Abstract No: 254 ***ICT, Mathematics and Statistics***

STATISTICAL APPROACH FOR MULTI-CLASS WEATHER CLASSIFICATION

C.S.A. Britto and S.P. Abeysundara*

Department of Statistics and Computer Science, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka
**sachitha@pdn.ac.lk*

Weather is an unexplainable state of the atmosphere around our environment. Therefore, processing information related to weather conditions at a given time and space is necessary for scene awareness, which helps to organize and take actions on human behaviour. Though several studies have been conducted using deep learning and computer vision to detect the multi-class of weather and visual conditions, a limited number of studies have considered the use of statistical features of such weather images. In this study, multi-class statistical classification techniques that use statistical features of an image were introduced to detect the given weather condition. A set of statistical features of an image, such as skewness and kurtosis along with the standard statistical features like mean and standard deviation, was used on 1,115 JPEG compressed (RGB) and uncompressed (YUV) domain from four different weather scenes (cloudy, rain, shine and sunrise). Several classification techniques, namely, Support Vector Machine (SVM), Random Forest and Gradient Boosting method, were used to train a model based on 70% of the image database, and the remaining 30% was used to evaluate the model accuracy. Among these models, the linear SVM and the SVM based on radial basis functions showed the highest classification accuracy of 90%, while that of the random forest model was 89%. All models showed a higher F1-score and the false positive rate was less than 4%. The findings of the study can be used but not limited to drive-assistance systems, climate-related research, or to understand weather conditions through images.

Keywords: Gradient boosting, Random forest models, Support vector machines, Weather classification