PROJECT TITLE: PREDICTING MALARIA OUTBREAKS IN RURAL LIBERIA USING MACHINE LEARNING

Project Background

Malaria continues to be a major health problem in rural parts of Liberia. The specific goal of this project is to build a predictive model that can forecast potential malaria outbreaks based on environmental, demographic, and health data. Early warning systems can help allocate medical resources more effectively and save lives.

Relevance to Sustainable Development Goals (SDGs)

This project supports **SDG 3: Good Health and Well-being** by aiming to reduce the impact of malaria through early detection and intervention. It also aligns with **SDG 1: No Poverty**, since malaria contributes significantly to economic hardship in affected communities, and controlling it improves economic productivity.

Literature Review

- **Study 1:** *"Predicting malaria incidence using climate variables in Sub-Saharan Africa"* – This research demonstrated the effectiveness of machine learning in forecasting malaria using rainfall, temperature, and humidity data.
- **Study 2:** *"A Machine Learning Approach for Malaria Detection and Forecasting"* – This paper used health records and environmental factors to successfully predict outbreak patterns, highlighting the feasibility of using AI for disease surveillance in low-resource settings.

Project Description

The project will use:

- **Health Data** from Liberia's Ministry of Health (CSV format, weekly reports of malaria cases by region).
- **Climate Data** from the World Bank Climate Change Knowledge Portal (CSV format, including rainfall, temperature).
- **Population Data** from Liberia Institute of Statistics (Excel or CSV).

  Data preprocessing steps include cleaning missing values, standardizing scales, and merging datasets by time and location.

Approach

A **machine learning approach** will be used due to the structured nature of the data (numerical and categorical variables) and the moderate size of the dataset. Algorithms such as Random Forests or Gradient Boosting Machines are suitable for modeling temporal-spatial patterns in malaria outbreaks, with good interpretability and relatively low computational cost compared to deep learning.

Project Guideline: Idea Proposal Submission

This idea proposal should not exceed **1 page** and each step should be described **very birefly.**

This is an initial document for your future research. You will do a more comprehensive research in the next step.

1. Project Idea:

- Start by selecting a project idea that interests you. It could be related to SDGs, such as healthcare, poverty reduction etc.
- Clearly define the problem you want to solve or the task you want to accomplish. What is the specific goal of your project?

2. Relevance to Sustainable Development Goals (SDGs):

- Explain how your project idea is relevant to the United Nations Sustainable Development Goals (SDGs). Consider how your project can contribute to achieving sustainability in areas like poverty reduction, environmental conservation, health, education, etc.

3. Literature Examples:

- Research and provide two relevant literature examples of projects or research papers that are similar to your idea. These examples can serve as references and sources of inspiration for your project. Please explain briefly.

4. Describe Your Data:

- Describe the data you plan to use for your project. Include details such as the source of the data, data format (e.g., CSV, images, text), size, and any data preprocessing steps required.

5. Approach (Machine Learning or Deep Learning):

- Choose whether you will use a machine learning or deep learning approach to solve your problem. Justify your choice based on the complexity of the task and the nature of the data.