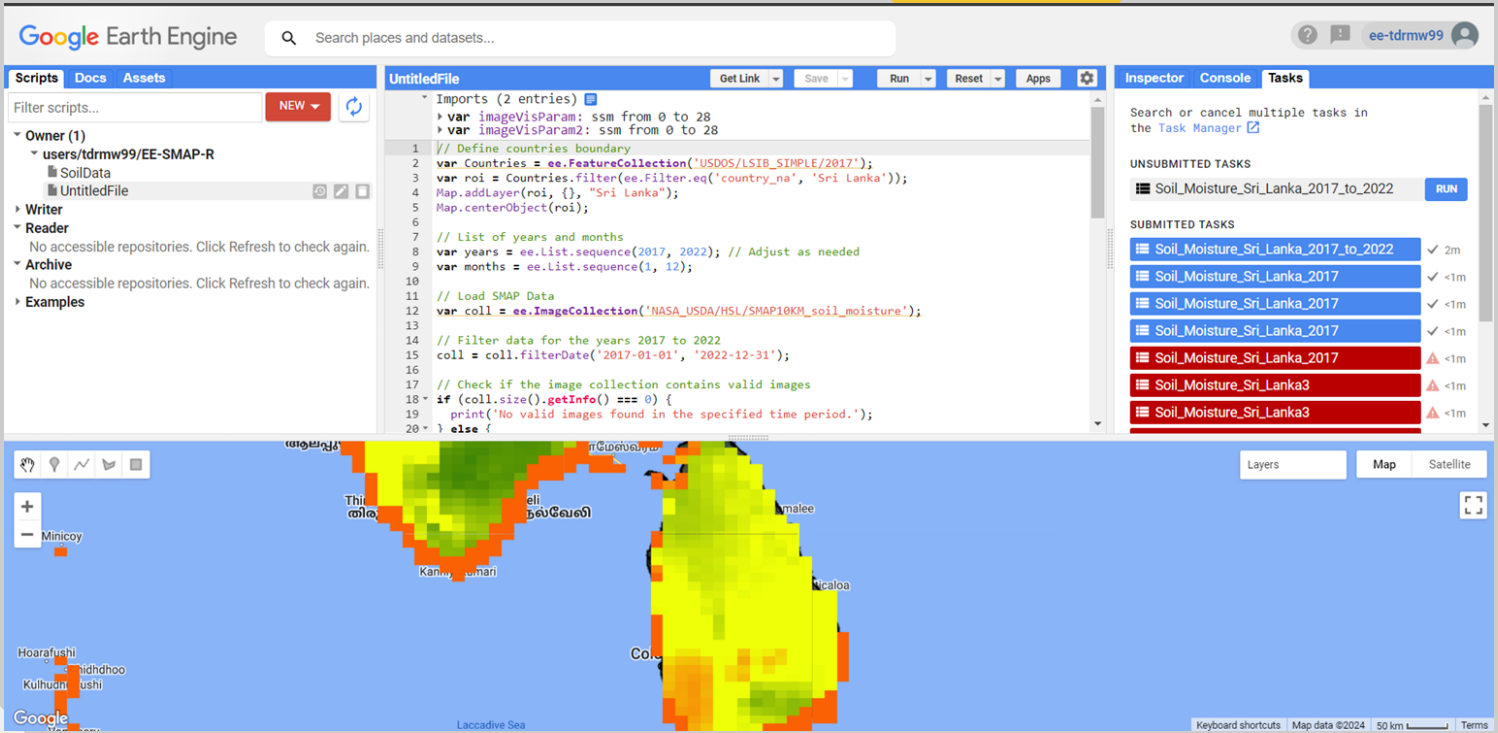
Research Problems.

- 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.

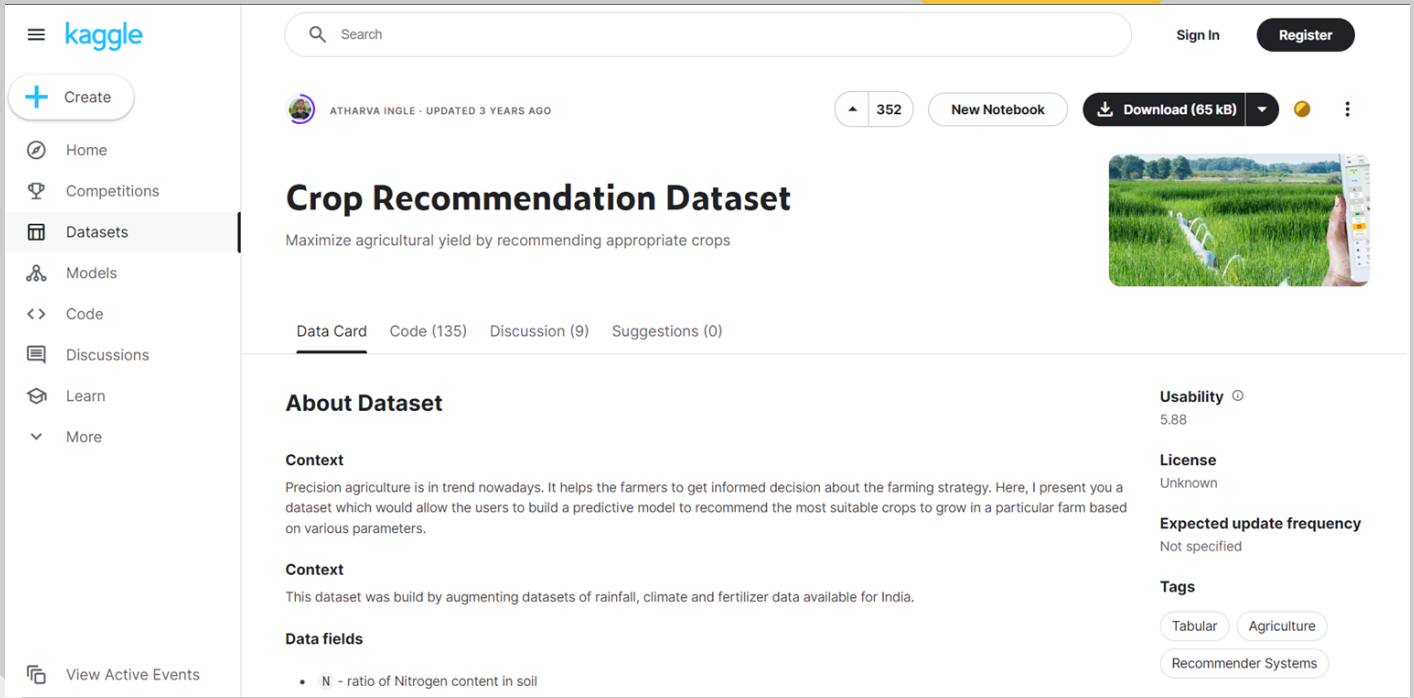
Background Research

- **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.

