

Project Kojak Proposal

Aircraft Detection at Aerodrome or in Airspace

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Domain

This topic is motivated by an incident occurred at Shanghai Hongqiao airport in 2016. There was one arrival Airbus A330 crossing the runway when another departure Airbus A320 started to take off on the exact runway. A catastrophic accident could have happened if the pilot of Airbus 320 had not reacted responsively. However, if there were onboard HUD (Head-up display) with aircraft detection functionality on the A330, the pilot might had been alerted that another aircraft on his left already speeding up on the runway. The incident could be avoided or alleviated at an early stage. This application can also ease the workload of pilots and tower controllers, enhance safety and improve the efficiency of airport ground traffic.

Data and Design

I choose to collect my image data from either [Open Images Dataset](#) or [MS-COCO](#). Pictures from Common Objects in Context (COCO) are fully segmented and supplied with API to extract pictures of a certain category (aircraft in my case) and to evaluate convoluted neural network (CNN) model's performance on detection tasks. While images and bounding boxes' metadata can be downloaded from Open Images Dataset, it may take a while to find all images belonging to a certain category. The CNN model's performance could be evaluated by the area ratio of intersection and union of the ground truth and the model prediction. I will download 1,000 images and use 700 for training and 300 for testing. If my model can generate satisfactory result, I would consider apply it to a video recorded inside the cockpit of aircraft while it was taxiing and visualize the prediction results by displaying bounding boxes over targets.

Technical Challenges

It will take a hard time to run COCO's API or extract categorized images from Open Images Dataset. Another thing I can expect is it will take hours or even days to train my neural network model and large memory storage. Using AWS machine and Spark tools looks like a most viable solution. The video detection task is a bonus but seems pretty challenging.