Lightning strike mapping for Peninsular Malaysia using artificial intelligence techniques

ABSTRACT

This research focuses on artificial intelligence (AI) techniques on mapping the lightning strike area in Peninsular Malaysia. Three AI techniques such as fuzzy logic, neural network and neuro-fuzzy techniques are selected to be explored in classifying the characteristics of lightning strike which are based on; level of strike (high, medium, low) and category of lightning (positive cloud-to-ground, negative cloud-to-ground, flash). Nine predefined areas in Peninsular Malaysia were chosen as a case study. The analysis was carried out according to twelve months lightning data strikes which had been made available by Global Lightning Network (GLN). All three AI techniques have successfully demonstrated the ability to mapping and classify lightning strikes. Each technique has shown very good percentage of accuracy in term of determining the area and characterizing the lightning strikes. The finding of this research can be made use in risk management analysis, lightning protection analysis, township planning projects and the like.

Keyword: Lightning strike; Classification; Fuzzy logic; Neural network; Neuro-fuzzy