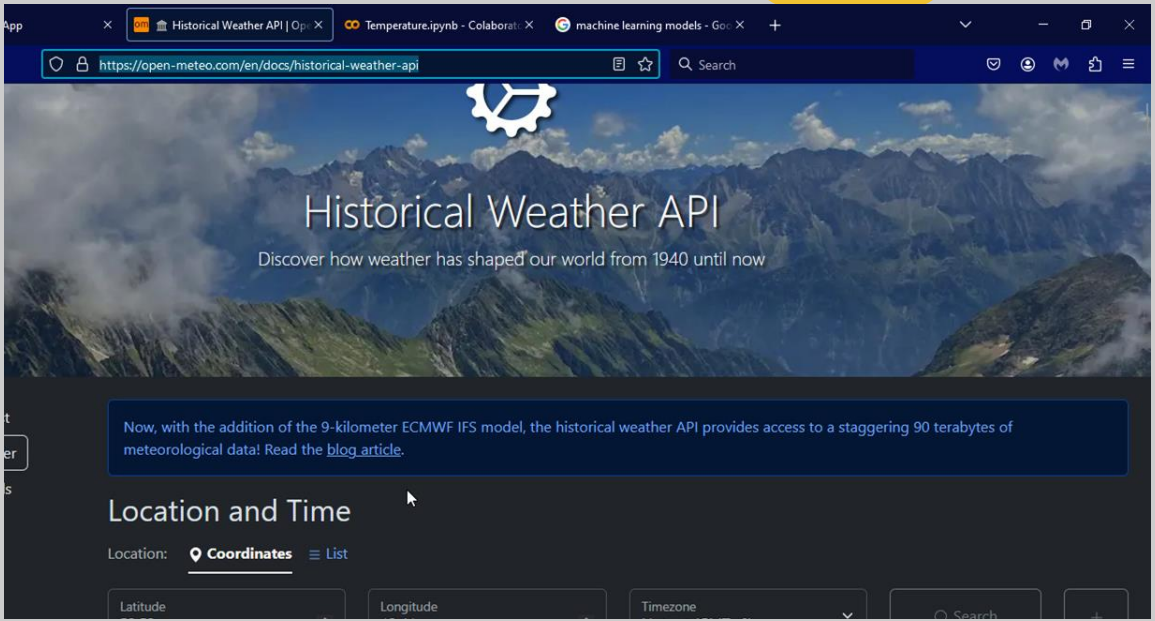
Data Collection



Data Collection



Data Collection



Ranawaka . T . D
IT 20142728

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Research Question

- How to forecast soil moisture accurately ?
- How can machine learning models improve their accuracy and dependability of predicting crops according to soil moisture levels ?
- 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 accurately.

Main Objective

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

Sub Objectives

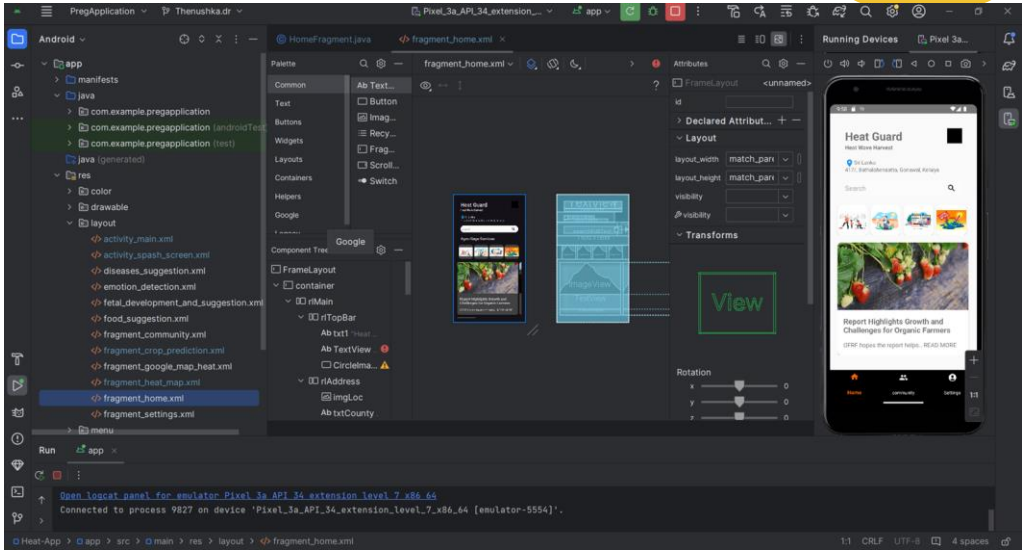
- Use machine learning models to predict crops according to soil moisture levels.

Technologies

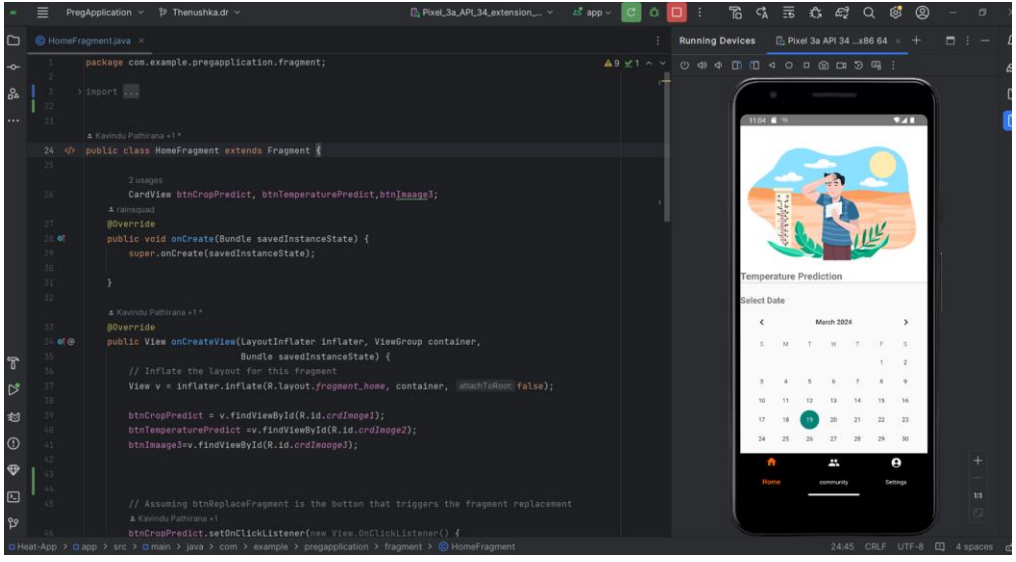
Tools and Algorithms

- **Algorithm** : RandomForestClassifier
- **Develop Mobile Application** : Android Studio
- **Model Trainer**: PyCharm
- **Languages**: Python, Java

Project Evidence



Completion of the project



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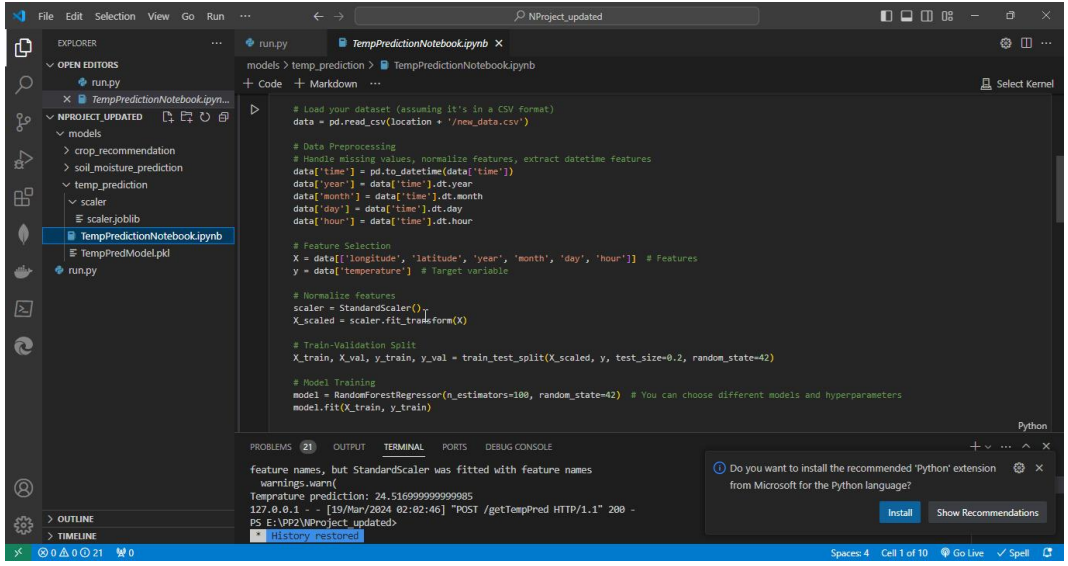

Current Progress

- Collecting the necessary dataset.
- Preparing the environment in the machine.
- Completed machine learning models.
- Completed the main UI.

