Final Project Proposal
ECEN 5060
Deep Learning

Identification of Aircraft Fuselage Defects Using Image Classification

In recent years, the aviation industry has faced heightened scrutiny over aircraft safety due to multiple reports of structural defects and in-flight incidents. High-profile cases involving fuselage cracks, panel detachments, and manufacturing flaws have raised serious concerns about the reliability of traditional inspection methods. As aircraft age and global fleets expand, there is an urgent need for more precise, efficient, and automated defect detection systems to ensure passenger safety and regulatory compliance.

We will be using the dataset: Aircraft_Fuselage_DET2023: An Aircraft Fuselage Defect Detection Dataset from IEEE DataPort. This dataset collects samples of different types of surface defects on aircraft fuselages to facilitate the identification and location of aircraft fuselage defects by computational vision and machine learning algorithms. The dataset consists of 5,601 images of four types of aircraft fuselage defects. This dataset may also be supplemented by additional datasets like: Aircraft Defect Detection Dataset from Roboflow with 1094 images.

We will be using CNN. We will be experimenting with customizing the network to fit our needs by testing pre-trained weights, augmentation, and applying dropout. Since there are only 4 classes in this dataset, we will be changing the output layer to reflect that.

Since this project mainly involves transfer learning and efficient deployment, TensorFlow with Keras is the best fit.

We will be pulling info from our labs that we have done alongside the textbook for this course as well as material from our previous computer vision course. For more information we can also use academic papers and for more specifics to the aircraft defects we can use FAA standards documentation for their best practices and regulations.

Similar to our first competition we will be judging loss, accuracy, and F1 score. We will implement a confusion matrix to provide a breakdown on all the statistics of performance. We can also use additional metrics like prediction time and memory usage to evaluate the model's performance outside of the results.

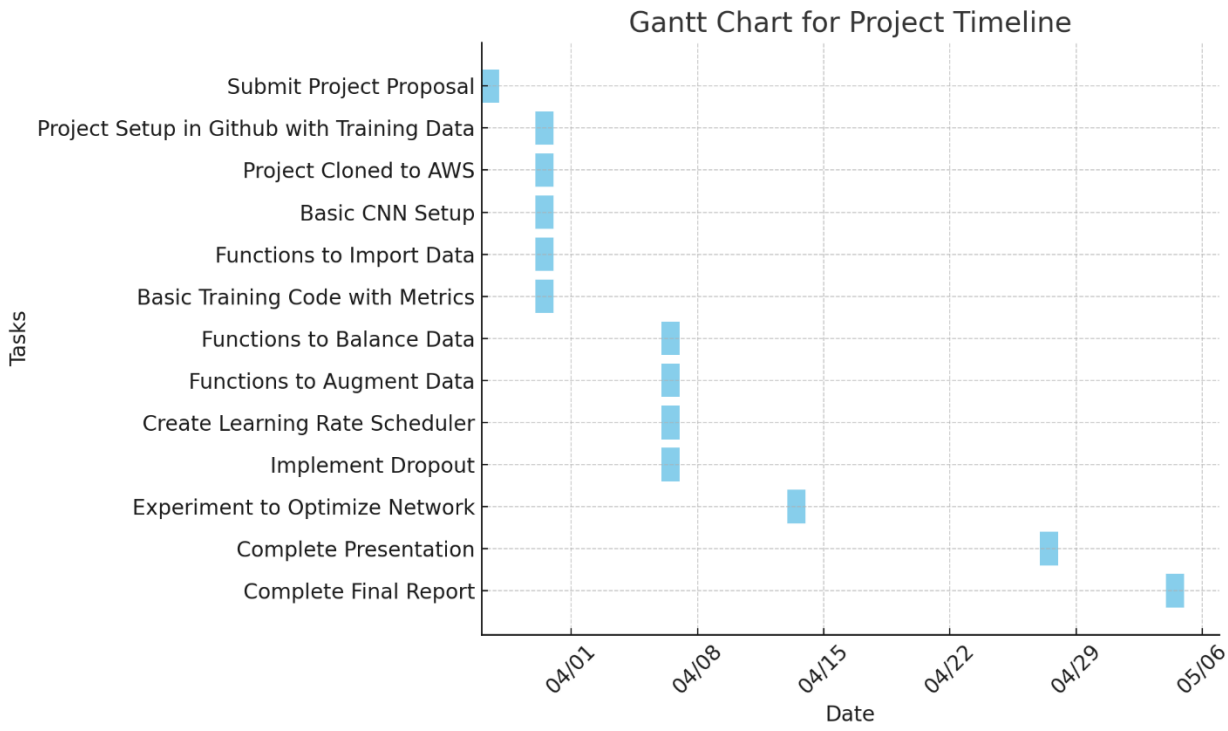

Figure 1 Project Schedule