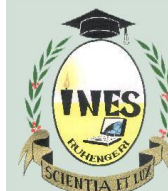


# INSTITUT D'ENSEIGNEMENT SUPÉRIEUR DE RUHENGERI



*Scientia et Lux*

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27<sup>th</sup> February, 2025

## Flood Emergency Response Advisor Documentation

**Faculty:** AFS  
**Department:** Computer Science  
**Class:** SWE A year3  
**Course:** Artificial Intelligence

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# FLOOD EMERGENCY RESPONSE ADVISOR

## DOCUMENTATION

### Introduction

The Flood Emergency Response Advisor system is designed to assist individuals and communities in flood-prone areas by providing alerts and advice based on real-time conditions such as heavy rainfall, rising water levels, road accessibility, and clean water availability. The system analyzes user inputs and generates appropriate responses to guide flood preparedness and response.

#### Key Features:

- Real-time flood risk alerts
- Categorization of risk levels (low, moderate, high)
- Personalized advice based on user input
- Easy-to-use web interface with a simple form to input relevant conditions

### System Requirements

#### Hardware Requirements

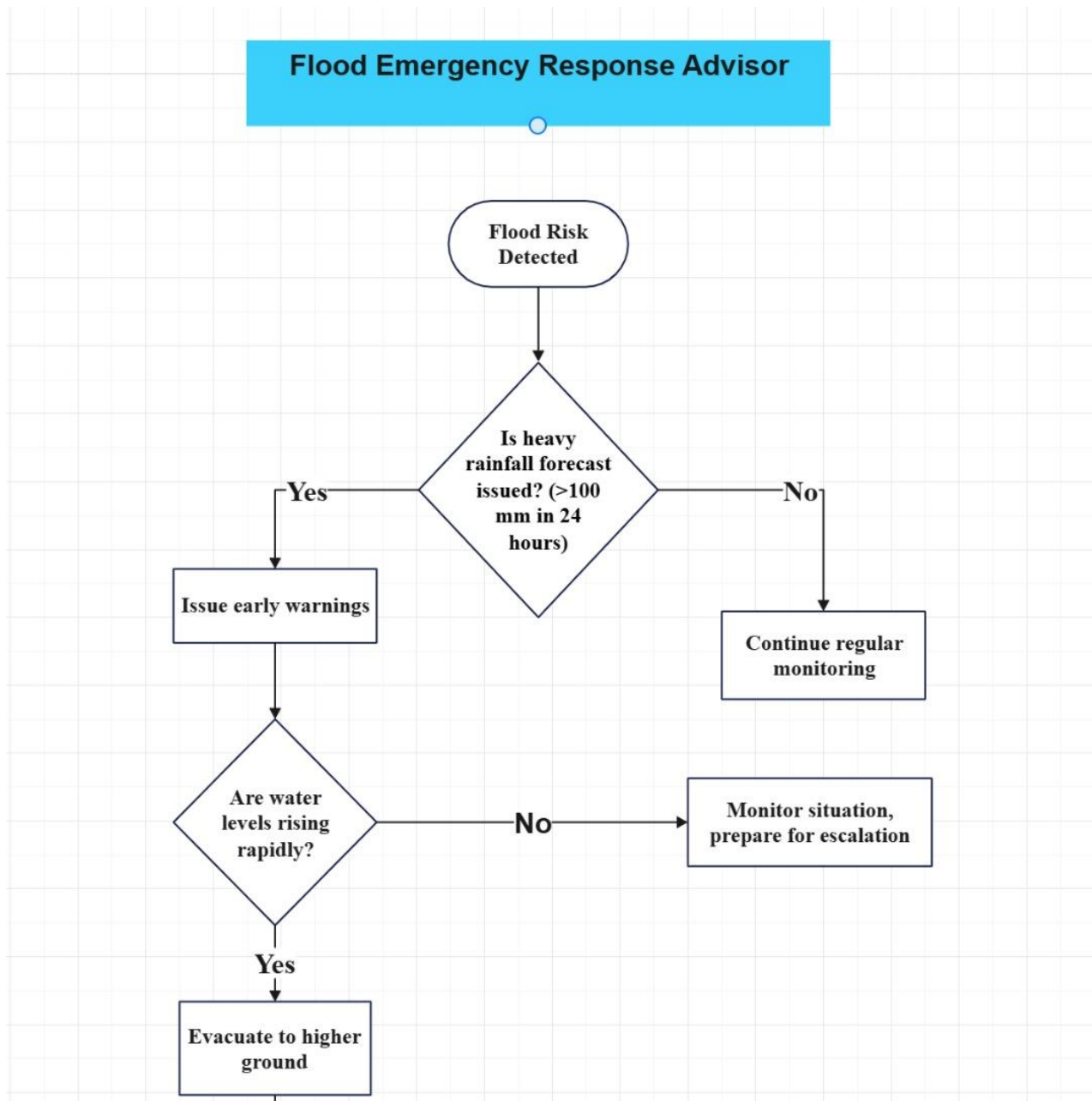
- **Server/Hosting Requirements:** Web server with Django support
- **Client Requirements:** Any modern web browser.