What’s to be done

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

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Dissanayaka. D. M. S. M

IT 20145552

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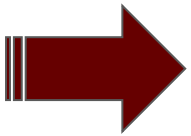
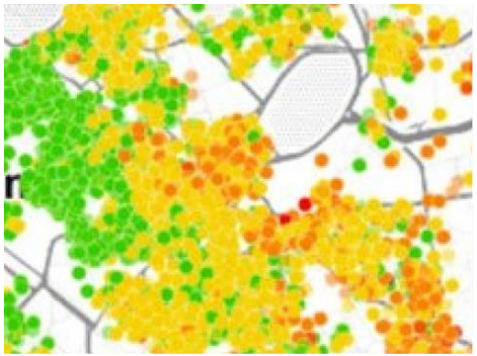
Research Question

- What are the key elements contributing to vulnerability to heat-related 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 **heatwaves mapping** system?

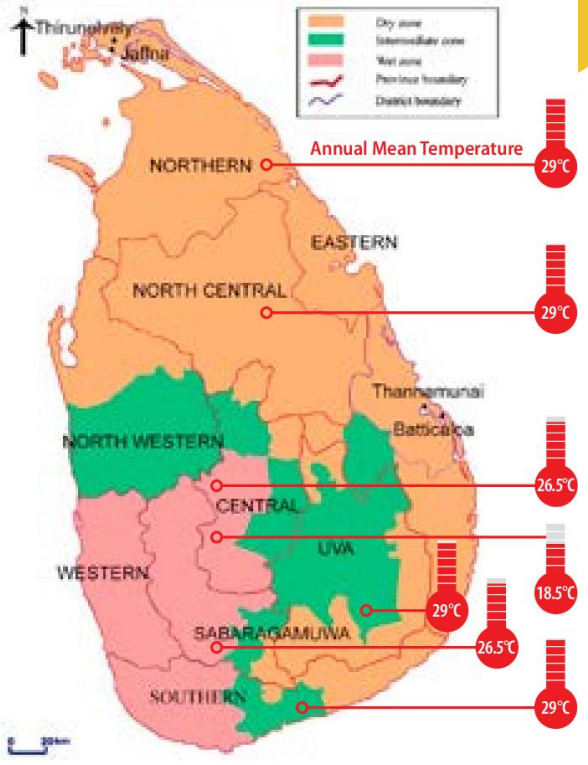
Research Gap

Inability to obtain information on heat wave resolution and the inability to obtain information simultaneously as a **single point of location** rather than Near the Location





Research Gap



Research Gap

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

Novelty

- Current solutions struggle to correctly map Sri Lanka's varied geography, including its coastlines, mountains, and cities.
- Current evaluations often overlook income and healthcare access, making vulnerability assessments too general and not community specific
- The system works on mobile phones, allowing people share data and get alerts.

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

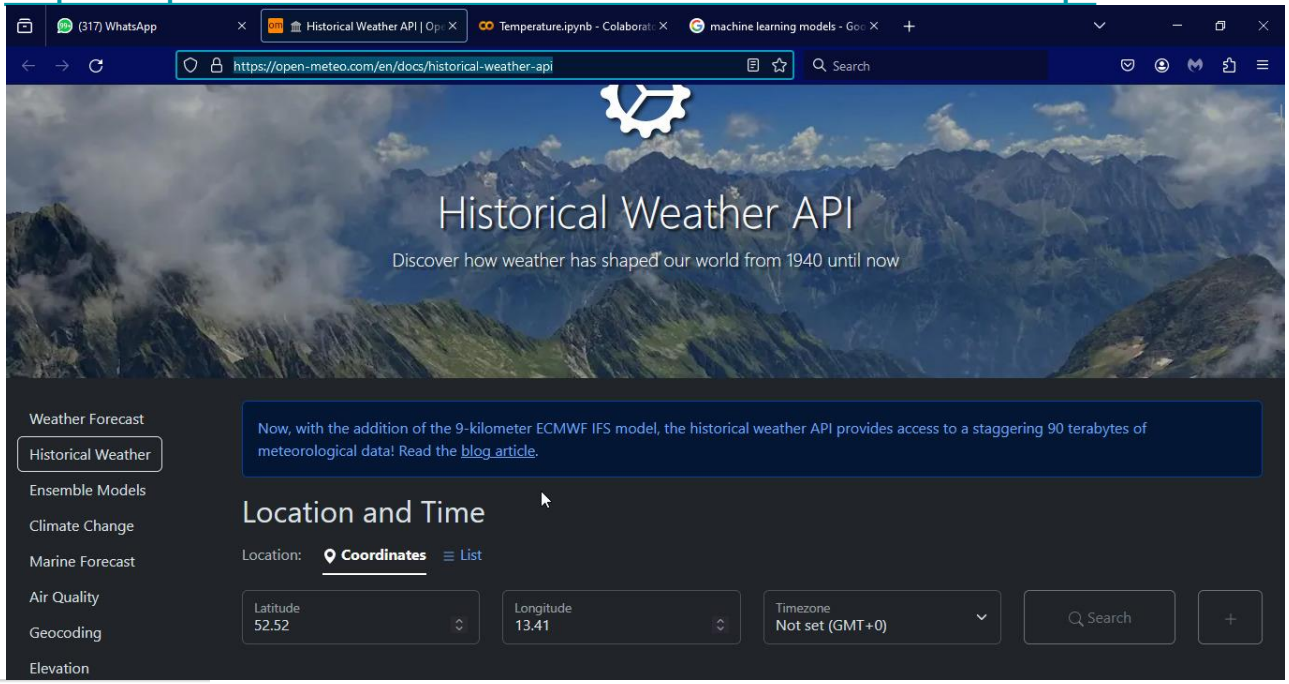
- **Algorithm** :RandomForestRegressor
- **Develop Mobile Application** :

