3/14/2019

NTT HACKATHON

Dignity Hackers

Disaster Relief & Response

Flood & Rainfall Prediction

Team - Dignity Hackers

WORKING MODEL

PROBLEM STATEMENT

Disaster Relief and Response

- Flood Prediction
- Rainfall Analysis

APPROACH

Disaster response is the second phase of the disaster Management cycle. It consists of a number of elements, for example, warning, evacuation, search and rescue, providing immediate assistance, assessing damage, continuing assistance and the immediate restoration.

So among all, we have worked upon warning system for floods. In this, we have provided a user interface to the common public to check the level of water flow in rivers in future and have a provided a mechanism of notification if there is any possibility of flood due to any river in nearby future (12 months). Along with that users can also see the historical trends of rivers flow and can visualize the rainfall patterns also in their Sub-Division (Area).

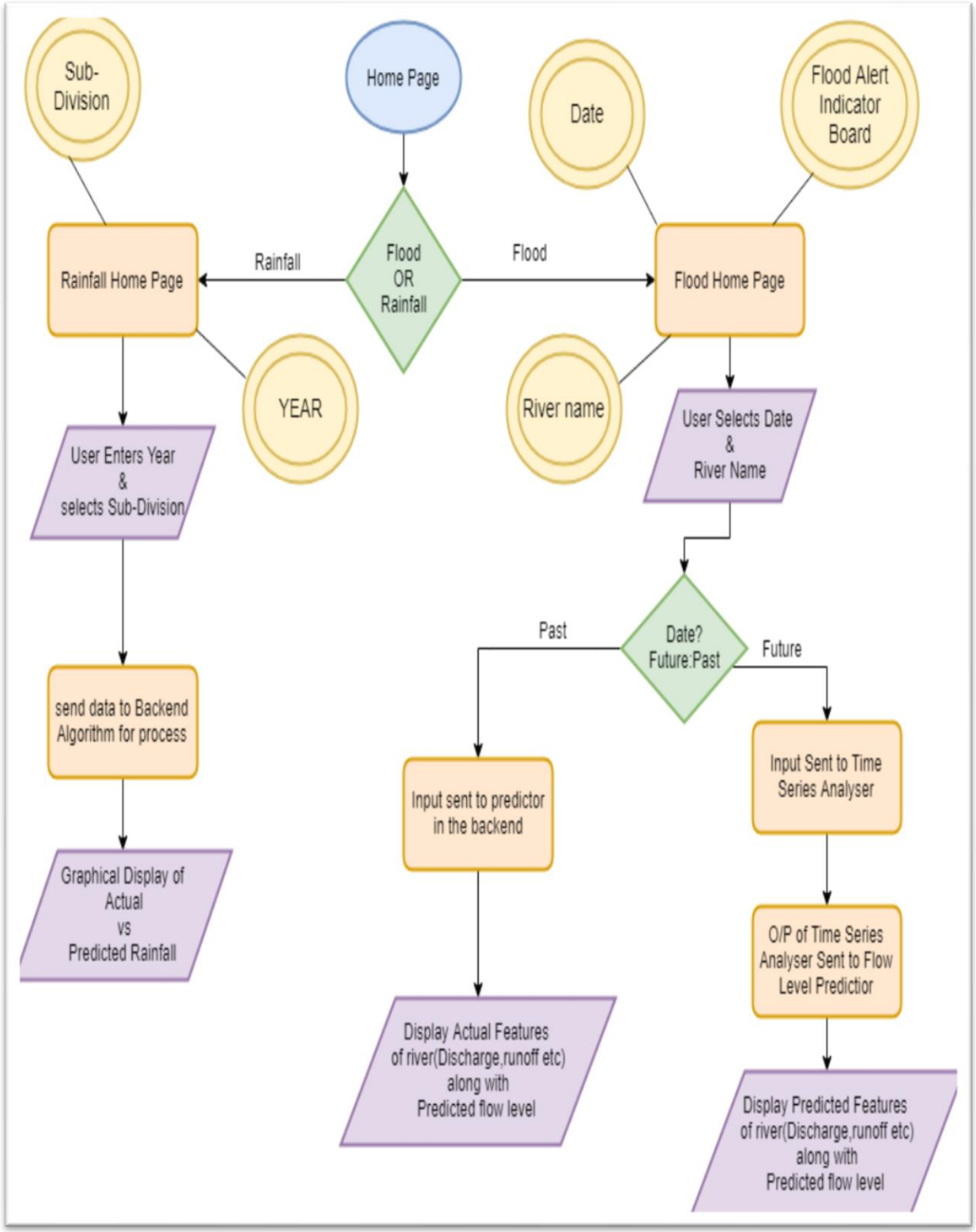
So with that much information beforehand and knowing the chances of the flood in any region we can prepare ourselves and alert the local public so that loss would be minimum.

INPUT DATA

The value of Input is taken from the user using the function **FLASK**.

Flask is a small and powerful web framework for Python. Flask is a microframework for Python based on Werkzeug, Jinja 2.

WORKFLOW CHART



1) FLOOD PREDICTION

First, we input the value of intended date and the river name for prediction from the User. Then the using FLASK we transfer this input value to our Machine Learning Model.

Here for the calculating the value of predicted flood in any coming year and also having feature to analyse the previous year flood via statistical analysis and mathematical parameters, first we have to train our model on any existing datasets of rivers that we have taken. River namely we use: {Godavari, Krishna, Mahanadi, Cauvery, Son}.

Here we have used datasets of rivers containing the data of flood happen or not via some parameter like discharge, flood runoff etc for training our model.