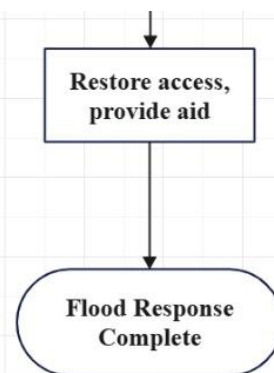
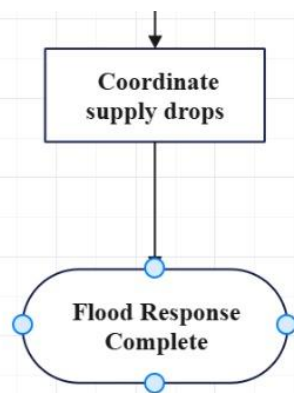
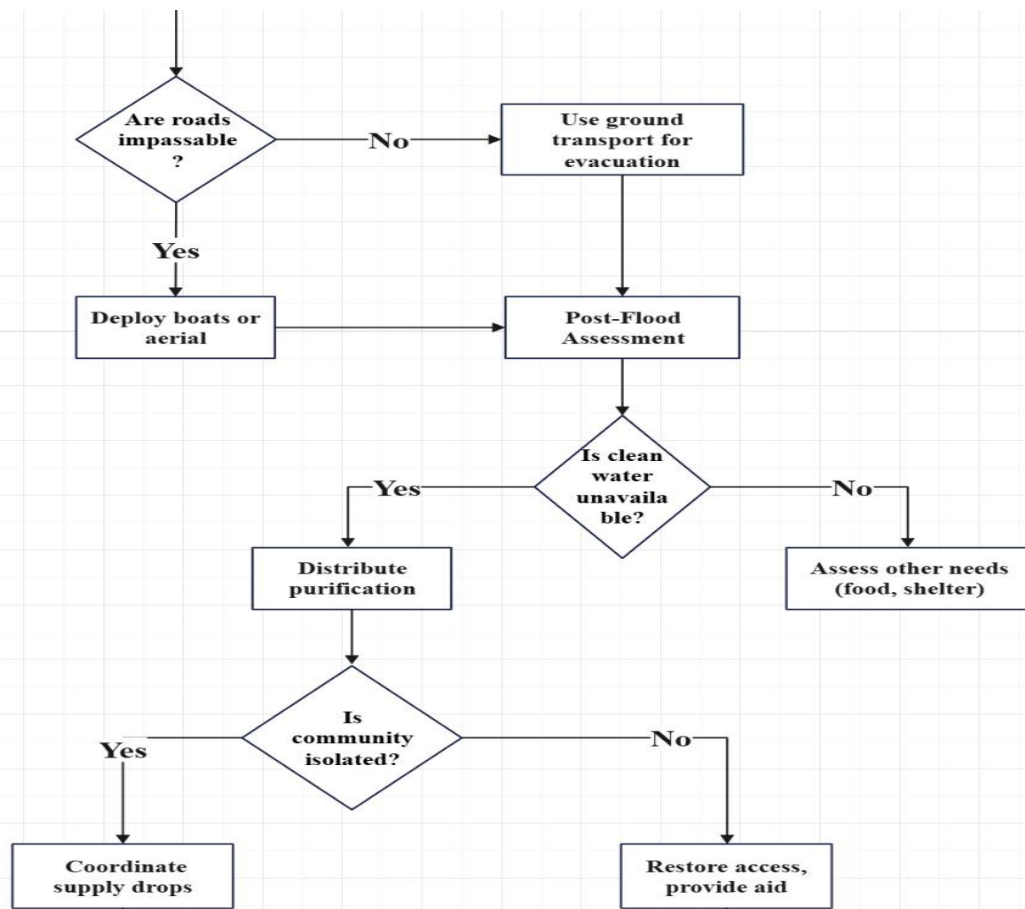
#### Software Requirements