  Android Studio
- **Model Trainer**: PyCharm
- **Languages**: Python, Java

Project Evidence

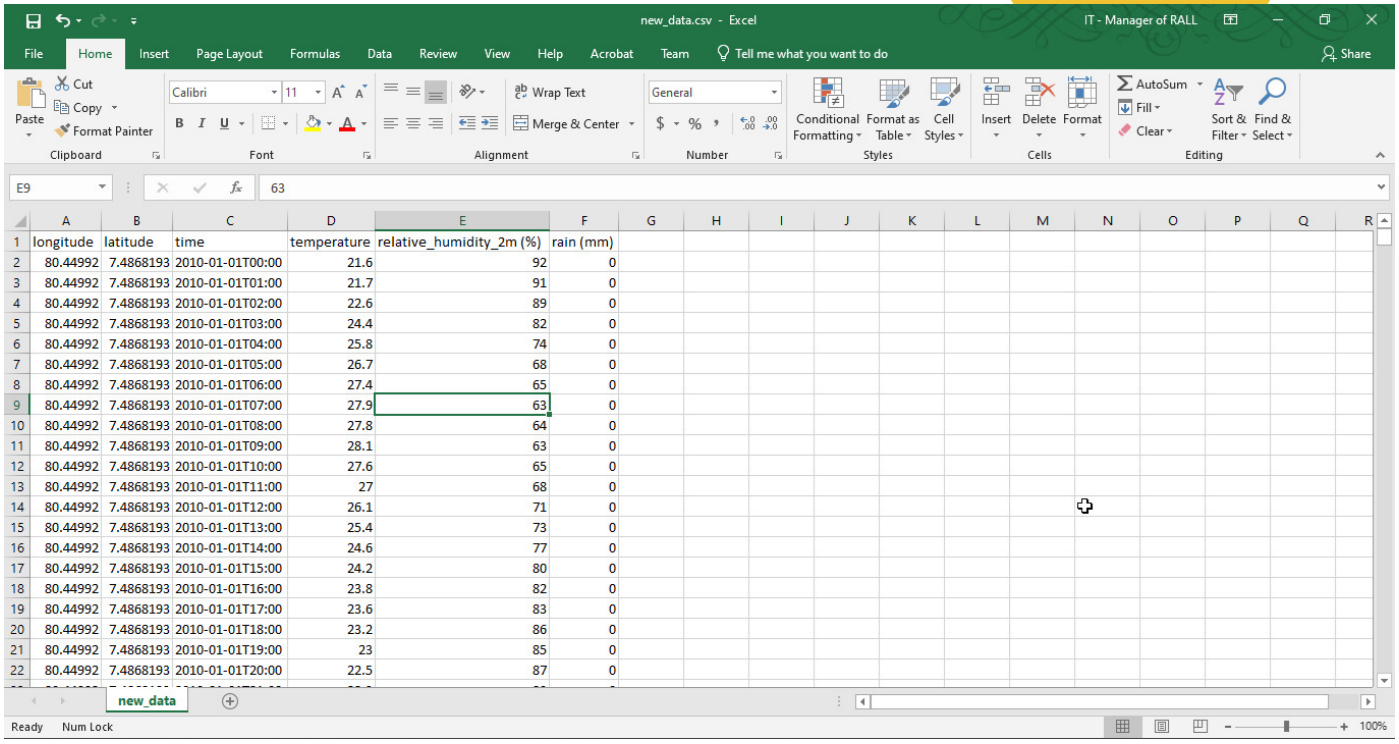
- Dataset given from that link:

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



Project Evidence

- Dataset:

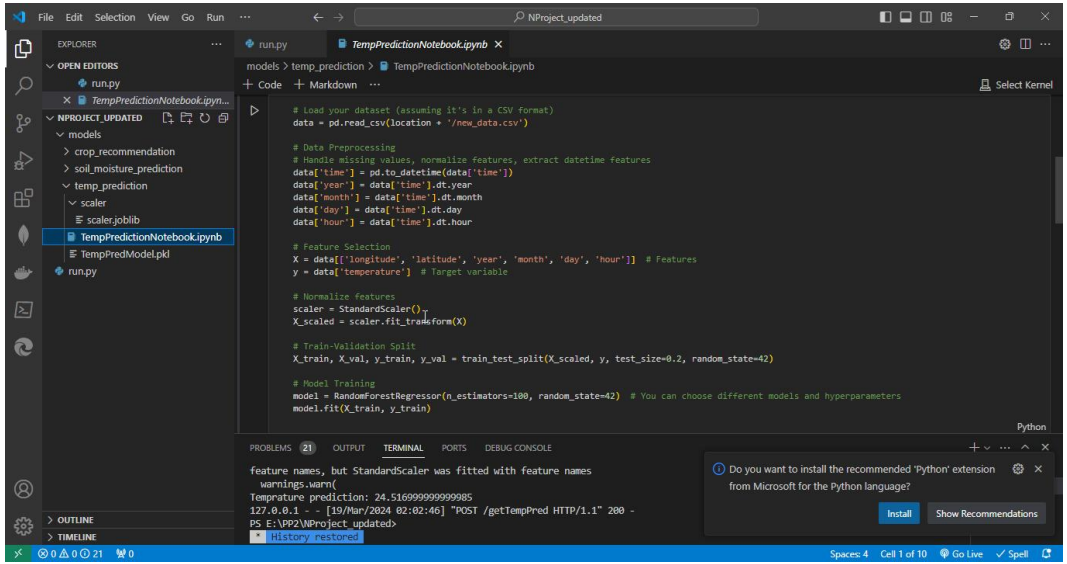


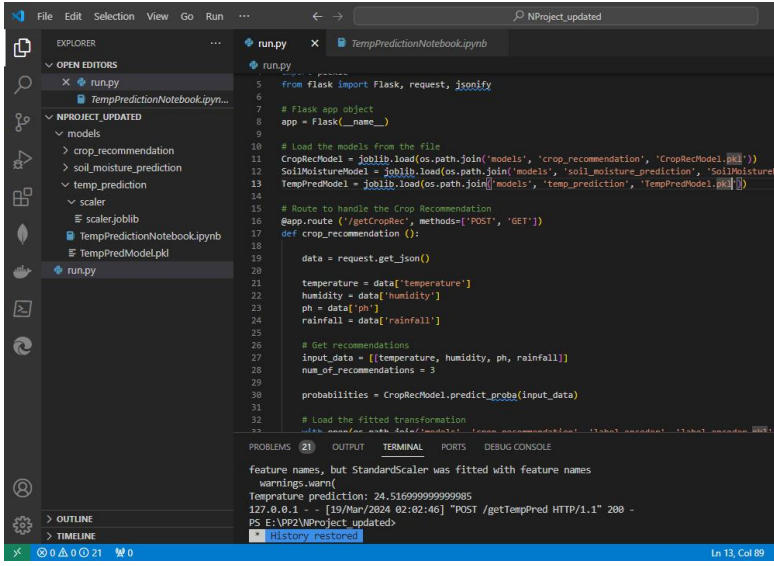
new_data.csv - Excel

	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

Completion of the project

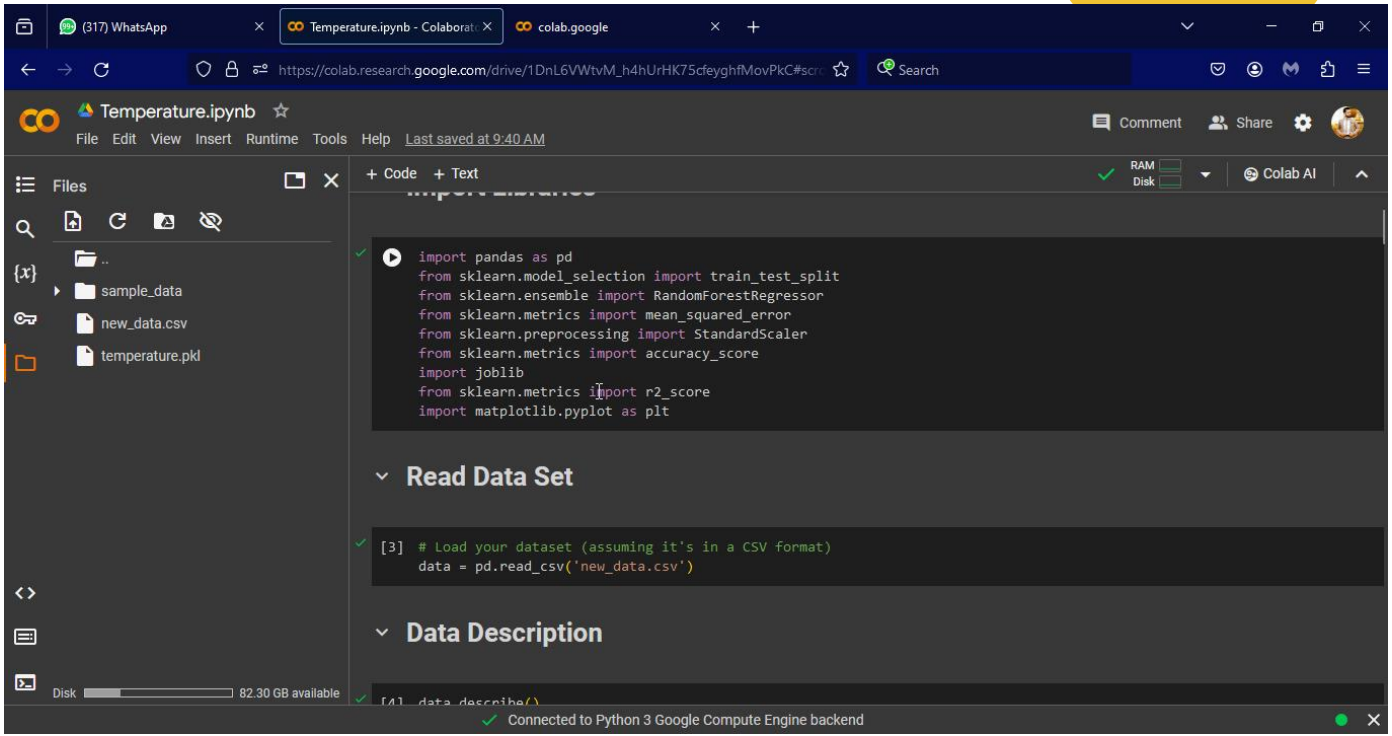
CODE EVIDENCE





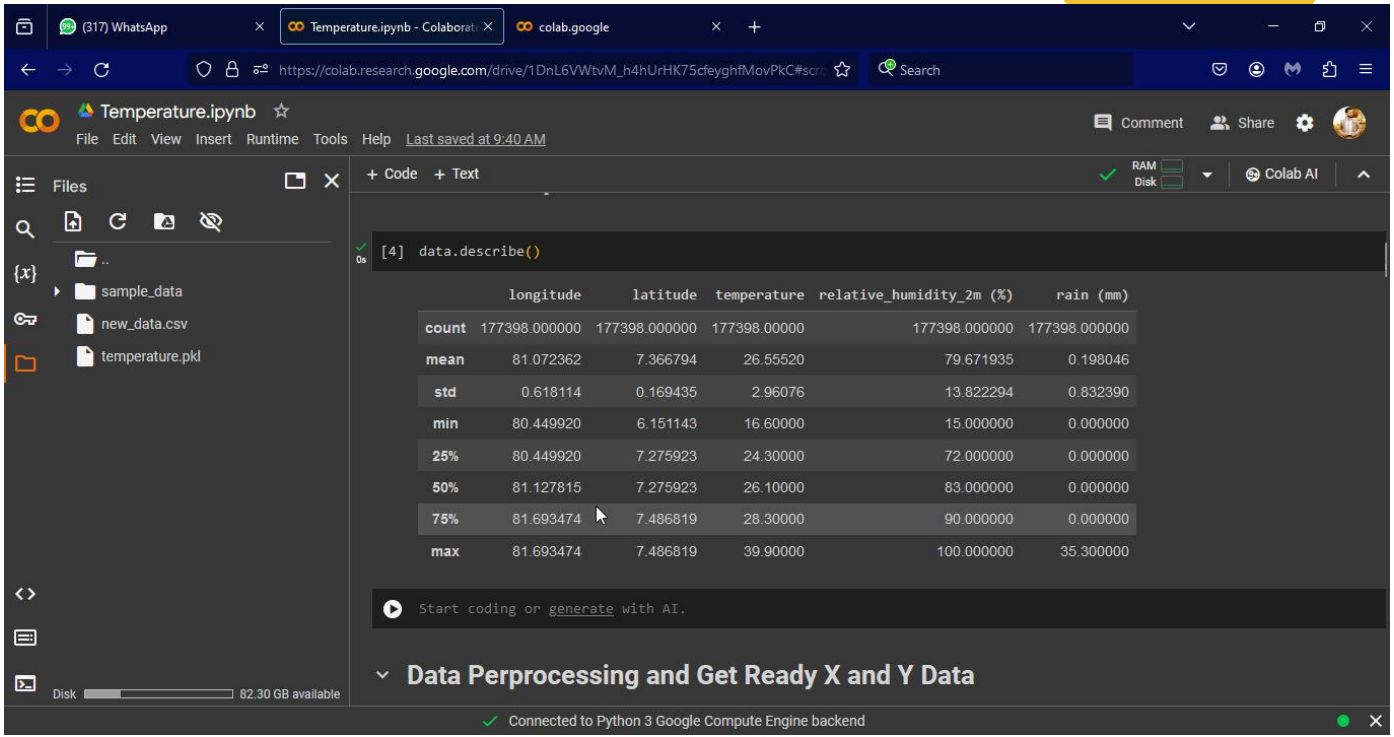
Completion of the project

MODEL RUNNING



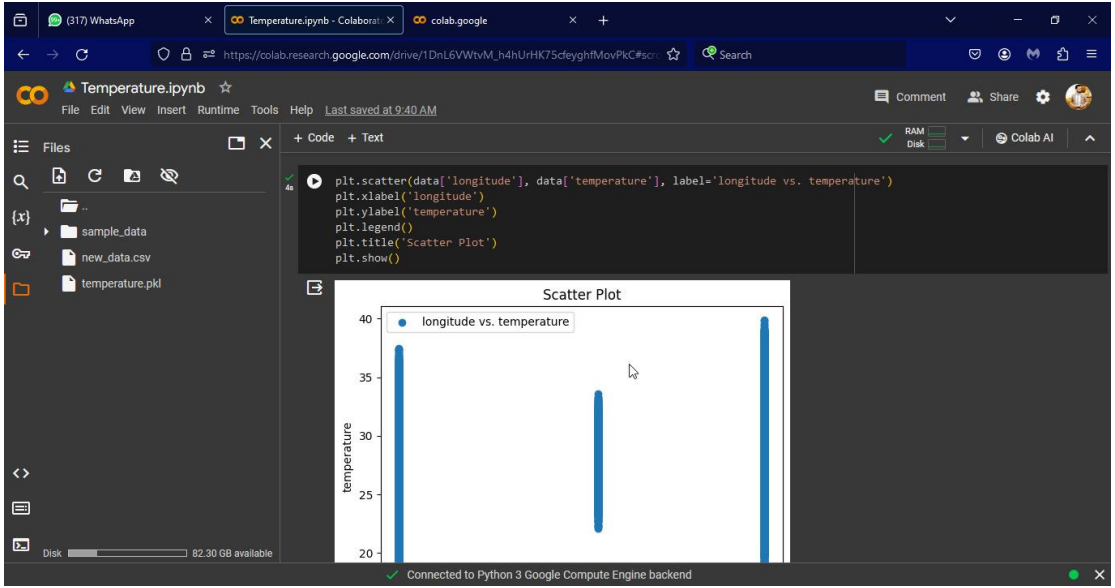
Completion of the project

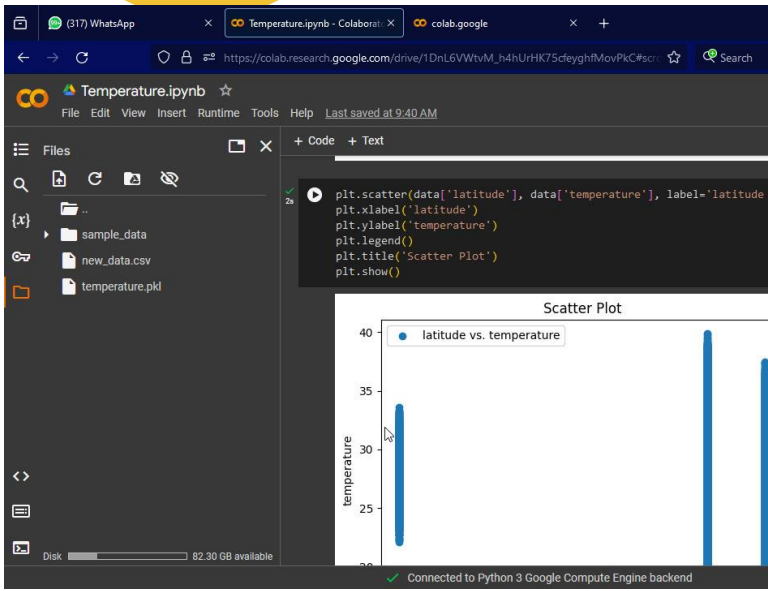
MODEL RUNNING



Completion of the project

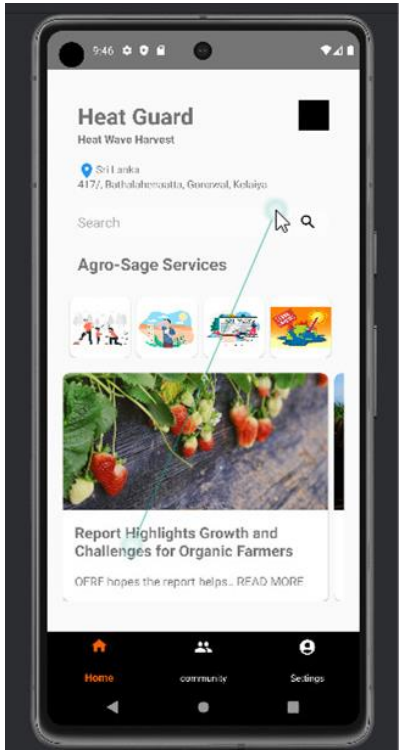
MODEL RUNNING





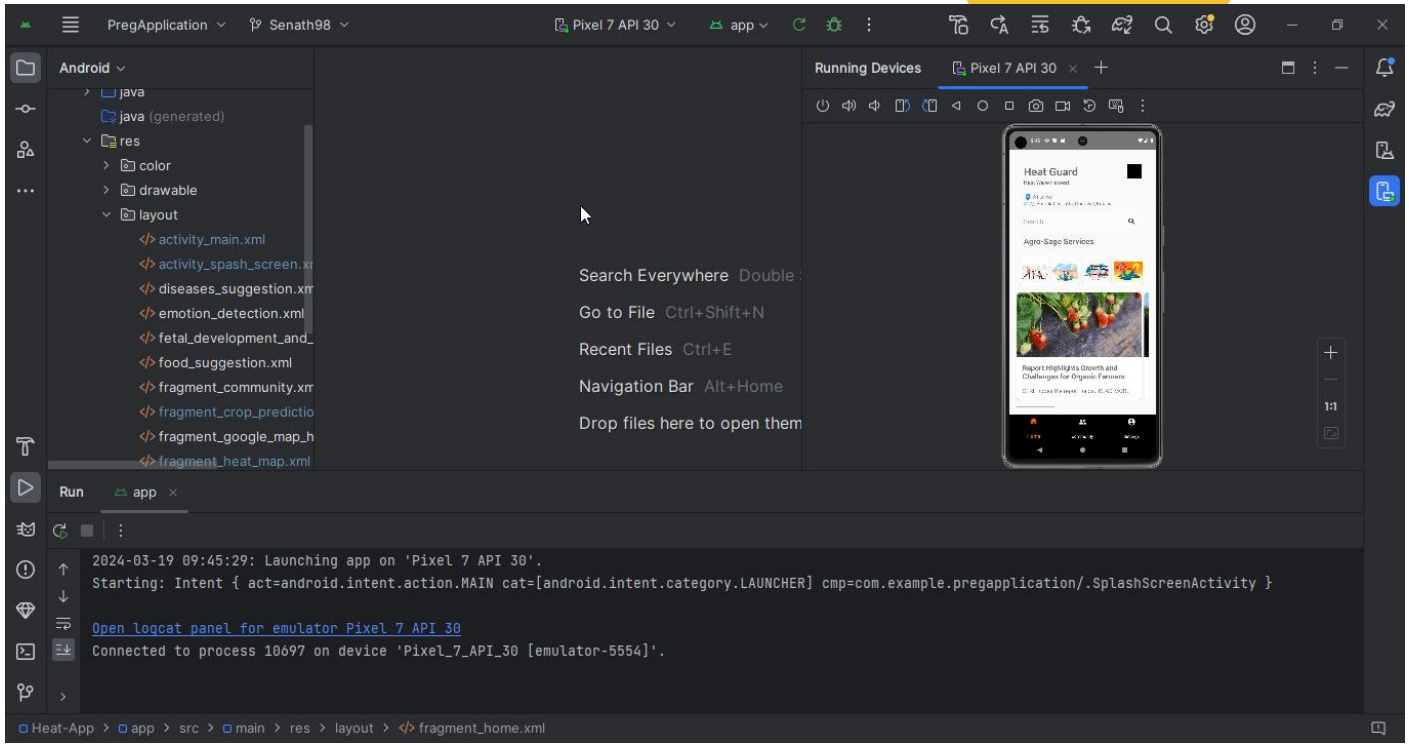
Completion of the project

UI EVIDENCE



Completion of the project

UI EVIDENCE



Current Progress

- Identified key vulnerability elements relevant to the Sri Lankan context.
- Completed the initial design of the User Interface (UI)