MACHINE LEARNING MODEL

We have used Machine Learning model for predicting the value of flood: -

- LINEAR DISCRIMINANT ANALYSIS (LDA)

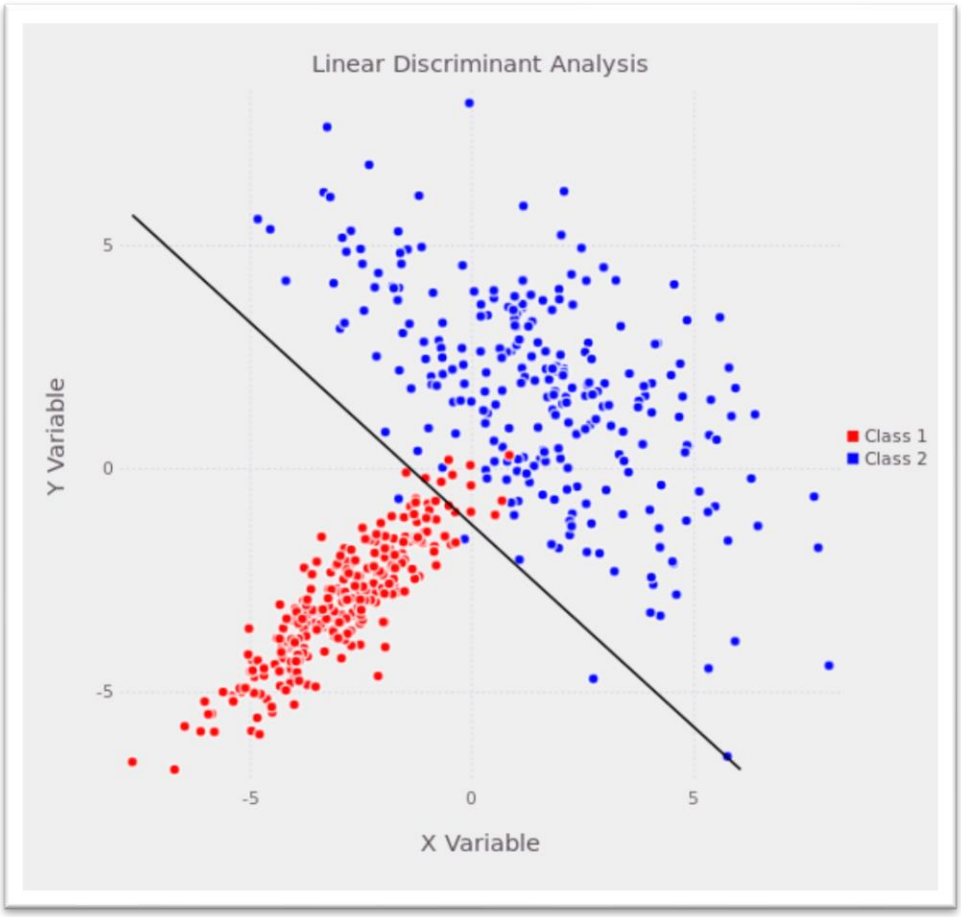
For predicting following values, we have used these Models: -

- Predicting Future -> LINEAR DISCRIMINANT ANALYSIS (LDA) AND FBPROPHET TOOL (For time series)
- Analysis of past -> LINEAR DISCRIMINANT ANALYSIS (LDA)

LINEAR DISCRIMINANT ANALYSIS

Linear discriminant analysis (LDA) or discriminant function analysis is a generalization of Fisher's linear discriminant, a method used in statistics, pattern recognition and machine learning to find a linear combination of features that characterizes or separates two or more classes of objects or events. The resulting combination may be used as a linear classifier, or, more commonly, for dimensionality reduction before later classification.

LDA is also closely related to principal component analysis (PCA).LDA works when the measurements made on independent variables for each observation are continuous quantities. When dealing with categorical independent variables, the equivalent technique is discriminant correspondence analysis.



Red dot: No Flood;

Blue dot: Flood;

FBPROPHET (FACEBOOK FBPROPHET)

It is basically a library to build forecasting models for time series data, but instead of using the traditional way of building the model such as using ARIMA, etc., it is fitting additive regression models or known as 'curve fitting'. They have implemented the core part of the procedure in Stan's probabilistic programming language. Because of this, "Stan performs the MAP optimization for parameters extremely quickly (<1 second), gives us the option to estimate parameter uncertainty using the Hamiltonian Monte Carlo algorithm, and allows us to re-use the fitting procedure across multiple interface languages.", according to the authors.

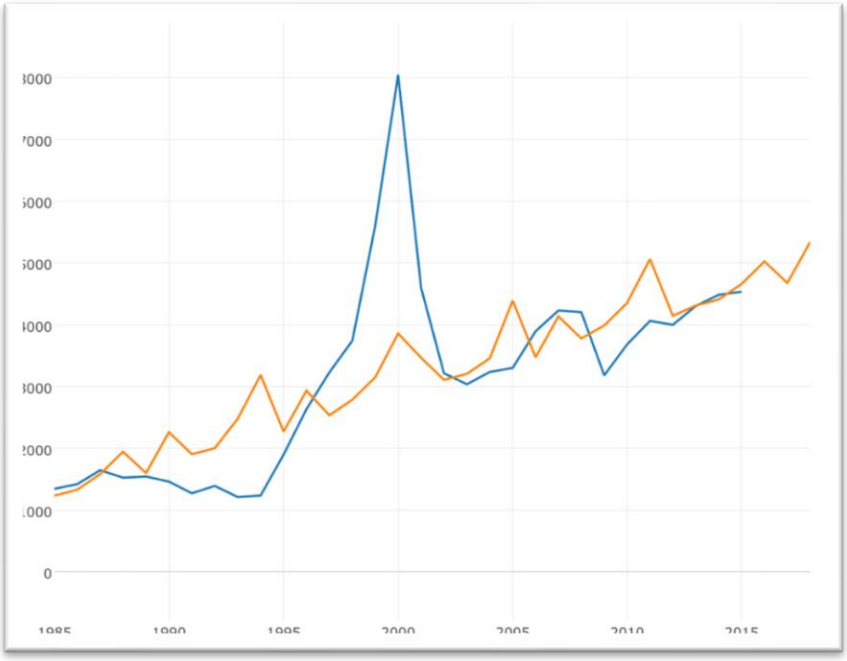
It is designed to handles typical data challenges like the followings by default.