- **Backend:**
  - Django 3.x or higher
  - Python 3.x
- **Frontend:**
  - HTML, CSS, JavaScript

# System Design

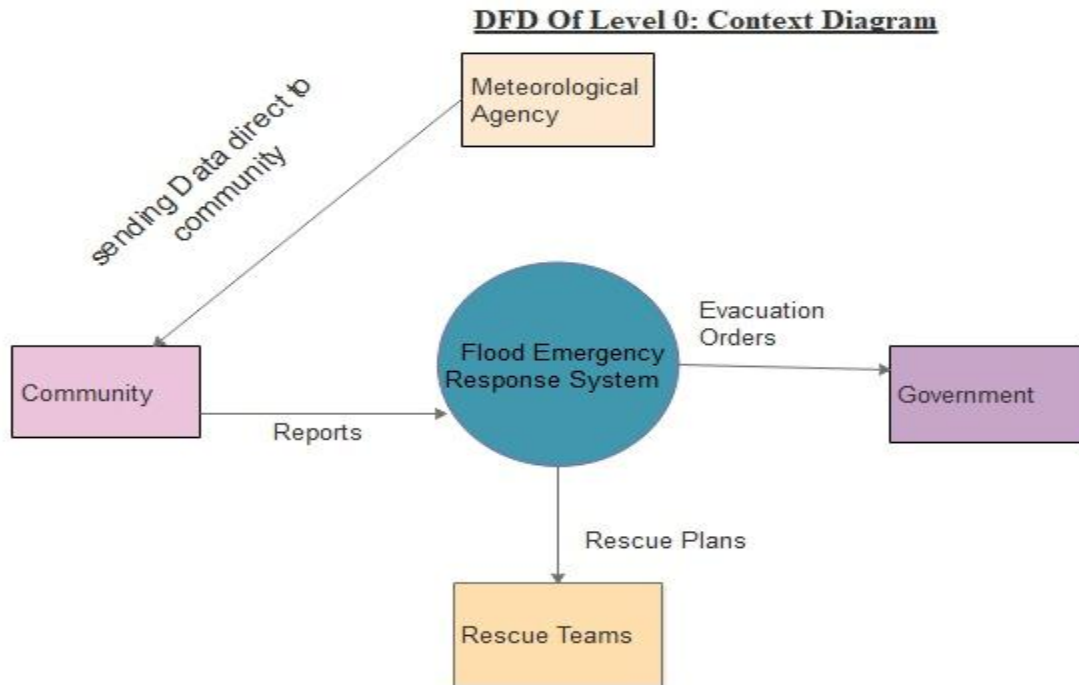
flowchart :