- The notification system should be developed.

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.

Gunadasa .B.N.S
IT 20652500

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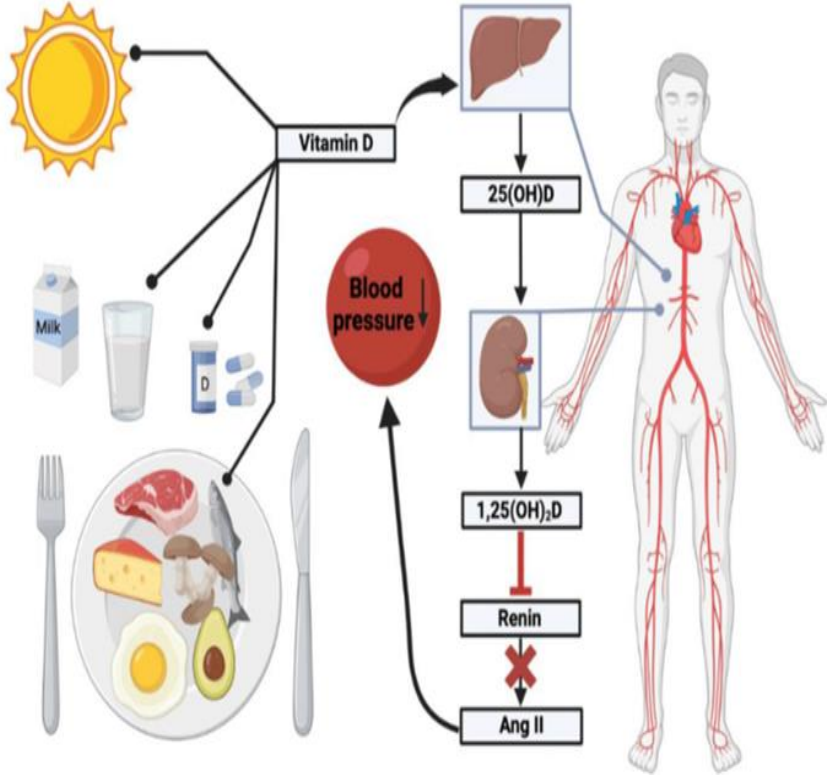
Research Introduction



This research paper aims to understand the effects of diuretics and beta-blockers medication on outdoor workers during heat waves. It seeks to develop a system that can improve efficiency and safety by identifying their health risks and recommending preventative measures. The study is crucial as heatwaves are becoming more frequent due to climate change, and outdoor workers are particularly vulnerable to heat exhaustion and dehydration. The paper suggests a system that can help workers manage their medication usage and work periods based on their impact.

