# Introduction

## 1.1 Background

Floods are among the most devastating natural disasters, causing significant damage to life, property, and the environment.

Predicting floods accurately and effectively is critical for mitigating their impacts.

With advancements in technology and data science, the development of flood prediction systems has gained considerable attention.

By leveraging geographic information systems (GIS), hydrological models, and machine learning techniques, we can now enhance flood forecasting and preparedness.

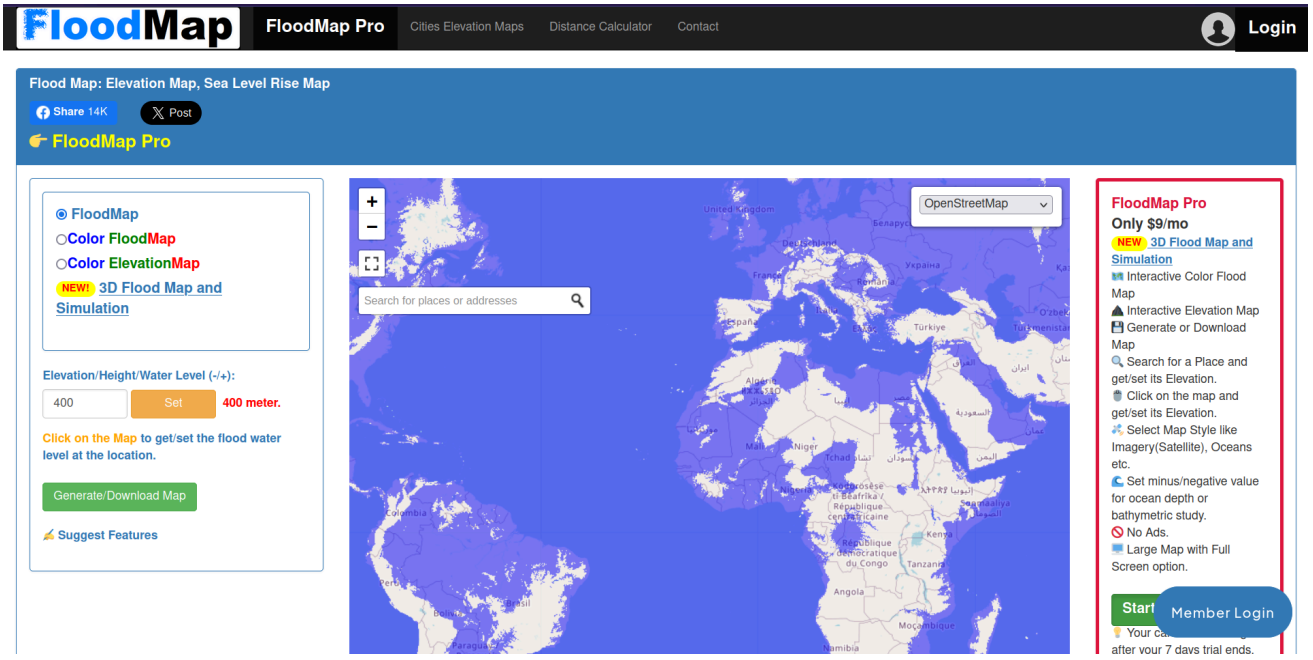
## 1.2 Survey on Existing Works

Numerous studies have explored flood prediction methods, ranging from traditional hydrological models to modern data-driven approaches. Traditional methods rely on physical parameters such as rainfall, river discharge, and topography.

Modern approaches integrate remote sensing data, real-time monitoring, and machine learning to improve prediction accuracy.

Key contributions in the field include:

- Machine learning-based flood forecasting models.
- Use of satellite imagery for inundation mapping.
- Integration of IoT sensors for real-time flood monitoring.



| Name of the website | Link | Key feature | Tech Stack (Front End) | Tech stack (Back End) |
|---|---|---|---|---|
| Floodmap net | link | 1) flood map (world map)<br>2) color flood map<br>3)Elevation/Height/Water Level (-/+) | html<br>css | express.js<br>node.js<br>js |
| Aregis Pro | link | 1) 3rd model simulation<br>2)video to understand the simulation only for premium customer<br>3)some documentations | html<br>css | don't now |
| flood.concord | link | 1)Water level simulation map of different areas<br>2)Static map<br>3) video player of water level | html<br>css | |
| FEMA Flood Map Service Center | link | 1)World map with area-specific flood view<br>2)No customized flood zone | html<br>css<br>js | apis<br>node<br>expres.js |
| HydroSheds | link | 1)Flood documentation by area<br>2)Categorized data product<br>3) no 3d effect | html<br>css<br>js | js<br>node<br>expres.js |
| European Flood Awareness System (EFAS) | link | 1) Latest flood news and events<br>2)EFAS real time forecasts are only accessible<br>3) any previous incident | html<br>css<br>js | js |

## 1.3 Motivation Behind the Work

Despite advancements, existing systems often face limitations such as high computational costs, lack of real-time data integration, and limited accessibility for end-users.