- A reasonable number of missing observations or large outliers
- Historical trend changes, for instance due to product launches or logging changes

- Trends that are non-linear growth curves, where a trend hits a natural limit or saturates

“We have found Prophet’s default settings to produce forecasts that are often accurate as those produced by skilled forecasters, with much less effort.”

“With Prophet, you are not stuck with the results of a completely automatic procedure if the forecast is not satisfactory—an analyst with no training in time series methods can improve or tweak forecasts using a variety of easily-interpretable parameters.”

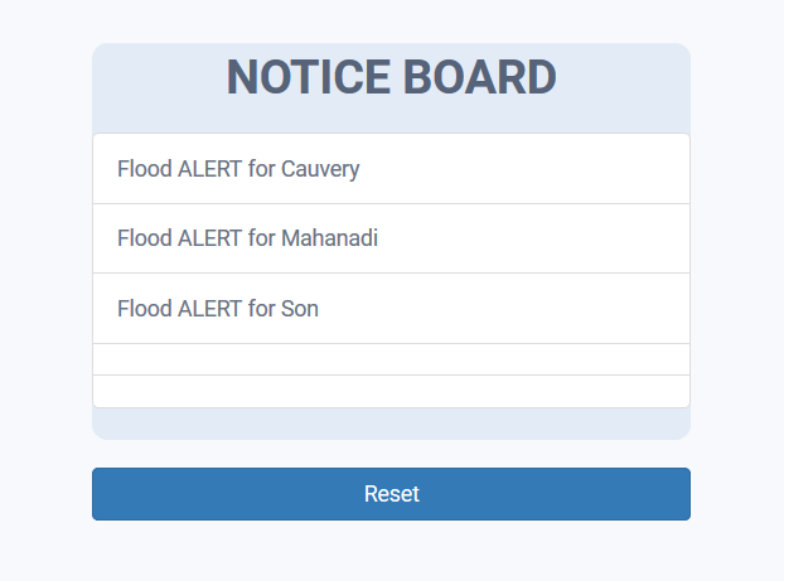


Orange line: Actual;

Blue line: Predicted;

FLOOD ALARM SYSTEM

In flood prediction homepage, we have one notice board which tell the name of the river going to be flooded in next 12 month. We predict this name by using FBPROPHET tool which give us future value of discharge and runoff’s by using time series analysis and by putting these values into our LDA model we get future prediction of flooding river in our notice board in flood homepage.



Notice board

2) RAINFALL ANALYSIS

First, we input the value of intended year and subdivision name for prediction from the User. Then the using FLASK we transfer this input value to our Machine Learning Model.

Here for the analyse the value of predicted rainfall in any coming year, first we have to train our model on any existing dataset.

Here we have used dataset SubDivision.csv containing the data of Rainfall in 36 Subdivisions for training our model.

MACHINE LEARNING MODEL

We have used two Machine Learning models for predicting the value of Rainfall: -

- RECURRENT NEURAL NETWORK (RNN)

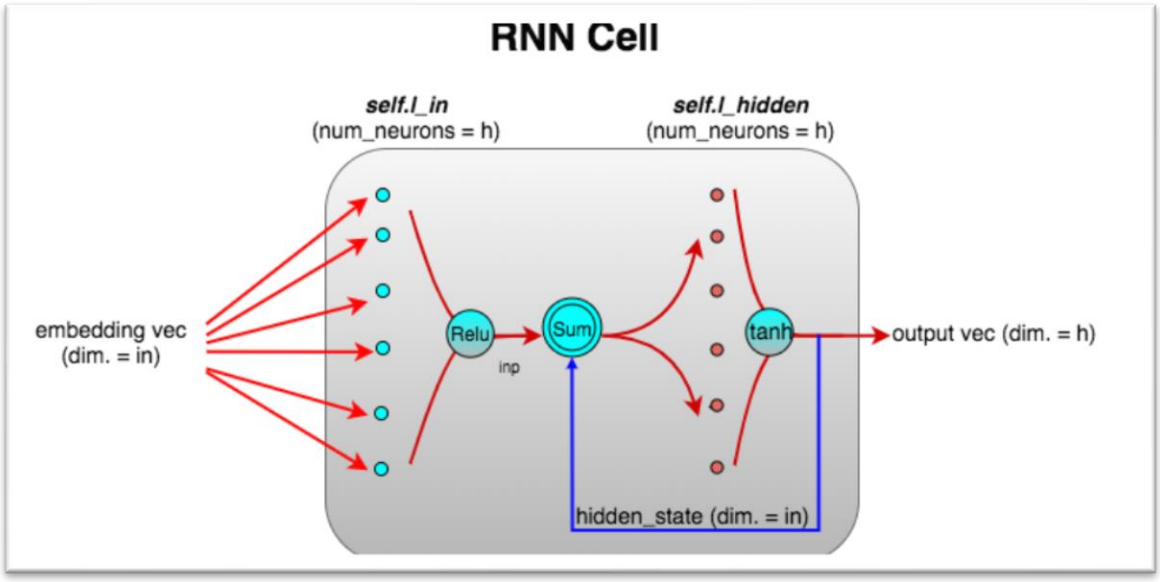
For analysing following values, We have used these Models: -

- RECURRENT NEURAL NETWORK (RNN)

RECURRENT NEURAL NETWORK

A recurrent neural network (RNN) is a class of artificial neural network where connections between nodes form a directed graph along a temporal sequence. This allows it to exhibit temporal dynamic behavior. Unlike feedforward neural networks, RNNs can use their internal state (memory) to process sequences of inputs. This makes them applicable to tasks such as unsegmented, connected handwriting recognition or speech recognition.

