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A Final Project Thesis by

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ABSTRACT

Climatic change has become a major drawback to the human civilization where most of the scientists, researchers concern about the ever-changing environments The life of the earth existence mostly based on the atmosphere where the air composition is designed to accumulate the needed oxygen and protect the life of the earth from ultra-violent solar radiation. Clouds are a major component of the atmosphere, and these cloud structures helps the photosynthesis to convert the light energy to chemical energy. These cloud structures help human to forecast weather, recover from natural disasters, measure photovoltage and build an accurate transportation systems. Identifying cloud patterns became a hot topic to scientists who are researching about dynamic weather conditions that occurs in atmosphere. To identify these cloud patterns, researchers and atmospheric scientists need the relevant domain knowledge on the cumulus cloud parameters to classify clouds through satellite images manually.

Manual identification of these cumulus clouds takes a considerable amount of time and lack of knowledge on the domain may cause human errors on the identification process. As a remedy for this problem author came up with an efficient way to automate this cloud pattern identification process. This proposed system is a web-based application that uses latest technologies to utilize the system. This system will be the first application that will be implemented to identify these cumulus clouds through latest deep learning algorithms. This system will be able to recognize both single and several images at once. This application is offered as a hosted service where any of the researcher or scientist can identify the relevant cloud patterns at any given moment in several seconds. The user-friendly interface will help any user of the system to export the relevant satellite images from local to the hosted service to get the needed results.

In the testing and evaluation phase the author has tested and evaluated the hosted web application from both domain and technical experts to get an idea about the contribution from the implemented system. Confusion matrices, model loss graphs, and model accuracy were used to test the model and yielded satisfactory results.

KEYWORDS: Cumulus Clouds, Image segmentation, Image classification, Machine Learning, Yolov8, Data Pre-Processing