This work aims to address these challenges by developing an accessible, efficient, and user-friendly flood prediction system.

The motivation stems from the need to:

- Enhance prediction accuracy.
- Make flood prediction tools accessible to a broader audience.
- Provide a platform for visualizing flood risks effectively.

## 1.4 Major Contributions of the Work

The major contributions of this work include:

- Designing a robust system architecture for flood prediction.
- Developing a web-based application for flood visualization and prediction.
- Comparing the proposed system with existing methods to highlight its effectiveness.

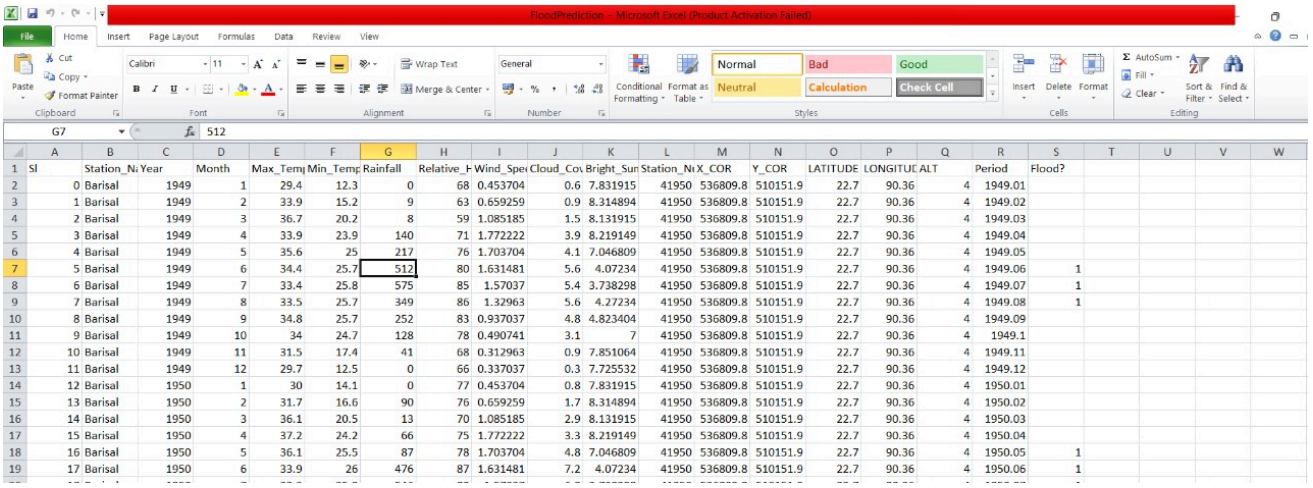
| Our work | Source |
|---|---|
| Track location in java script | link |
| time api | link |
| make the world map | link |
| weather api | Link1, link2 |

# Proposed Work

## 2.1 System Architecture

The proposed system architecture integrates data collection, processing, prediction, and visualization. Key components include:

1. Data Collection: Gathering data from IoT sensors, satellite imagery, and historical records.
2. Data Processing: Cleaning and preprocessing the collected data.
3. Prediction Model: Implementing a machine learning model trained on processed data.
4. Visualization: A web-based interface to display flood predictions and risk maps.
5. Model has been trained on this dataset [link]