The term "recurrent neural network" is used indiscriminately to refer to two broad classes of networks with a similar general structure, where one is finite impulse and the other is infinite impulse. Both classes of networks exhibit temporal dynamic behavior. A finite impulse recurrent network is a directed acyclic graph that can be unrolled and replaced with a strictly feedforward neural network, while an infinite impulse recurrent network is a directed cyclic graph that cannot be unrolled.



STEPS TAKEN IN THE PROCESS

1) CONNECTION TO HTML

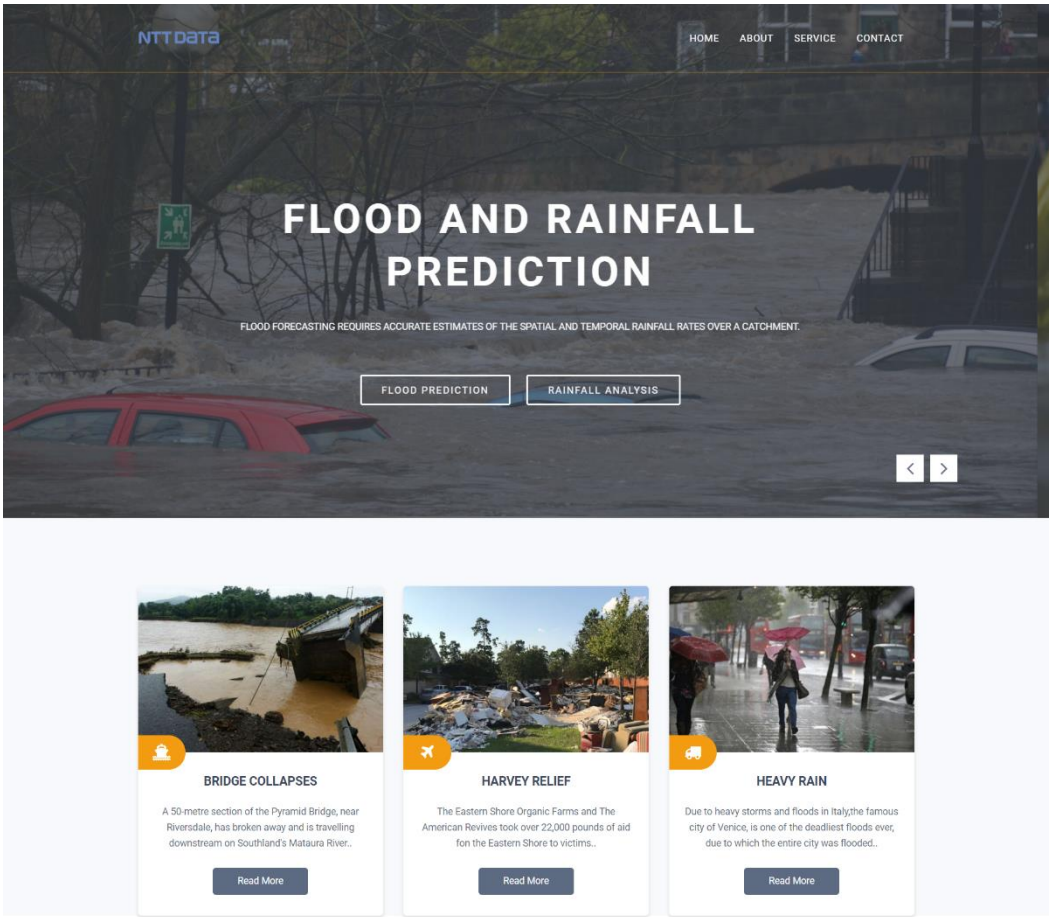
1. A user issues a request for a domain's root URL / to go to its index page
2. main.py maps the URL / to a Python function
3. The Python function finds a web template living in the templates/ folder.
4. A web template will look in the static/ folder for any images, CSS files it needs as it renders to HTML
5. Rendered HTML is sent back to main.py
6. main.py sends the HTML back to the browser

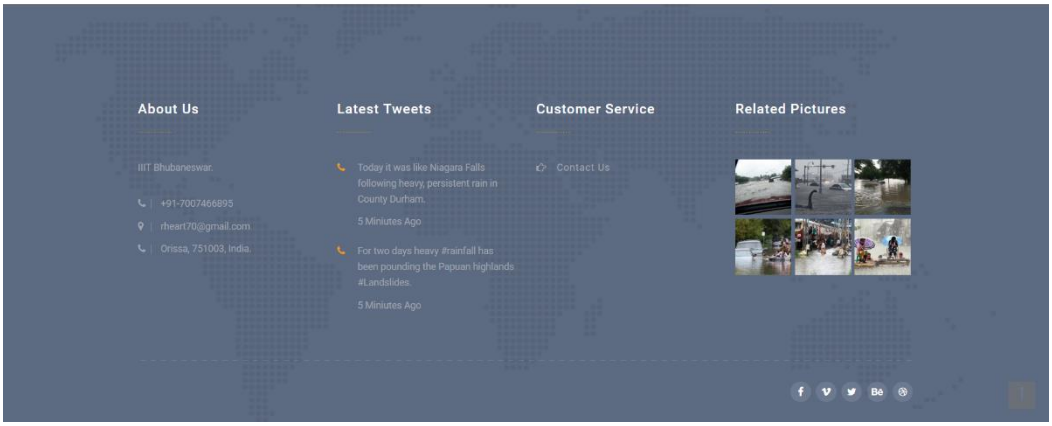
2)URL IN THE BROWSER AND BACKEND CONNECTION

