Analysis of Airspace Infringements (AI) in England, UK

Mingda Li , supervised by Dr. Arnab Majumdar and Miss Elena Psyllou

Department of Civil And Environmental Engineering, Imperial College London

Introduction

Fly On Track (2012), a private pilot website as part of Airspace & Safety Initiative, defined airspace infringement (AI) as a flight driven into a notified airspace without permission from the designated airspace controlling authority (Air Traffic Service, (ATC) in UK), who is responsible for separation of aircrafts, of that airspace. AIs are fairly dangerous because they might result in collisions of aircrafts. This work aims to investigate trends of AIs and study the airspace changes in England to help alleviate AI. The data source are the AI incident data during 2008-2014 provided by CAA and the Aeronautical Chart 2016 given by NATS Limited. This data analysis is conducted focusing on England and its Birmingham, Bristol, Luton, Stansted and Southend Airports.

Background Information about AIs

Aviation Community Sectors:
- ❖ General Aviation (GA): Generally considered as recreational flying.
- ❖ Commercial: operating flights for hire to transport passenger or cargo.
- ❖ Military: flights for military purpose.

Flight Rules:
- ❖ Instrument Flight Rules (IFR): pilots need to refer to the instruments in the cockpit when operating IFR flights.
- ❖ Visual Flight Rules (VFR): VFR flights require pilots to control the aircraft (navigating, avoiding obstacles and other aircrafts) based on visual reference.

Notified Airspace Types:
- ❖ Controlled Airspace: e.g. Controlled Zones (CTRs), and Controlled Areas (CTAs and TMAs).
- ❖ Aerodrome Traffic Zones (ATZs): cylindrical zones always in uncontrolled airspace.
- ❖ Restricted airspace: airspace includes danger areas and other prohibited areas.

Notes for Airspace Classes A-G:
- ❖ Class A: VFR flights are not allowed.
- ❖ Class C and D: VFR/VFR separation is not provided in Class C, VFR/VFR and VFR/IFR separation are not provided in Class D.
- ❖ Class E: Only IFR may infringe this airspace class.
- ❖ Class F and G: uncontrolled airspace