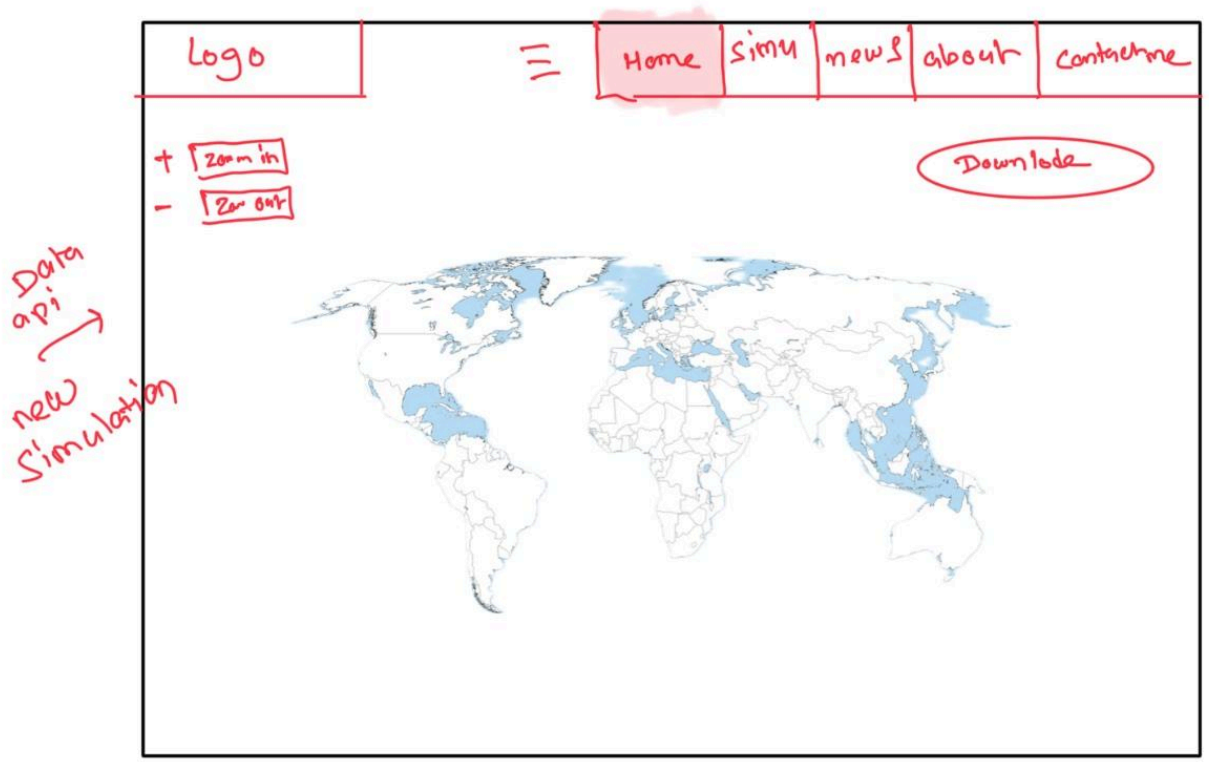
| SI | Station_N | Year | Month | Max_Tem | Min_Temp | Rainfall | Relative_H | Wind_Spe | Cloud_Co | Bright_Sun | Station_N | X_COR | Y_COR | LATITUDE | LONGITUD | ALT | Period | Flood? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Barisal | 1949 | 1 | 29.4 | 12.3 | 0 | 68 | 0.453704 | 0.6 | 7.831915 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.01 | |
| 1 | Barisal | 1949 | 2 | 33.9 | 15.2 | 9 | 63 | 0.659259 | 0.9 | 8.314894 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.02 | |
| 2 | Barisal | 1949 | 3 | 36.7 | 20.2 | 8 | 59 | 1.085185 | 1.5 | 8.131915 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.03 | |
| 3 | Barisal | 1949 | 4 | 33.9 | 23.9 | 140 | 71 | 1.772222 | 3.9 | 8.219149 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.04 | |
| 4 | Barisal | 1949 | 5 | 35.6 | 25 | 217 | 76 | 1.703704 | 4.1 | 7.046809 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.05 | |
| 5 | Barisal | 1949 | 6 | 34.4 | 25.7 | 512 | 80 | 1.631481 | 5.6 | 4.07234 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.06 | 1 |
| 6 | Barisal | 1949 | 7 | 33.4 | 25.8 | 575 | 85 | 1.57037 | 5.4 | 3.738298 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.07 | 1 |
| 7 | Barisal | 1949 | 8 | 33.5 | 25.7 | 349 | 86 | 1.32963 | 5.6 | 4.27234 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.08 | 1 |
| 8 | Barisal | 1949 | 9 | 34.8 | 25.7 | 252 | 83 | 0.937037 | 4.8 | 4.823404 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.09 | |
| 9 | Barisal | 1949 | 10 | 34 | 24.7 | 128 | 78 | 0.490741 | 3.1 | 7 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.1 | |
| 10 | Barisal | 1949 | 11 | 31.5 | 17.4 | 41 | 68 | 0.312963 | 0.9 | 7.851064 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.11 | |
| 11 | Barisal | 1949 | 12 | 29.7 | 12.5 | 0 | 66 | 0.337037 | 0.3 | 7.725532 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1949.12 | |
| 12 | Barisal | 1950 | 1 | 30 | 14.1 | 0 | 77 | 0.453704 | 0.8 | 7.831915 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.01 | |
| 13 | Barisal | 1950 | 2 | 31.7 | 16.6 | 90 | 76 | 0.659259 | 1.7 | 8.314894 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.02 | |
| 14 | Barisal | 1950 | 3 | 36.1 | 20.5 | 13 | 70 | 1.085185 | 2.9 | 8.131915 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.03 | |
| 15 | Barisal | 1950 | 4 | 37.2 | 24.2 | 66 | 75 | 1.772222 | 3.3 | 8.219149 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.04 | |
| 16 | Barisal | 1950 | 5 | 36.1 | 25.5 | 87 | 78 | 1.703704 | 4.8 | 7.046809 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.05 | 1 |
| 17 | Barisal | 1950 | 6 | 33.9 | 26 | 476 | 87 | 1.631481 | 7.2 | 4.07234 | 41950 | 536809.8 | 510151.9 | 22.7 | 90.36 | 4 | 1950.06 | 1 |