Main Objective

Introduce the research aim: to develop a recommendation system for diuretics and beta-blockers medic
heat waves.

Emphasize the system's goal: to offer personalized guidance on water intake and work timing.

Specific Objectives

- ★ Collect future heatwave forecast data and user data, such as weight, medication use, and water levels.
- ★ Develop a method to estimate the water level in the human body.
- ★ Recommend how much water users should drink within a given time period, based on the impact of heatwaves, medication, and biodata.
- ★ Identify and analyze the most suitable times for users to work, based on heatwaves and the impact of diuretics and medication.

About Medicine

Dr. Wasantha P.K. Yamasinghe
MBBS (SRI LANKA)
Reg No: 12122
MEDI CARE CENTER,
UDAWATUNA

Beta blocker drugs and Diuretics are used in cardio-vascular diseases and Hypertension in my clinical practice.

Technologies, Tools and Algorithms

- Algorithm: **NLP**
- Develop Mobile application: **Android Stud**

k-means clustering

LDA topic modeling

- Model Trainer : **PyCharm**
- Languages : **Python,Java**

Current Progress

- Collect future heatwave forecast data and user data.
- Completed the main UI.
- Outdoor workers can enter their information and complete the forme.

Project Evidence

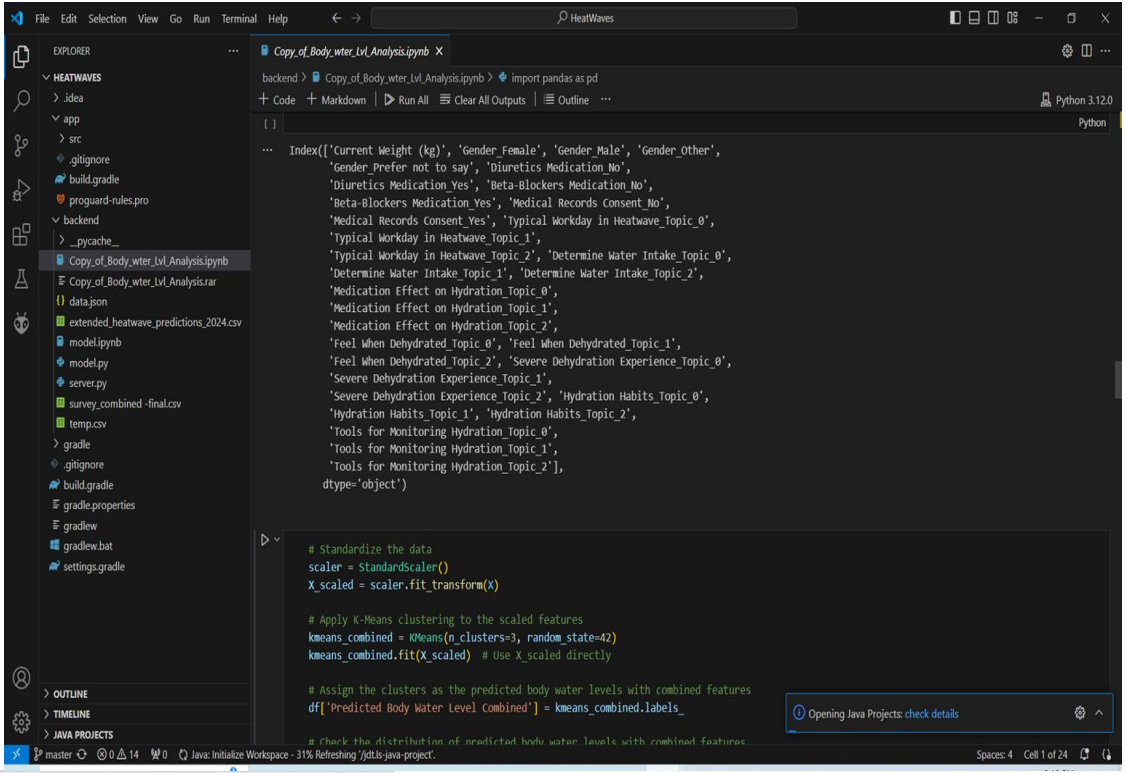
Dataset for progress evaluation

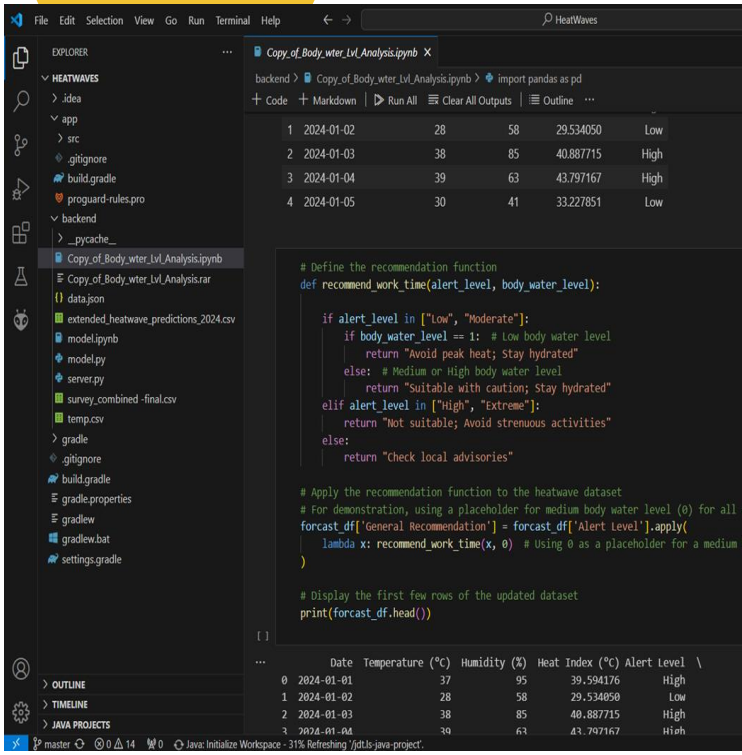
P1

	B	C	D	E	F	G	H	I	J	K	L	M
1	Date of Birth	Gender	Current Weigh	Health Conditio	Allergies	General Health	Diuretics Medic	Diuretics Name	Beta-Blockers I	Beta-Blockers I	Other Medicatic	Medical Records Consent
2	27/8/1968	Female	61	Diabetes	Yes	Fair	No	Med_B 20mg	Yes	None	None	Yes
3	1/7/1971	Other	112	Hypertension;H	No	Poor	No	None	No	Med_Z 10mg	Med_P 5mg	Yes
4	24/11/1962	Prefer not to sa	99	Diabetes;Kidne	No	Very Good	Yes	None	No	Med_Z 10mg	None	No
5	16/10/1976	Other	108		Yes	Good	No	Med_A 50mg	No	None	Med_Q 25mg	No
6	7/2/1971	Female	120		Yes	Poor	No	Med_C 10mg	Yes	Med_X 50mg	None	Yes
7	16/2/1980	Male	55	Hypertension	Yes	Good	Yes	None	Yes	Med_Z 10mg	None	Yes