Airspace Design Information in England from Aeronautical Chart 2016
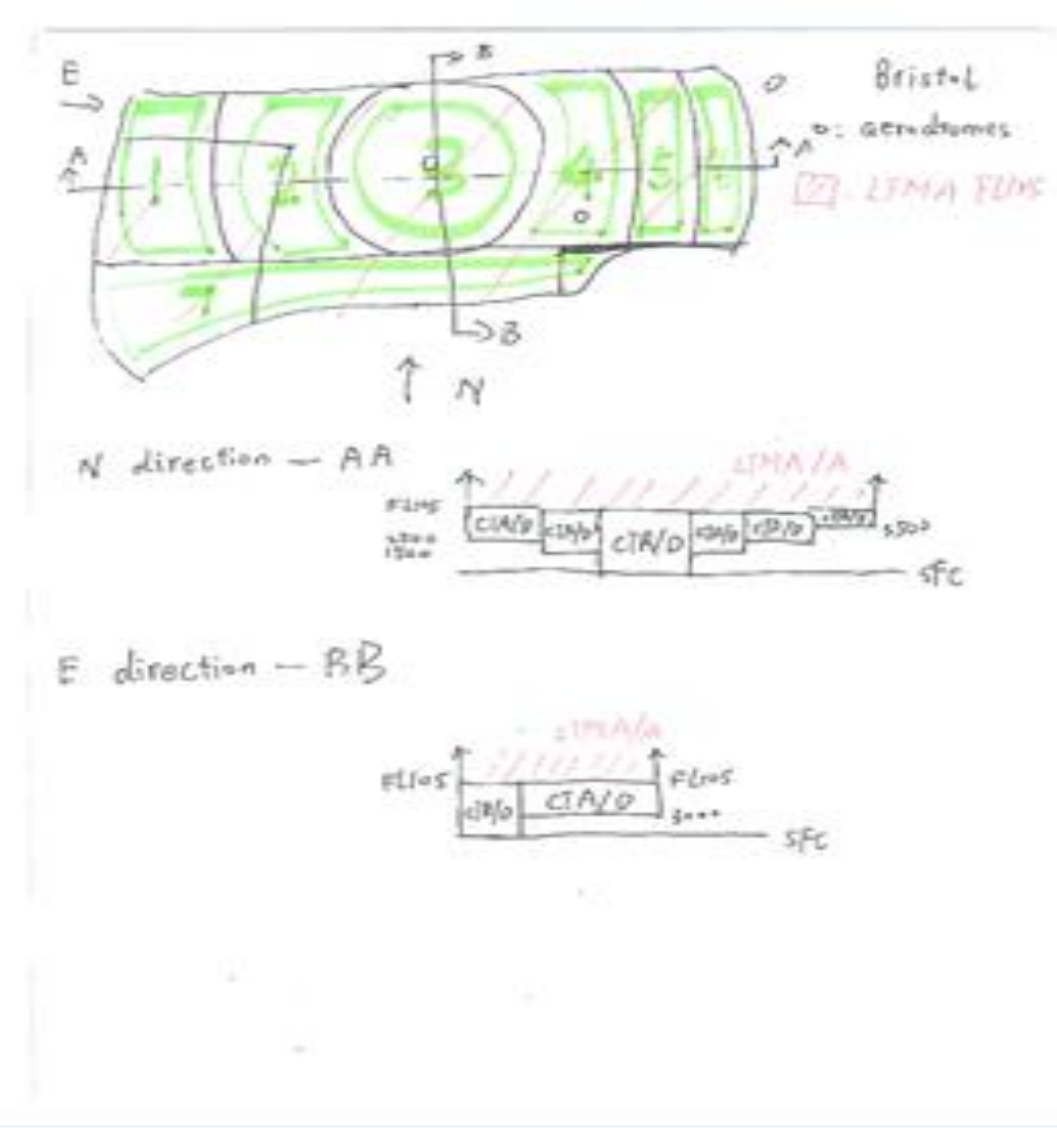
Names	Altitude (of Center CTR)/ feet	Vertical Shape	Plan View Shape	Estimated Size/ km²	Number of Airfields inside or nearby	Controlled Airspace nearby (Name/Class)	Airspace inside (Type/Class)
Birmingham	4500	Ladder	Irregular	3000	9	Daventry/A	CTR/D, CTA/D, CTA/A
Bristol (close to Cardiff Airport)	10500	Ladder	Irregular	1250	4	Cotswold/A	CTR/D, CTA/D, CTA/A
Luton	3500	Ladder	Irregular	875	4	LTMA/A	CTR/D, CTA/D, LTMA/A
Southend	3500	Ladder	Irregular	1500	4	LTMA/A	CTR/D, CTA/D, LTMA/A
Stansted	3500	Ladder	Irregular	2250	8	LTMA/A	CTR/D, CTA/D, LTMA/A, TMZ/A

Airspace Changes Proposed in England

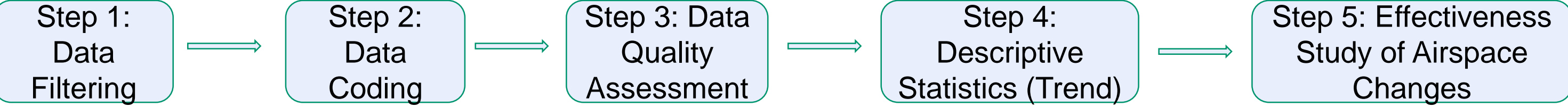| Birmingham	Bristol	Luton	Stansted	Southend
Introduction of Surveillance Mandatory Zone (SMZ) in 2015.	One CTR/CTA airspace zone is changed into ATZ in 2015.	Departure change to avoid affecting airspace below 7000 feet in 2015.	Introduction of Transponder Mandatory Zone (TMZ) in 2009.	Class D (controlled) airspace is established in 2015.

Acknowledgement

Methodology

Step 1: Data Filtering	Step 2: Data Coding	Step 3: Data Quality Assessment	Step 4: Descriptive Statistics (Trend)	Step 5: Effectiveness Study of Airspace Changes

Coding Example:

FlightOperation	NoAircraftInvolved	LocationRecoded	Location	ComparisonLocation	LocationLocalGroup	RadioContact	PilotRequestClearance	ClearanceRejected	TransponderOn	InfringingOn	Lower altitude	Lower Boundary	Upper Boundary	AirspaceType	AirspaceClass
UNKNOWN		Luton2CTR	LUTON		1	4	0	0	0	NULL	0		3500	CTR	CLASS D

