

## A MODEL FOR PREDICTING MALARIA OUTBREAK USING MACHINE LEARNING TECHNIQUE

Adebanji Stephen<sup>1</sup>, Patrick O. Akomolafe<sup>2</sup>, Kazeem I. Ogundoyin<sup>1</sup>

<sup>1</sup> Department of information and communication technology, University Osogbo, Osun State, Nigeria

<sup>2</sup> Department of computer science, University of Ibadan, Oyo State, Nigeria

Corresponding author: Adebanji Stephen, stephen.adebanji@uniosun.edu.ng

**ABSTRACT:** Malaria is a mosquito-borne infectious disease caused by protists (a form of microorganism) of the Plasmodium genus in humans and other animals. Malaria is a leading worldwide cause of morbidity and mortality. According to WHO the estimated value of malaria cases in 2019 was 229 million worldwide, with children under the age of 5 years having 67% (274,000) and being the most vulnerable group affected by malaria. Nigeria Demographics and health survey (NDHS) has a repository for data that can be used to predict malaria disease outbreak using machine learning techniques, from the literature reviewed no research has been carried out using machine learning technique to model the prediction of malaria outbreak using malaria incidence data from southwest Nigeria. This Research work used 5 supervised machine learning techniques to model the outbreak of malaria using meteorological and malaria incidence data of collected from 2010 - 2020, the machine learning techniques that was used are, Naive Bayes, Support Vector, Linear Regression, Logistic Regression, and K-Nearest Neighbor. The research was carried out using Scikit-learn Library that was imported into Anaconda IDE, the programming language used was Python programming language. The result of the research shows that Naive Bayes has the best accuracy for both testing and training with average accuracy of 79.1% and therefore is the best prediction model that can be used for predicting malaria incidence outbreak using the data set used in this research. Support Vector machine (SVM) is the second best prediction model that can be used for predicting malaria incidence outbreak for both testing and training data with average accuracy of 75.45%, followed by K-Nearest Neighbor with average accuracy of 70.8%, followed by Logistic Regression prediction model which has an average accuracy of 68%, based on this research work it is not advisable to use Linear Regression prediction model for predicting malaria incidence outbreak because it has an average accuracy of 26.05%.

**KEYWORDS:** Artificial Intelligence, Machine Learning, pre-processing, Prediction, Malaria, Support Vector machine, Naive Bayes, Logistic Regression

### 1. INTRODUCTION

Artificial intelligence (AI) is a field of computer science concerned with building smart machines capable of performing tasks that require human intelligence, one of the fields of artificial intelligence is machine learning, robotics, knowledge representation etc [7].

Machine learning is a field of artificial intelligence that trains algorithms to learn from previous experience and improve it to solve problems; machine learning has been a very important tool in solving problems that are related to Image Recognition, Speech Recognition, Medical diagnosis, and prediction of diseases. The prediction of disease outbreaks warns that a certain amount of disease may exceed the expected amount in the future at a particular time [5]. Prediction of infectious diseases attempts to predict the features of both seasonal epidemics and possible pandemics. Accurate and timely detection of infectious diseases by informing key preparedness and mitigation activities may help public health responses [3]. Malaria is a mosquito-

borne infectious disease caused by protists (a form of microorganism) of the Plasmodium genus in humans and other animals. It starts with a bite from an infected female mosquito that introduces the protists into the circulatory system via its saliva, and eventually to the liver where they develop and reproduce. According to the WHO report of 2018, malaria is causing public health concern in developing countries, with estimated resultant deaths close to a million annually.

According to a publication by Severe Malaria Observatory on 28th of October 2020 Nigeria had the highest number of global malaria cases (25% of global malaria cases) in 2018 and accounted for the highest number of deaths, according to the 2019 World Malaria Report (24% of global malaria deaths). Malaria is transmitted throughout Nigeria; 76% of the population lives in areas of high transmission, while 24% of the population lives in areas of low transmission. In the south, the transmission season can last throughout the whole year and is about 3 months or less in the northern part of the country (Severe Malaria Observatory (SMO),

# Malaria Outbreak Prediction Model Using Machine Learning

**Terry C. Jones**



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