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# MISSING AIRCRAFT DETECTION USING ARTIFICIAL INTELLIGENCE

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**ABSTRACT -** There is an ever-increasing amount of image data in the world, and the rate of growth itself is increasing. Infotrends estimates that in 2016 still cameras and mobile devices captured more than 1.1 trillion images. According to the same estimate, in 2020 the figure will increase to 1.4 trillion. Many of these images are stored in cloud services or published on the Internet. In 2014, over 1.8 billion images were uploaded daily to the most popular platforms, such as Instagram and Facebook. This project presents a framework to incrementally cluster airport missing aircraft trajectories based on the GPS data. The framework consists of two steps: 1) Classifying airport aircraft data according to spatial and temporal information. 2) Merging the similar aircraft trajectories incrementally. Evaluating our framework experimentally using a state-of-the-art test-bed technique, and find that it can effectively and efficiently construct and update on-ground Missing aircraft trajectory map. The main task of this thesis is to review and test convolutional Aircraft detection methods.In the theoretical part, review the relevant literature and study how convolutional Aircraft detection methods have improved in the past few years. In the experimental part, studies how easily a convolutional Aircraft detection system can be implemented in practice, test how well a detection system trained on general image data performs in a specific task and explore, both experimentally and based on the literature, how the current systems can be improved.

**Key word:** situation awareness mapping, Support Vector Machine, Principle Component Analysis, trajectory.

## 1.INTRODUCTION

Aircraft detection is technologically challenging and practically useful problem in the field of computer vision. Aircraft detection deals with identifying the presence of various individual Aircraft in an image. Great success has been achieved in controlled environment for Aircraft detection/recognition problem but the problem remains unsolved in uncontrolled places, in particular, when Aircraft are placed in arbitrary poses in cluttered and occluded environment. As an example, it might be easy to train a domestic help robot to recognize the presence of coffee machine with nothing else in the image. On the other hand, imagine the difficulty of such robot in detecting the machine on a kitchen slab that is cluttered by other utensils, gadgets, tools, etc. The searching or recognition process in such scenario is very difficult. So far, no effective solution has been found for this problem. A lot of research is being done in the area of Aircraft recognition and detection during the last two decades. The research on Aircraft detection is multi-disciplinary and often involves the fields of image processing, machine learning, linear algebra, topology, statistics/probability, optimization, etc. The research innovations in this field have become so diverse that getting a primary first-hand summary of most state-of-the-art approaches is quite difficult and time consuming. The approach used incorporates four computer vision and machine learning concepts: sliding windows to extract sub-images from the image, feature extraction to get meaningful data from the sub-images, Support Vector Machines (SVMs) to classify the Aircraft in sub-image, and Principal Component Analysis (PCA) to improve efficiency. As a model problem for the motivating application, focusing on the problems of recognizing Aircraft in images, in particular, soccer balls and sunflowers. For this algorithm to be useful as a real-time aid to the visually-impaired, it would have to be enhanced to distinguish between “close” and “far” Aircraft, as well as provide information about relative distance between the user and the Aircraft, etc.

## 2. LITRATURE VIEW

1. Alarcón, V.; García, M.; Alarcón, F.; Viguria, A.; Martínez, A.; Janisch, D.; Acevedo, J.; Maza, I.; Ollero, A. Procedures for the Integration of Drones into the Airspace

Based on U-Space Services. Aerospace 2020. This 'Detect and Avoid' concept has been the subject of research in recent years, but a standardized system for light RPAS has not yet been achieved. Current approaches involve large aerial vehicles which carry complex sensors and heavy computer systems.

2. Murphy, J.R.; Williams-Hayes, P.S.; Kim, S.K.; Bridges, W.; Marston, M. Flight test overview for UAS integration in the NAS project. In Proceedings of the AIAA Atmospheric Flight Mechanics Conference, San Diego, CA, USA, 4–8 January 2016.Presents a collection of slides covering the following topics: unmanned aircraft systems; national airspace system project; UAS control; non payload communication system phase-1 flight test; NASA-Rockwell Collins cooperative agreement.

3. Otsuyama, T.; Honda, J.; Shiomi, K.; Minorikawa, G.; Hamanaka, Y. Performance evaluation of passive secondary surveillance radar for small aircraft surveillance. In Proceedings of the 2015 European Radar Conference (EuRAD). These systems limit the operational area of the RPAS, but they have the advantage of reducing the aerial platform payload and the computational requirements on board and are especially suitable for VLL operations.

## 3. PROPOSED APPROCH

This component mainly generates a situational awareness map of the on-ground Missing aircraft trajectory based on pre-processed GPS trajectory points. It incrementally updates the map by adding new trajectories to the Target trajectory pool one-by-one. For each new trajectory, the part which shares the same tarmac or Missing Location with the existing trajectory pool will be merged into the existing route network. The other part is then directly added to the current trajectory pool

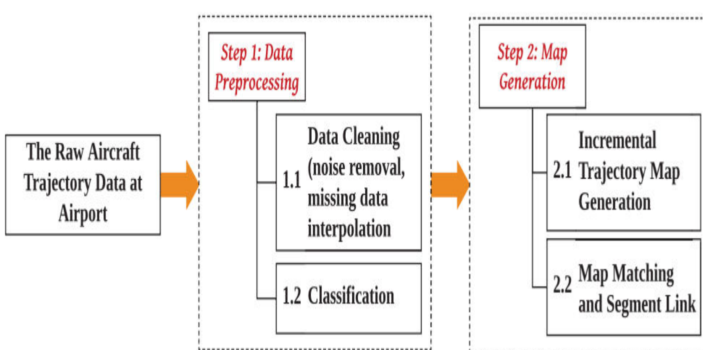


*Figure 1: Architecture of missing aircraft detection*

**Advantages:**

- Our observations show that most aircraft departure and landing trajectories are not the shortest or optimized.
- By constructing the situational awareness map, which can extract abnormal trajectories.
- Using situational awareness map, which can detect such case and optimize the Flight location schedule.

## 4. FUNCTION

**Image Preprocessing Module:**

Read an image using imread command as shown below:

I = imread('airplane.JPG');

figure;

imshow(I);

title('Original Image');

This module will read image convert that image into digital value based on the pixel size for processing the image.

**Proposal Generation Module:**Airplanes are human-made objects with a regular and symmetrical boundary from the top view. The system can approximate the airplane boundary by a chain of line segments. Based on these properties, system proposesa new airplane proposal generator called symmetric line segments (SLS).

**Feature Extraction Module:**The number of false alarms produced by a proposal generator, even the specific ones, is usually much more than acceptable. Thus, it requireseliminating the undesired proposals by a supervised algorithm.In the feature extraction module, represent each proposal by a discriminative feature vector.

**Classification Module:** The last module in a typical object detector pipeline is decision making by a classifier. SVM and AdaBoost are two popular classifiers that have been used in for airplane detection. These classifiers are commonly used after engineered features.

## 5. CONCLUSION

This project proposes an incremental approach to construct on-ground missing aircraft map from massive amount of GPS data. Formulate the on-ground aircraft trajectory map creation and updating problem, provide the approach to clean, and process huge volumes of on-ground aircraft GPS data.The AircraftDetection system in Images is web-based application which mainly aims to detect the multiple Aircraft from various types of images. To achieve this goal shape and edge feature from image is extracted. It uses large image database for correct Aircraft detection and recognition. This system will provide easy user interface to retrieve the desired images. The system has additional feature such as Sketch based detection. In Sketch detection user can draw the sketch by hand as an input. Finally, the systemresults output images by searching those images that user want.

## 6. REFERENCE

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