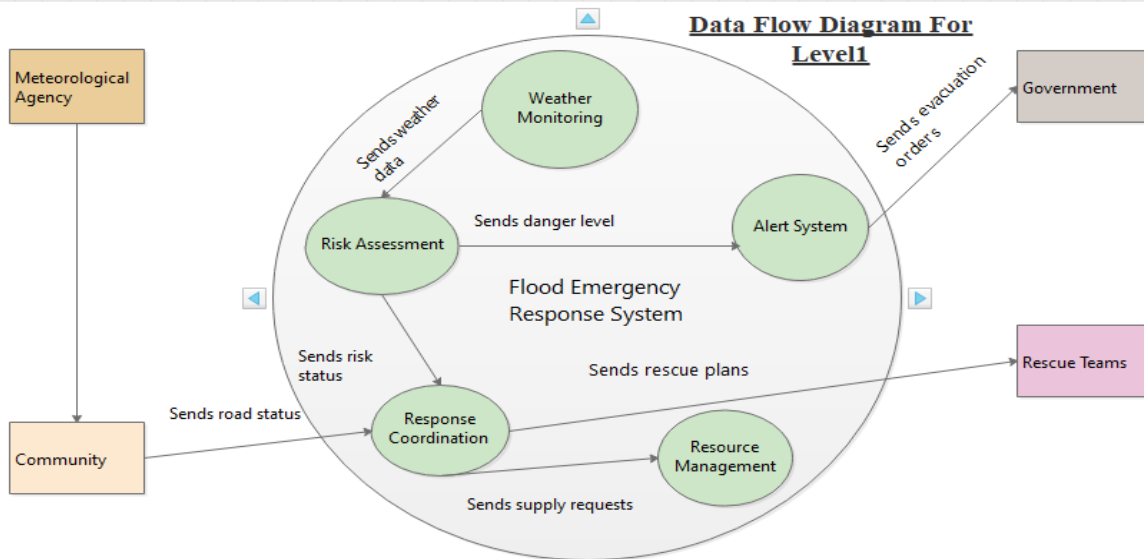


Data flow diagram (DFD) :

### Level 0 DFD



### Level 0 DFD



## How the System Works

### User Input

- The user is asked to check relevant conditions based on their current situation (rainfall, water levels, road accessibility, clean water availability).
- The system receives this input via a simple form and processes it.

## Your Flood Emergency Response Advisor

Please check the boxes that apply to your current situation:

- ☐ Is heavy rainfall forecast issued? (More than 100mm in 24h?)
- ☐ Are water levels rising rapidly?
- ☐ Are roads impassable?
- ☐ Is clean water available?
- ☐ Is your community isolated?

Get Response Advice

### Analysis Logic

- Based on the user inputs, the system evaluates the risk level:
  - **Low Risk:** No immediate danger detected.
  - **Moderate Risk:** Prepare for evacuation and stay informed.
  - **High Risk:** Immediate evacuation required.

### Response Generation

- The system generates personalized advice based on additional conditions such as road accessibility and clean water availability.
  - For example, if roads are impassable, it suggests rerouting rescue teams.
  - If clean water is unavailable, it advises using purification tablets.

## Alerts

- The system displays alerts with color-coded response boxes:
  - **Low Risk:** Green

### Your Flood Emergency Response Advisor

Please check the boxes that apply to your current situation:

- ☐ Is heavy rainfall forecast issued? (More than 100mm in 24h?)
- ☐ Are water levels rising rapidly?
- ☐ Are roads impassable?
- ☒ Is clean water available?
- ☐ Is your community isolated?

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**GREEN ALERT:** No immediate danger detected, stay informed.

- **Moderate Risk:** Orange

### Your Flood Emergency Response Advisor

Please check the boxes that apply to your current situation:

- ☒ Is heavy rainfall forecast issued? (More than 100mm in 24h?)
- ☐ Are water levels rising rapidly?
- ☒ Are roads impassable?
- ☐ Is clean water available?
- ☐ Is your community isolated?

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**ORANGE ALERT:** Be prepared for evacuation and stay informed on weather updates.  
Use purification tablets or boiled water.  
Avoid flooded roads and seek alternative routes.

- **High Risk:** Red

## Your Flood Emergency Response Advisor

Please check the boxes that apply to your current situation:

- ☒ Is heavy rainfall forecast issued? (More than 100mm in 24h?)
- ☒ Are water levels rising rapidly?
- ☒ Are roads impassable?
- ☒ Is clean water available?
- ☒ Is your community isolated?