1. First. we imported the Flask class and a function render template.
2. Next, we created a new instance of the Flask class.
3. We then mapped the URL / to the function index(). Now, when someone visits this URL, the function index() will execute.
4. The function index() uses the Flask function render template() to render the index.html template we just created from the templates/ folder to the browser.
5. Finally, we use run() to run our app on a local server.
6. We'll set the debug flag to true, so we can view any applicable error messages if something goes wrong, and so that the local server automatically reloads after we've made changes to the code.
7. When we visited http://127.0.0.1:5000/, main.py had code in it, which mapped the URL / to the Python function index().
8. index() found the web template index.html in the templates/ folder, rendered it to HTML, and sent it back to the browser, giving us the screen above.

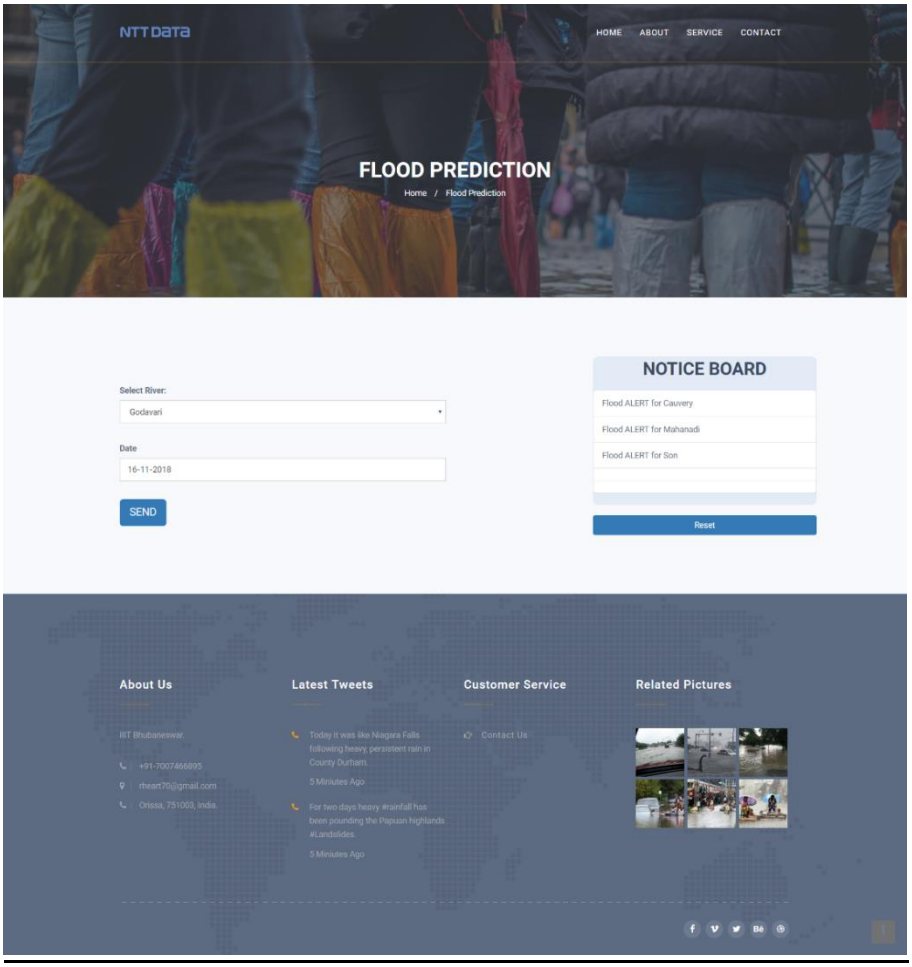
SCREENSHOT OF OUR UI

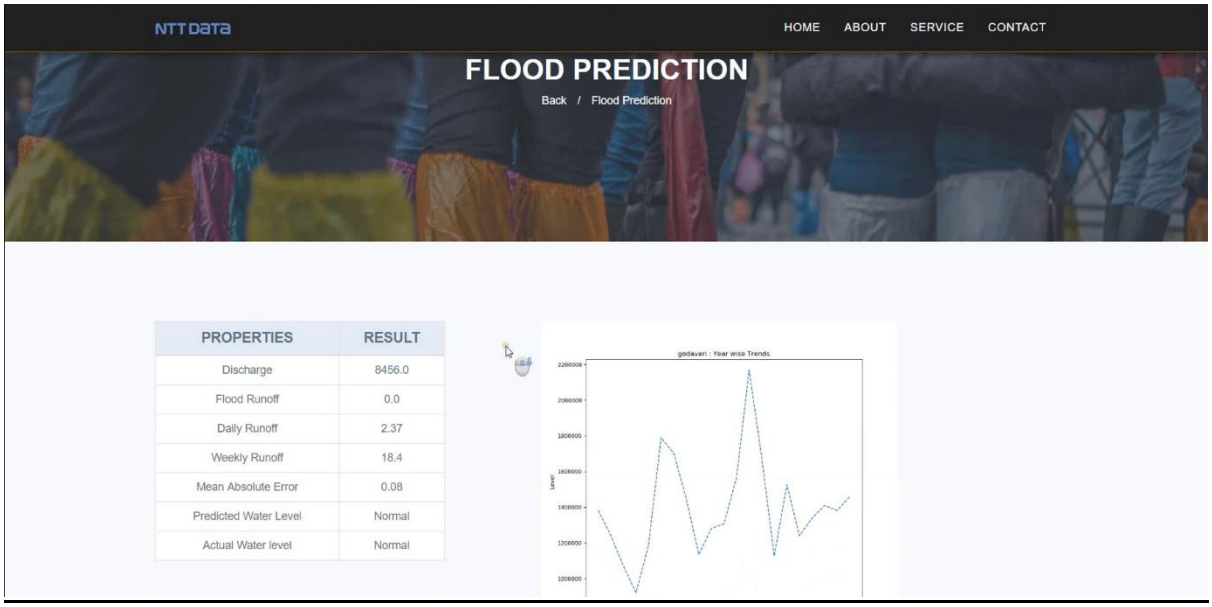
1) Home Page:



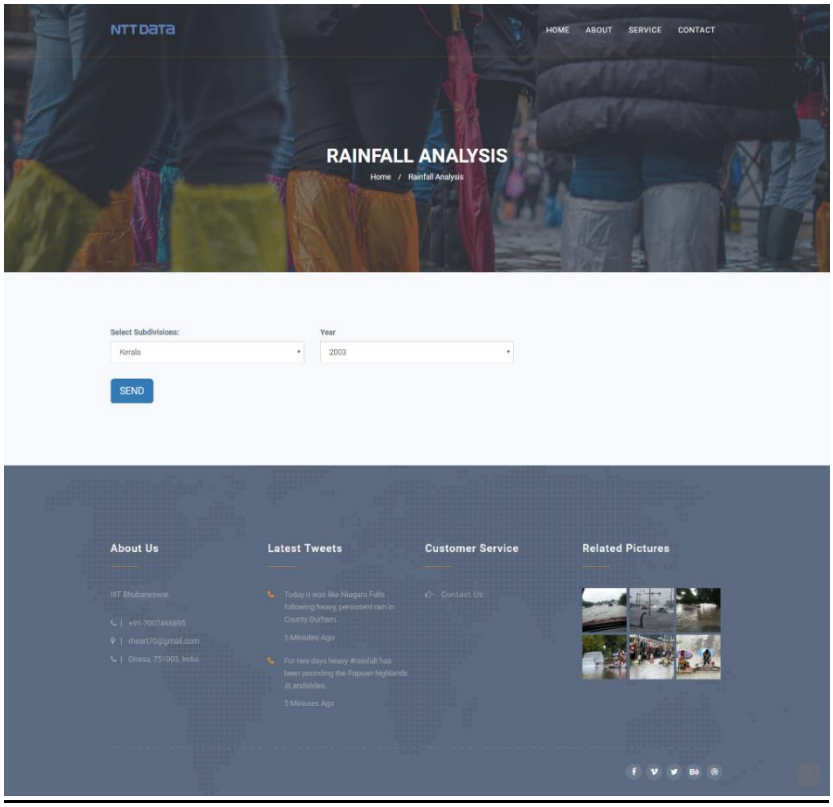


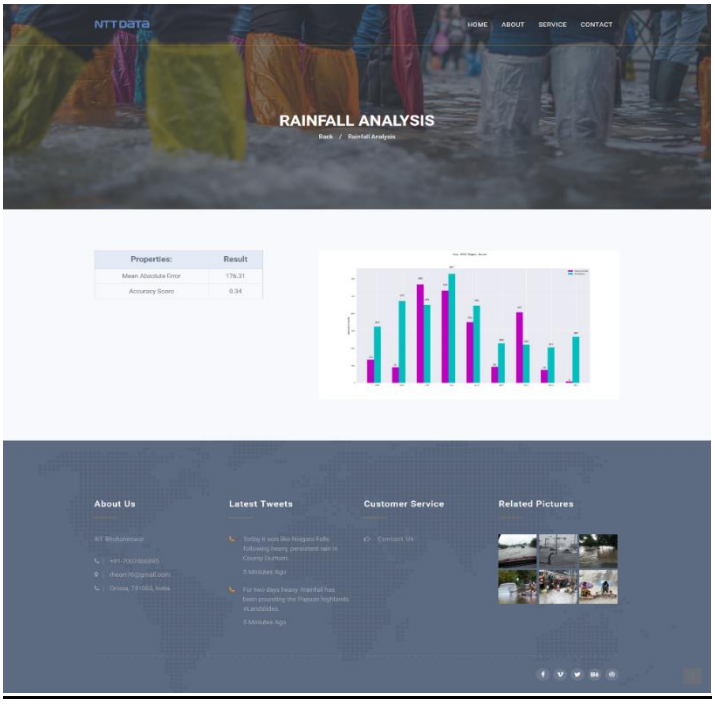
2) Flood Prediction and Result Page:



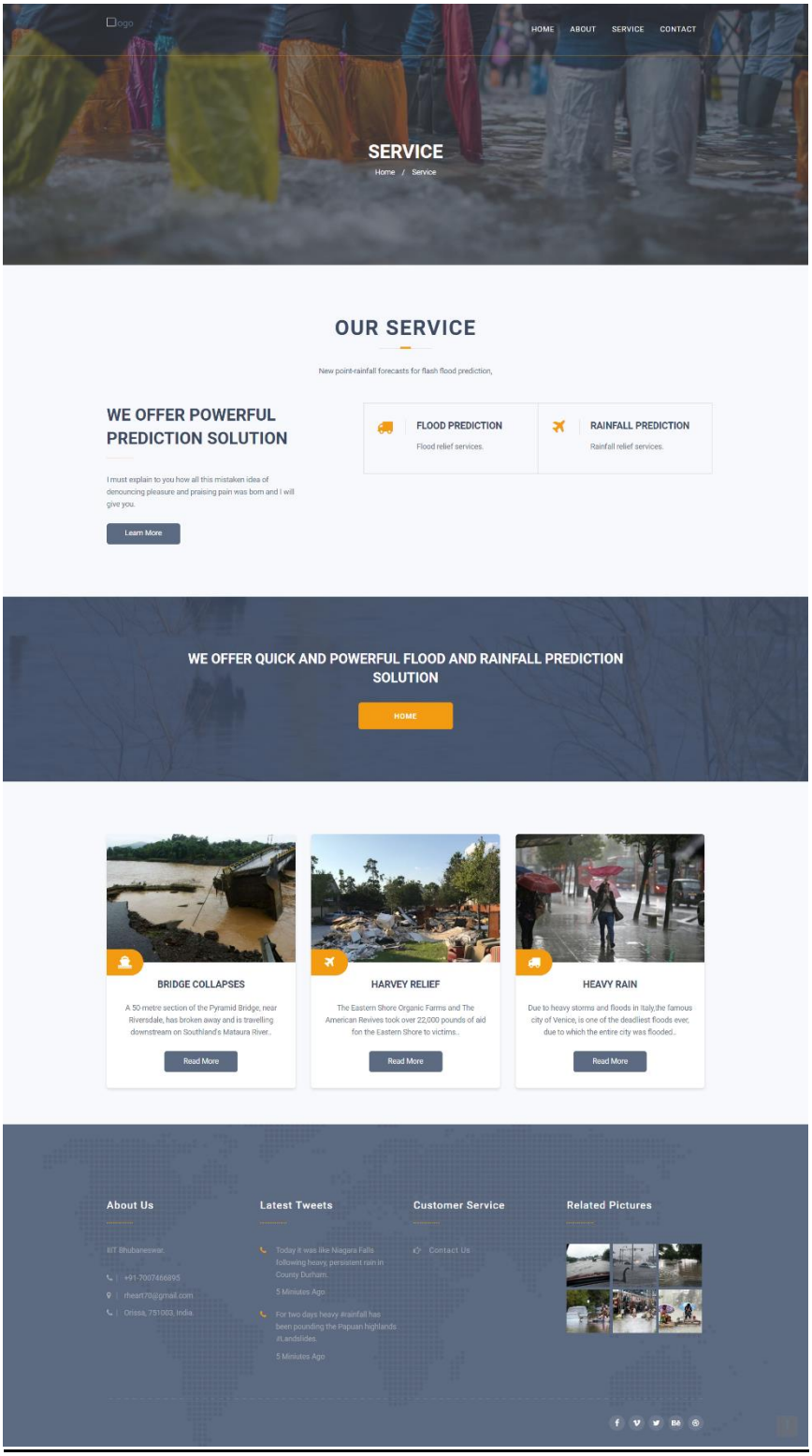


3) Rainfall Prediction and Result Page:

