**CONTENTS**

1. **THE PROBLEM STATEMENT**
   1. **The proposed problem:**
   2. **Background:**
   3. **Data:**
   4. **model:**
2. **PROPOSED SOLUTION:**

**2.1 Evaluation:**

**2.2 implementation**:

1. **HOW THE PROPOSED SOLUTION WILL BE ACHIEVED:**
2. **IMPACT OF THE PROPOSED SOLUTION:**
3. **MEASURING METRICS AND TIMELINES:**
4. **REFERENCES:**
5. **PROBLEM STATEMENT**

INTRODUCTION

Floods are a recurring natural disaster in Malawi that causes damage of infrastructure, homes and crops. This year alone (2023), Malawi has recorded 7,000 new cases of flood victims; 239 deaths and counting, some are rendered homeless. This has been attributed to climate change. The floods have also led to loss of lives, displacement of people and increased vulnerability to waterborne diseases cholera inclusive.

* 1. The proposed problem

Group c would like to predict the likelihood of a flood occurring from a given location in Malawi within the next year using Machine Learning models.

1.2. BACKGROUND

Malawi almost every year faces erratic rainfall and which leads to heavy precipitation causes flash as well as rive line floods. For example, precipitation in January 2015 was four times higher than average and caused flooding in 15 of 28 districts: This natural disaster affected over 1,300,000 Malawians. In 2022, the UN reports that 46 people died, 18 people reported missing and 206 were injured from floods caused by cyclone ANA. This natural disaster affected 995,072 Malawians. As a result, Malawi lost economic gains through death of life, livestock and loss of property, thereby pushing more people into absolute poverty. Precipitation is one of the indicators used to determine likelihood of flooding.

1.3. Data

The data consists of a set of locations and various features associated with each location, such as soil type, elevation, proximity to bodies of water and past flood history from 2010 to 2022. The target label for each location is a binary value indicating whether or not a flood occurred within the next year.

1.4. Model

A machine learning model will be trained on the data to predict the probability of a flood occurring at each location. The model should be able to take as input a set of location features and output a probability of flood.

**2.PROPOSED SOLUTION(S)**

The proposed solution to the problem at hand is to develop an accurate and reliable flood prediction model for Malawi, which can provide timely and precise warnings to help prevent loss of life and property damage. This project will involve analyzing historical data on weather patterns, flood events and integrate real-time data. The project will also involve developing a user friendly interface that allows decision makers and communities to access and interpret flood risks information. We hope to reduce the impact of flooding on Malawi’s communities and support disaster preparedness and response efforts.

2.1. Evaluation

The model will be evaluated on its ability to accurately predict the probability of a flood occurring at each location. The metric will be average absolute error between the predicted probabilities and the true labels. The model with the lowest average absolute error will be chosen as the best model.

2.2. Implementation

The model will be implemented as a web application that allows users to input their location and view the predicted probability of flood at that location. The application will also provide information on flood prevention and evacuation procedures to help users prepare for and respond to floods.

**3.HOW THE PROPOSED SOLUTION WILL BE ACHIEVED**

To achieve this solution of improved flood prediction model, the following steps will be involved;

* Data collection and analysis

The first step is to gather and analyze data on weather patterns, river flow rates on both historical and real-time. This data will be used to train and validate the flood model.

* Model development

After collecting and analyzing the data, the next step is to develop the flood prediction model. here we’ll involve machine learning techniques like decision tree, linear regression to develop a model that can accurately predict floods.

* Model implementation

The model can now be implemented in real world once it has been developed and tested.

**4. IMPACT OF THE PROPOSED SOLUTION**

The generated solution will help government and other key stakeholders to develop and execute evacuation plans in advance of floods.

**5. REFERENCES**

“Flood prediction using Machine Learning”, <https://github.com/cormac-obrien/FloodPrediction>.