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**RED ALERT: Immediate evacuation is recommended!**  
**Seek higher ground.**  
**Avoid flooded roads and seek alternative routes.**  
**Contact emergency services for assistance at '112' or '115'**

## System Architecture

**Frontend** • The frontend is built using basic HTML, CSS, and JavaScript.

- The form allows the user to check conditions such as rainfall, water levels, and more.
- Upon submission, the form sends the user input to the backend via a POST request.



```

<body>
  <div class="container">
    <h1>Your Flood Emergency Response Advisor</h1>
    <p>Please check the boxes that apply to your current situation:</p>
    <form id="floodForm">
      {% csrf_token %}
      <div class="checkbox-group">
        <label><input type="checkbox" id="rainfall"> Is heavy rainfall forecast issued? (More than 1
        <label><input type="checkbox" id="waterLevels"> Are water levels rising rapidly?</label>
        <label><input type="checkbox" id="roads"> Are roads impassable?</label>
        <label><input type="checkbox" id="cleanWater"> Is clean water available?</label>
        <label><input type="checkbox" id="isolation"> Is your community isolated?</label>
      </div>
      <button type="button" onclick="analyzeSituation()">Get Response Advice</button>
    </form>
    <p id="responseMessage"></p>
  </div>
</body>
<script>
  function getCsrftoken() {
    return document.querySelector('[name=csrfmiddlewaretoken]').value;
  }

  function analyzeSituation() {
    let formData = new FormData();
    formData.append("rainfall", document.getElementById("rainfall").checked ? "on" : "off");
    formData.append("waterLevels", document.getElementById("waterLevels").checked ? "on" : "off");
    formData.append("roads", document.getElementById("roads").checked ? "on" : "off");
    formData.append("cleanWater", document.getElementById("cleanWater").checked ? "on" : "off");
    formData.append("isolation", document.getElementById("isolation").checked ? "on" : "off");
  }

```

## Backend

- The backend is developed using Django and handles the following:
  - **Index view:** Renders the HTML form.
  - **Analyze view:** Processes POST data, analyzes the conditions, and returns a response with the alert and advice.

```

def index(request):
    return render(request, 'floodapp/index.html')

def analyze(request):
    if request.method == 'POST':
        rainfall = request.POST.get('rainfall') == 'on'
        water_levels = request.POST.get('waterLevels') == 'on'
        roads = request.POST.get('roads') == 'on'
        clean_water = request.POST.get('cleanWater') == 'on'
        isolation = request.POST.get('isolation') == 'on'

        message = ""
        alert_type = "low-risk"

        if rainfall and water_levels:
            message = "RED ALERT: Immediate evacuation is recommended! Seek higher ground.\n"
            alert_type = "high-risk"
        elif rainfall or water_levels:
            message = "ORANGE ALERT: Be prepared for evacuation and stay informed on weather updates.\n"
            alert_type = "moderate-risk"
        else:
            message = "GREEN ALERT: No immediate danger detected, stay informed.\n"
            alert_type = "low-risk"

        if not clean_water:
            message += "Use purification tablets or boiled water.\n"

```

## How to Use the System:

1. Open the application in a web browser.
2. Check the boxes that match the current situation (e.g., heavy rainfall, rising water levels, impassable roads, etc.).
3. Click the **Get Response Advice** button.
4. The system will display an alert based on the conditions, with advice such as evacuation and clean water advice.

## Your Flood Emergency Response Advisor

Please check the boxes that apply to your current situation:

☐ Is heavy rainfall forecast issued? (More than 100mm in 24h?)
 ☐ Are water levels rising rapidly?
 ☒ Are roads impassable?
 ☐ Is clean water available?
 ☒ Is your community isolated?

Get Response Advice

**GREEN ALERT: No immediate danger detected, stay informed.**  
**Use purification tablets or boiled water.**  
**Avoid flooded roads and seek alternative routes.**  
**Contact emergency services for assistance at '112' or '115'**

## Conclusion

The Flood Emergency Response Advisor is an essential tool for individuals and emergency services in flood-prone regions. It provides real-time alerts and advices based on the conditions and helping to improve flood preparedness and response.

Github repository link: [https://github.com/Aicha-code/AI\\_Group11\\_ExpertSystem\\_Assignment2](https://github.com/Aicha-code/AI_Group11_ExpertSystem_Assignment2)