

## Assignment 10: Databases and Data Structures

Date Due: May 3 (midnight)

Instructor: Trani

### Problem 1

Download the flight track data collected at busy airport in the United States used for noise analysis. The file contains a Matlab structure array organized as follows:

**Parent structure** = flight

#### Children

airportID = airport ID

flightID = flight ID (flight number)

aircraftType = four letter aircraft type designator

arrival\_departure = arrival or departure field

runwayName = runway label where the flight departed or arrived

track = detailed flight track information with longitude (deg), latitude (deg) and altitude (meters) data (all vectors of equal length)

### Task 1

Create a Matlab script to read the flight plan data and make a plot of longitude versus latitude to visualize the flight tracks. Use the US map provided on the Syllabus website to understand where the flights occur within the United States.

### Task 2

Improve the Matlab script created in Task 1 to read the flight plan data and make a plot of longitude versus latitude to visualize the flight tracks. In Task 2, plot in red the arrivals and in blue the departure tracks. Use the US map provided on the Syllabus website to understand where the flights occur within the United States.

### Task 3

Improve the Matlab script created in Tasks 1 and 2 to add code that selects flights performed with Boeing 737-800 (aircraftType = B738) . In this task, plot in red the arrivals and in blue the departure tracks performed by Boeing 737-800. Use the US map provided on the Syllabus website to understand where the flights occur within the United States.



Boeing 737-800

**Task 4**

Add Matlab code to the previous scripts to count how many departures (all aircraft) take place on runway 22L. Add code to count the number of arrivals on runway 28C. Display the results in the command window with appropriate labels.

## Problem 2

Download the two Excel files named: a) export\_airport\_runways.xlsx and b) export\_NC\_airports.xls provided. Samples of the files are shown below for reference.

Table 2. Airport database (for North Carolina).

Location_id	Airport ID	State	City	Airport_Type	Land Area (acres)	Lat(seconds)	Lon(seconds)	Lat (deg) format	Lon (deg) format	Lat (deg)
16494.*A	6NC8	NORTH CAROLINA	ADVANCE	PR	3	129377.4930N	289384.1950W	12	12	35.94
16494.1*A	30NC	NORTH CAROLINA	ADVANCE	PR		129775.0000N	289645.0000W	12	12	36.05
16499.3*A	ASJ	NORTH CAROLINA	AHOSKIE	PU	210	130671.0930N	277815.0800W	12	12	36.30
16499.31*A	15NC	NORTH CAROLINA	AHOSKIE	PR	40	130463.0000N	277106.0000W	12	12	36.24
16503.*A	VUJ	NORTH CAROLINA	ALBEMARLE	PU	300	127500.1010N	288542.8640W	12	12	35.42
16503.01*H	9NC1	NORTH CAROLINA	ALBEMARLE	PR		127308.0000N	288701.0000W	12	12	35.36
16506.*A	RHP	NORTH CAROLINA	ANDREWS	PU	206	126702.8270N	301906.9390W	12	12	35.20
16506.52*A	87NC	NORTH CAROLINA	ANGIER	PR		127690.0000N	283156.0000W	12	12	35.47
16506.53*A	NC44	NORTH CAROLINA	ANGIER	PR		127681.0000N	283262.0000W	12	12	35.47
16510.*A	NC11	NORTH CAROLINA	APEX	PR	7	128669.5430N	284129.0310W	12	12	35.74
16510.01*A	NC81	NORTH CAROLINA	APEX	PR		128706.5440N	283895.0260W	12	12	35.75
16515.12*A	1NC0	NORTH CAROLINA	ASHEBORO	PR	100	128599.4910N	287789.1410W	12	12	35.72
16515.21*A	7NC9	NORTH CAROLINA	ASHEBORO	PR		128618.4910N	287680.1350W	12	12	35.73

Table 3. Sample File runways\_aircraft\_airports.xls.

Location_id	RunwayName	Length (ft)	Width (ft)	RunwayMaterial
16494.*A	40717	2500	60	TURF
16494.*A	40717	2500	60	TURF
16494.1*A	16/34	2700	50	TURF
16494.1*A	16/34	2700	50	TURF
16499.3*A	40561	4502	75	ASPH-G
16499.3*A	40561	4502	75	ASPH-G
16499.31*A	14/32	1800	50	TURF
16499.31*A	14/32	1800	50	TURF
16503.*A	04L/22R	3500	75	ASPH-G
16503.*A	04L/22R	3500	75	ASPH-G
16503.*A	04R/22L	5500	100	ASPH-G
16503.*A	04R/22L	5500	100	ASPH-G

### Task 1:

Import both files into Access creating a new database. Define **Location\_id** as a text datatype in both tables. The **Location\_id** field, serves to connect both files in a database. Establish a one-to-many relationship between the North Carolina airports and the runways\_NC\_airports files using the field **Location\_id**. Verify that the relationship works. Explain how do you know the relationship works.

### Task 2:

Create an MS Access query to find all the airports in North Carolina whose runways longer than 4,500 feet. In your query, include the number of airports and show the resulting Access table. In your solution table include the following fields:

- Airport ID
- Runway label
- Runway length
- Runway width

### Task 3:

Create another MS Access query to find the **public airports** in North Carolina with **runways longer than 5,500 feet** and with **Asphalt (ASPH) runways**. State the number of airports and show the resulting Access table showing the following fields:

- Airport ID
- Runway label (s)
- Runway length

#### **Task 4:**

Create an MS Access query to find all the runways at airports in North Carolina with **land areas greater than 25 acres**. The query should produce a table with the airport ID, runway label, runway length, airport latitude and longitude.