Trend of AIs in England and Effectiveness Study of TMZ in Stansted

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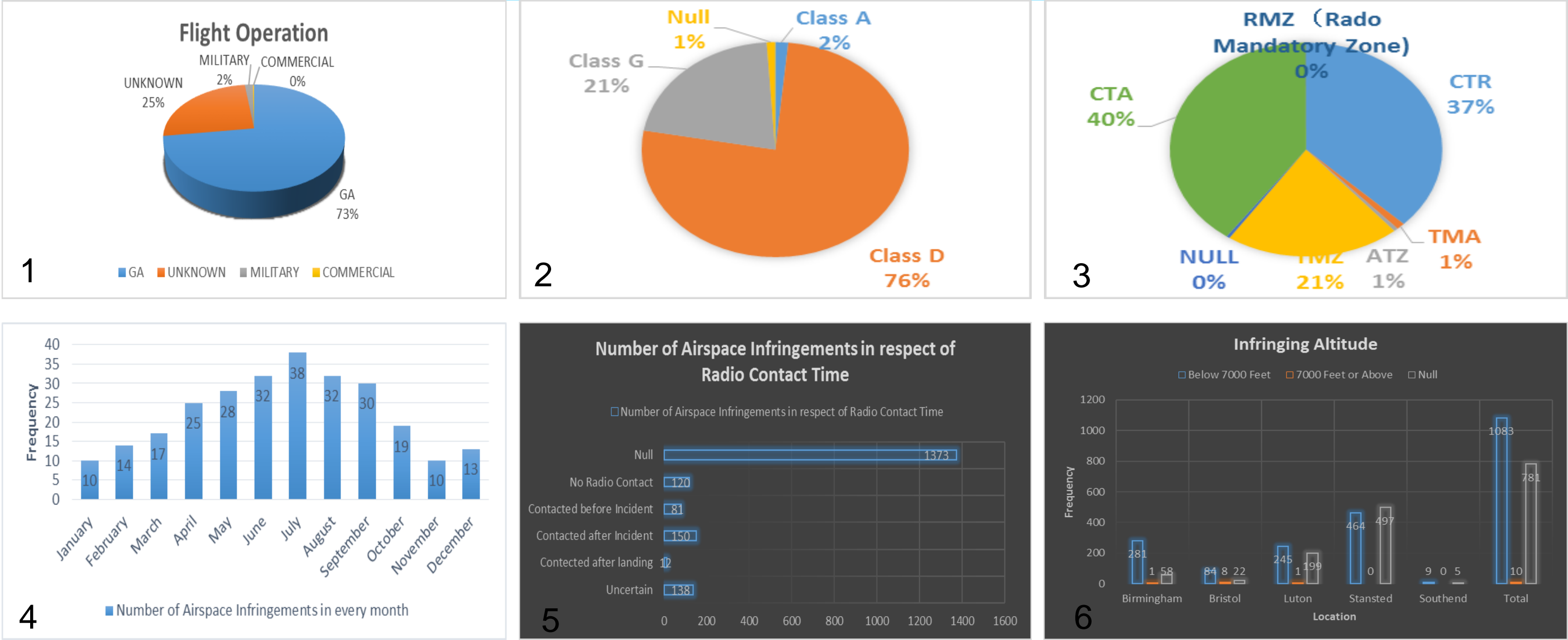
Figures 1-7 reveal the trends of AIs derived from the given AI data 2008-2014:
1. 73% of AIs are committed by GA among aviation community sectors.
2. 76% of AIs happened in Class D.
3. Totally 77% of AIs happened in CTR/CTA.
4. AIs are seasonal, mostly happened in summer.
5. 1373/1874 of AIs were reported without radio contact information.
6. Most of AIs happened below 7000 feet.
7. No. of AIs reaches a peak in 2009 then is decreased gradually and No. of AIs in Stansted dominates in England.

Figure 8 shows a regression line estimating the downward trend of AIs happened in Stansted after 2010. It is decreased because of the introduction of TMZ. The effectiveness of this airspace change can be estimated as a 43.2% reduction of AIs. However, five years' incident data is not enough to give an accurate result. So pilots are encouraged to submit reports with more details to help study the effectiveness of airspace changes in the future.

Reference

Fly On Track (2012) Airspace Infringements – Background Statistics. Available from: http://flyontrack.co.uk/wpcontent/uploads/2013/08/20120815FlyontrackInfringementBackground.pdf/ [Accessed 2nd June 2016].