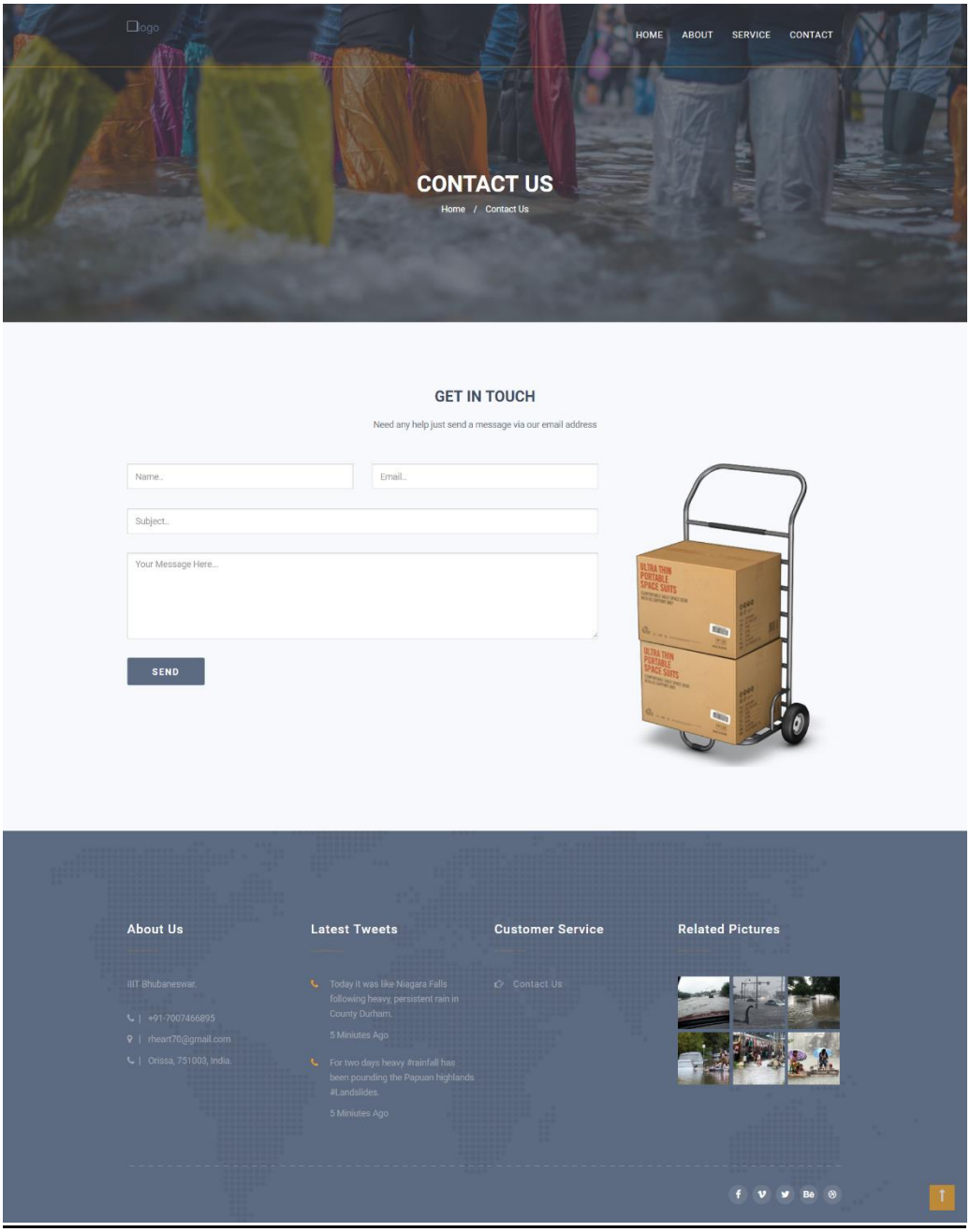




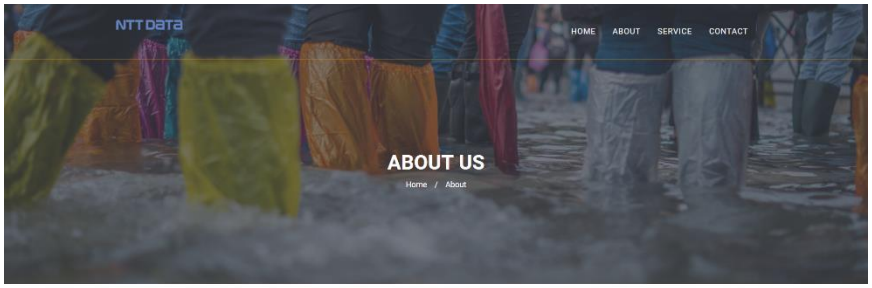
4) Service we provide:

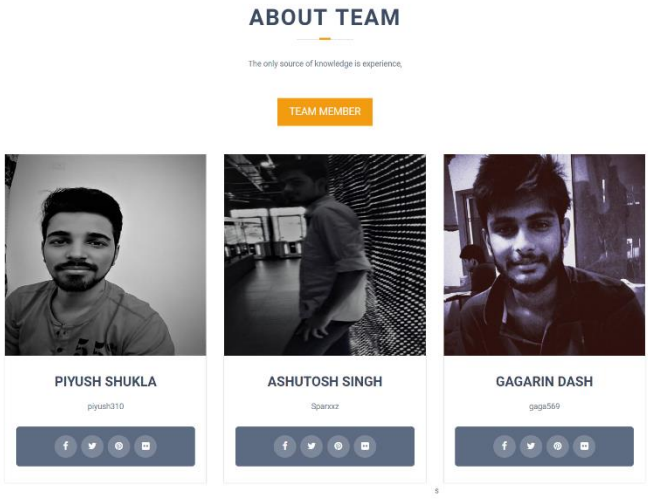


5) Contact page:



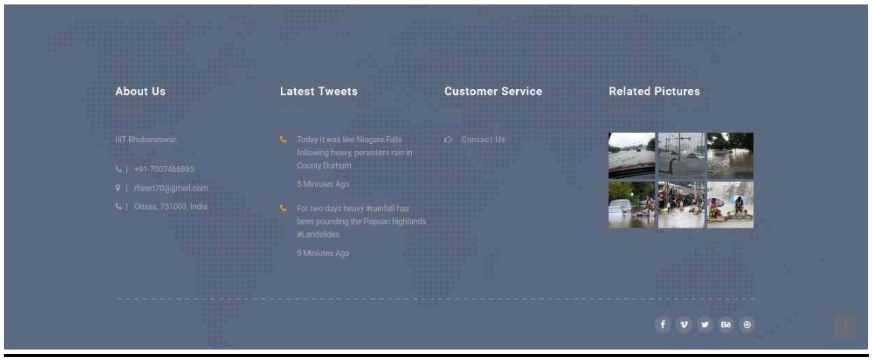
6) About page:


NTT DATA
HOME
ABOUT
SERVICE
CONTACT
ABOUT US
Home / About


ABOUT TEAM
The only source of knowledge is experience,
TEAM MEMBER
PIYUSH SHUKLA
piyush310
ASHUTOSH SINGH
Spanxxz
GAGARIN DASH
gaga569


FLOOD FORECASTING IS THE USE OF FORECASTED PRECIPITATION AND STREAMFLOW DATA IN RAINFALL-RUNOFF
HOME


GARAGE
VINTAGE
VINTAGE
MILLER
VINTAGE
GARAGE


About Us
IIIT Bhubaneswar,
+91-7007466895
rheart70@gmail.com
Orissa, 751003, India
Latest Tweets
Today it was like Niagara Falls following heavy, persistent rain in County Durham.
5 Minutes Ago
For two days heavy #rainfall has been pounding the Papuan highlands #Landslides.
5 Minutes Ago
Customer Service
Contact Us
Related Pictures