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Entitled

A NOVEL APPROACH FOR DETECTION FAULT IN THE AIRCRAFT EXTERIOR BODY USING IMAGE PROCESSING

by

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Abstract

This endeavor aims to create new techniques for the inspection and maintenance of aircraft structures. The work aims to simplify the entire procedure by using images to detect defects in the aircraft body and compare them to the functioning images of the aircraft, then concluding whether or not this section of the aircraft is faulty. For this purpose, image processing is used to train a model to detect faulty images. The image processing method employs images of both defective and working parts of the aircraft's exterior. The images have been transferred to the preprocessing phase, which retains valuable details. A new image of the same section of the aircraft is then used during the training period to validate the model. After processing, the image is graded as faulty or normal by the proposed algorithm. This study is based on the Convolutional Neural Network (CNN) approach, which uses features from the images to collect distinguishing features from a single patch created by the frame segmentation of a CNN kernel. Moreover, different filters are used to process the images using the image processing toolbox in Python. In the initial run, it was observed that the CNN falls for the overfitting of the faulty class. So, to overcome this problem, image augmentation is applied, and a small dataset of 87 images is converted to the augmented dataset of 4000 images. After passing the data through several convolutional layers and multiple epochs execution, the proposed model achieved a training accuracy of 98.28%. Also, we designed a GUI-based interface that takes an image and shows results in terms of faulty and normal. Lastly, we propose the applied implementation of this research as future work in the domain of robotics.

Keywords: Aircraft Maintenance, Robotics, Image Processing, Data Augmentation.