

COMP 4989: Aircraft Image Classification Project

We are proposing an examination into the feasibility of an image-based aircraft damage recognition program in order to reduce aircraft examination times.

Problem and Proposed Solution

At periodic intervals, aircraft are examined for damage, with steps taken if damage is found. The problem presented is that examination can take a long time. We will examine if a solution for damage recognition can be constructed using machine learning, with the idea that the solution will reduce examination times for aircraft.

The program will be trained using data provided by Spexi Geospatial. As of this date (October 30th, 2019), the data provided includes drone images of airplanes with and without defects (defect pictures labelled in excel spreadsheet).

The data will be used in the construction of a Convolutional Neural Network (CNN), that will be trained to recognize different types of damage. Types of damage include: cracks, dents, and scratches.

Solution Design

The initial step will be to go over all images provided and come up with labels for each one. The label will be the type of damage seen in the image.

Next is data preprocessing. This will include standardizing images to the same resolution, and, since the images are a mixture of color and black, applying the same color profile to each image.

Next, we split the data into a training and a test set. We are proposing a ratio of 3:1 for training to test. Variations on the model are limited, with two major areas that can be used for customization: the number of convolutional layers and the use of convolutional function, used in pattern recognition.

As our function is set (we will be using the default function from `sklearn`), and we will attempt to increase layers until it's computationally impossible, there is no real model selection happening, and thus a validation set is not required.

The model is able to improve itself overtime, and will rely on user input to progress. That is, the output will be the model's "best guess" as to what damage is present (if any) in the provided image, and we will need to provide what the actual output should be so the model can compare and learn.

The goal is to create a model that can accurately identify and classify types of damage on aircrafts, with at least 65% accuracy.