An IoT based Deep Machine Learning System for Aedes Mosquitoes Identification

Arya S, Gayatri Menon B, Elizabeth Sherly
Indian Institute of Information Technology and Management-Kerala
{arya.mphilcs5, gayatri.menon, sherly}@iiitmk.ac.in}

***Abstract*—The increasing cases of dengue fever (DF) and dengue hemorrhagic fever (DHF) in the last decade have been reported worldwide and if it is untreated, the mortality rate will be increased. At present, there is no direct cure, or no particular vaccines available to prevent dengue fever. According to the World Health Organization (WHO), mosquito bites result in the deaths of more than 1 million people every year and the majority of these deaths are due to malaria and dengue. Therefore, the first remedial step is to control the mosquitoes (Aedes Aegypti) that cause dengue fever. This paper proposes ultra sound sensors based IOT software system to detect mosquitoes and to identify female Aedes mosquito using certain image processing and deep machine learning techniques, so that proper evacuation or mitigation strategy can be implemented to prevent the spread of mosquito borne diseases.**

***Index Terms*—Aedes Mosquitoes, Deep Machine Learning, Wing beat frequency, IoT, Ultra sound sensors.**

I OBJECTIVE

- To capture the wing beat frequency of the mosquitoes using ultra sound sensors, and their images using camera.
- To identify the mosquito species (Aedes aegpyti) using image processing and deep machine learning techniques.

II PROPOSED SYSTEM

One of the techniques to identify the mosquitoes species is its wing beat frequency. There are about 3500 known species and these all have a wing beat frequency of range between 100 and 1000 hertz. So at least 2600 of them share the same frequency, so that categories of mosquitoes species is a herculean task. We propose certain technique to extract the relevant features, which include wing beat frequency, certain environmental parameters for the spread of different species prevalent in an area of interest, and certain characteristics of mosquitoes to identify the category of species.

The wing beat frequencies can be sensed using ultra sound sensors and the images of the mosquitoes are captured using smart phone cameras or built-in cameras. The captured images proceed through four approaches –image resize, noise removal, feature extraction and classification.The image resizing will be performed to reduce the large sized image, hence computational complexity is reduced. It is ideal to keep the image size to 256x256 pixels. Median filtering is applied for removing salt and pepper noises. The most important step is feature extraction and feature selection. In this method, we proposed to extract features from images, such as colour of mosquito, colour of wings and legs, shape, and the wing beat frequency obtained from the ultra sound sensors. The environmental parameters can also be considered. The images and extracted features are fed into a deep learning neural network for classification.

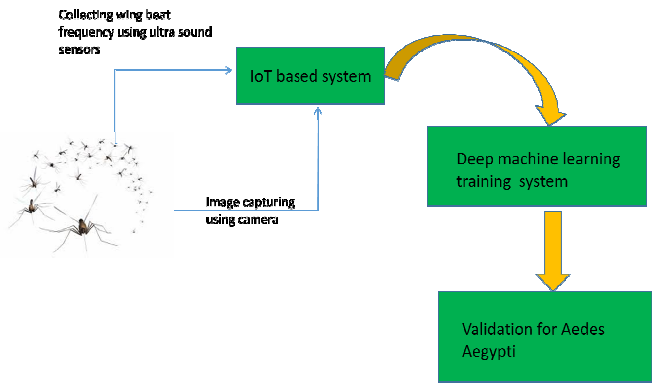

figure 1: Architecture of IoT based DMLS for Aedes mosquito identification.

III EXPECTED RESULTS

The proposed system envisages to identify harmful mosquitoes, especially Aedes aegypti by proposing a low cost IoT device and to correctly classify them using image processing and machine learning techniques. The system also helps to categorize different type of mosquitoes and performance analysis will be done based on certain benchmarking.

IV CONCLUSION

The severity of certain diseases due to environmental problem is a big concern in health care system. The pollution, urban waste, stored water affects the penetration of dangerous female mosquitoes, for that an IOT based software system is proposed for proper decision making. The system can be extended for analysis, such as risk classification, reliability trust, and loss of health probability etc.