8	18/1/1962	Male	78	None;Heart Fai	Yes	Excellent	No	Med_B 20mg	Yes	Med_Y 20mg	Med_P 5mg	Yes
9	13/3/1978	Prefer not to sa	88	Kidney Disorde	Yes	Fair	Yes	Med_B 20mg	No	Med_Y 20mg	Med_P 5mg	No
10	8/6/1970	Female	99	None;Hyperten	No	Poor	No	Med_A 50mg	Yes	None	Med_Q 25mg	Yes
11	1/6/1993	Male	76	Heart Failure	No	Very Good	Yes	Med_B 20mg	Yes	Med_Y 20mg	Med_R 15mg	No
12	4/8/1975	Prefer not to sa	72	None;Heart Fai	No	Fair	No	Med_B 20mg	No	None	Med_P 5mg	Yes
13	20/11/1970	Male	88	Diabetes	Yes	Good	Yes	Med_B 20mg	No	None	Med_P 5mg	No
14	8/8/1961	Female	118	Diabetes	No	Excellent	No	Med_A 50mg	Yes	Med_Y 20mg	Med_Q 25mg	Yes
15	9/7/1973	Prefer not to sa	76	Hypertension;H	No	Excellent	No	Med_B 20mg	No	Med_Y 20mg	Med_P 5mg	No
16	17/7/1973	Prefer not to sa	119	Kidney Disorde	No	Very Good	No	Med_B 20mg	No	Med_X 50mg	Med_P 5mg	Yes
17	9/1/1975	Other	47	Kidney Disorde	Yes	Excellent	Yes	None	No	Med_Z 10mg	None	Yes
18	17/4/1984	Male	60	Heart Failure;H	Yes	Good	Yes	Med_A 50mg	No	Med_Z 10mg	Med_Q 25mg	No
19	8/12/1993	Other	120	Heart Failure;H	No	Excellent	No	Med_C 10mg	No	Med_X 50mg	Med_P 5mg	No
20	21/7/1983	Male	99	Hypertension	Yes	Fair	No	Med_A 50mg	Yes	Med_Z 10mg	Med_Q 25mg	Yes
21	28/1/1973	Prefer not to sa	92	Hypertension	Yes	Good	No	Med_C 10mg	No	Med_Y 20mg	None	No
22	12/4/1967	Other	69	None;Diabetes	Yes	Very Good	Yes	Med_B 20mg	Yes	Med_Y 20mg	None	Yes
23	8/6/1977	Prefer not to sa	73	Heart Failure;D	No	Good	Yes	None	No	Med_Z 10mg	Med_P 5mg	No
24	2/8/1991	Prefer not to sa	103	Kidney Disorde	No	Good	Yes	Med_B 20mg	Yes	Med_X 50mg	Med_R 15mg	Yes
25	24/6/1977	Female	119	Diabetes	Yes	Good	No	None	Yes	Med_X 50mg	Med_R 15mg	No
26	22/7/1988	Other	96	Kidney Disorde	Yes	Fair	No	Med_C 10mg	Yes	Med_X 50mg	Med_R 15mg	No
27	3/1/1983	Female	53		Yes	Excellent	No	None	Yes	Med_Z 10mg	None	Yes

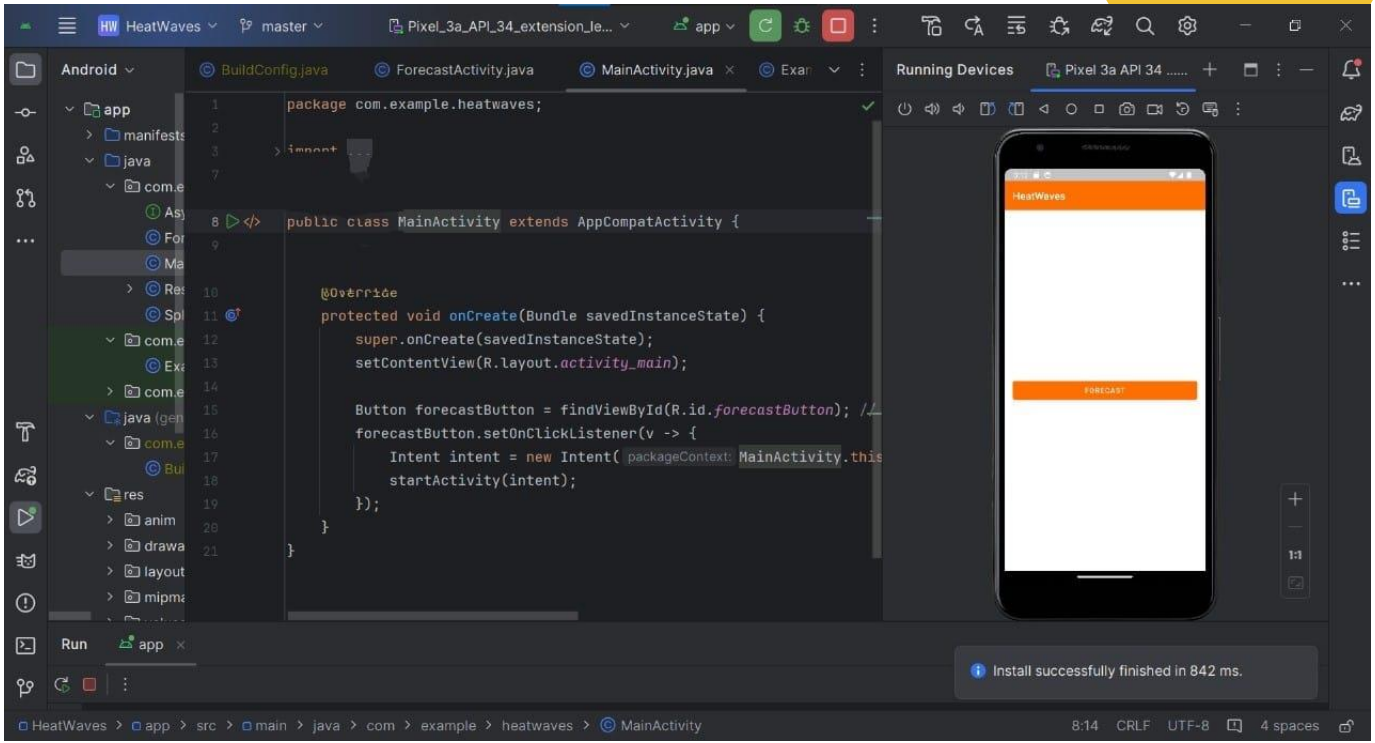
survey_data

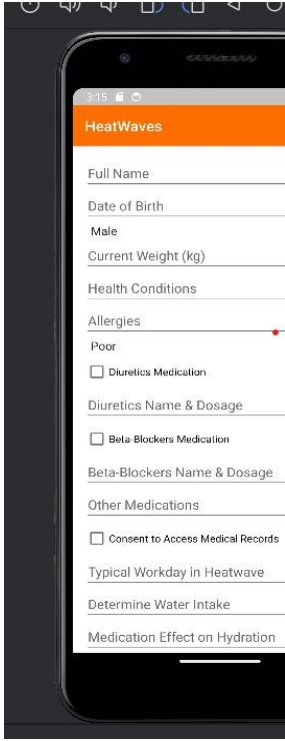
Completion of the project





Completion of the project





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.

Best Practices

- 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.

Commercialization

- 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