## 2.2 Website for Flood Prediction

The web-based application is designed to:

- Display real-time flood predictions.
- Provide interactive flood maps.
- Allow users to input location-specific data for localized predictions.

| | |
|---|---|
| page1 | ai model with live time update on world map(download option) |
| page2 | simulate with world map( + 3d model creation) |
| page3 | live time news update (share news) |
| page4 | documentation |
| page5 | contact via mail |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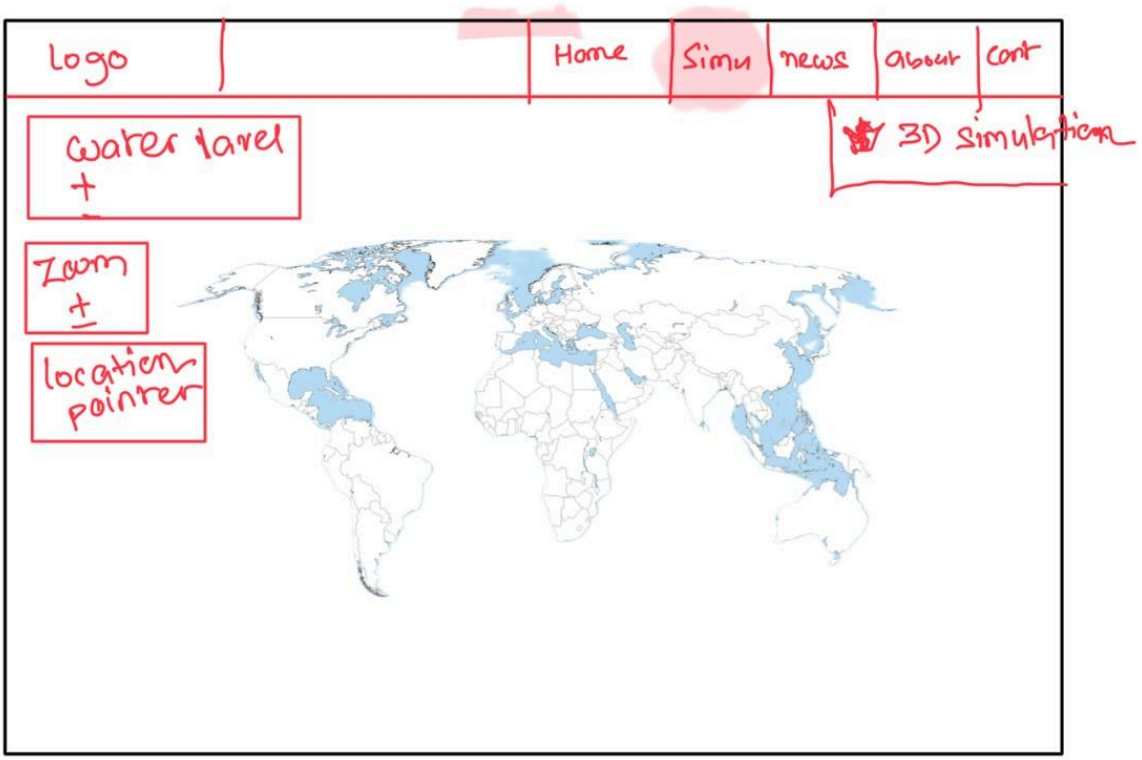
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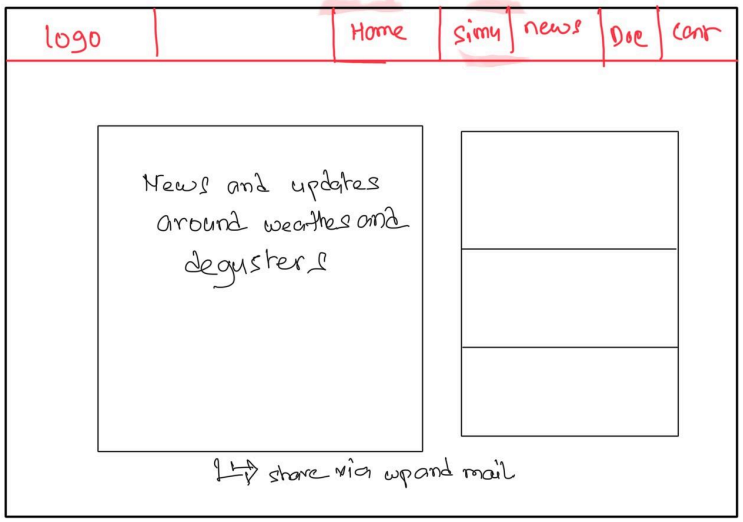
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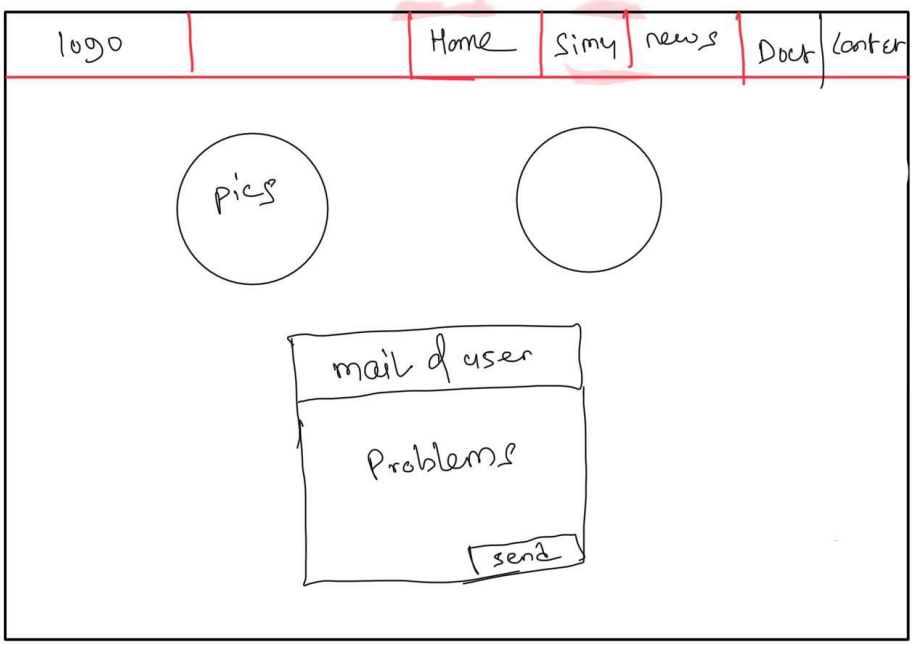
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# Performance Analysis

## 3.1 Experimental Environment

The experiments are conducted in an environment equipped with:

- A high-performance computing system for model training and testing.
- Datasets from [list sources, e.g., government agencies, research databases].
- More about this here.... link

## 3.2 Metrics

The performance is evaluated based on:

- Accuracy: Precision of flood predictions.
- Processing Time: Speed of data analysis and prediction.
- User Accessibility: Usability of the web-based application.

| | |
|---|---|
| Accuracy | 97% |
| Processing Time | 50 seconds |

## 3.3 Results and Discussion

The results demonstrate the effectiveness of the proposed system compared to existing methods. Key findings include:

- Improved prediction accuracy by [percentage].
- Faster processing times due to optimized algorithms.
- Positive feedback from end-users on accessibility and usability.

Comparison with existing works highlights the system's strengths in terms of prediction accuracy and user experience.

# Conclusion

This work presents a comprehensive approach to flood prediction and visualization.

By combining advanced data processing techniques, machine learning, and user-friendly interfaces, the proposed system addresses key challenges in flood prediction.

Future work may focus on integrating more diverse datasets and enhancing the scalability of the system.