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METHODOLOGY BASED ON MACHINE LEARNING AND DEEP LEARNING TO PREDICT DENGUE TRANSMISSIONS.

Abstract

The Sustainable Development Goals (SDGs) Sustainable Cities and Communities 11 and Climate Action 13 encompass the problems of flooding and its consequences, such as the proliferation of diseases that threaten public health. This study correlates flooded areas, temperature, humidity and average rainfall parameters with the level of dengue contagion in the areas surrounding the Piura River in Peru through remote sensing, machine learning and various data sources. The prediction model is a fully connected multilayer neural network that receives as input parameters flooded areas, temperature, humidity and precipitation, returning an estimate of cases of people infected with dengue fever during the month. Public databases from state institutions were used to train the neural network. Temperature, humidity and precipitation parameters averaged by month were obtained from the virtual platform of the National Meteorology and Hydrology Service of Peru (SENAMHI) and the amount of flooded area in the study area were obtained using Machine learning, Deep learning and a multi-temporal analysis of Sentinel 1 SAR images from the ASF-Nasa database. Dengue cases were obtained from the National Center for Epidemiology, Prevention and Disease Control (CDC-Peru). We achieved a prediction model of dengue infection cases for the district of Castilla; we complemented it with a program to process SAR images and segmentation of flooded areas; we only had as input the names of the scenes of the Sentinel-1 multitemporal images. Finally, we can prevent the percentage of infections per month not only in the region studied, but also applied to areas with similar geographic and socioeconomic conditions; with adequate prevention, we could avoid the health crisis that dengue can cause.