

GEOG3600. Geographical Information Systems

Lab 6. Spatial and Attribute Query

Objectives

This laboratory aims to introduce the concepts and techniques in utilising GIS query functions. When a GIS database has been established, the most frequently used application functions are query functions. These include spatial, attribute and spatial relationship queries, as well as highly structured query using Structured Query Language (SQL) and its spatial data extension.

Task 0 Preparation

We got new data of roads centre line from the Lands Information Centre, thus we may use this instead of the roads feature class (which you should digitised it during last tutorial). However, the extent of this coverage is larger than what we need so we need to crop it into the same size of other feature class.

- i) Start ArcCatalog, import the coverage '11sw' (in Y:\hongkong\hkroads) into your personal geodatabase (11swaxxx). Give this feature class a meaningful name (e.g. sw11road).
- ii) A shapefile which defines the extent of our personal geodatabase was created by your tutor. It names 'boundary.shp' and placed in the course folder ('y:\geog3600'). Please import it into your personal geodatabase as well.
- iii) Go to ArcMap, add the above two feature classes. Then start GeoProcessing Wizard (from Tool menu), choose 'clip one layer based on another'. Read the description carefully and select appropriate input layer and clip layer, and give the output feature class a meaningful name (e.g. 11swaroad).

Task 1 Spatial Query

In this task, we want to find out how many temples are within 10 meters of roads (road centre line actually) in this area. The feature classes we will use include:

11swafacil_point (existing feature class in our personal geodatabase)

11swroad (road center line of 11sw area)

- i) Start 'Select by Location', and input the following statement with the guidance of dialog box

I want to select features from 11swafacil_point that are within a distance of the features in this layer 11swroad.

Also remember to apply a buffer distance of 10 metres.

Answer: there is / are _____ temple(s) within 10 metres of roads

- ii) There are many other options available in this command, study them carefully. They will be useful in the future.

Task 2 Attribute Query

In this task, we want to find out information about all temporary structure in this area. The feature class we will use includes:

11swabilup_polygon (existing feature class in our personal geodatabase)

- i) Try to find out all temporary structure (TYPE = TSP) in the map, and write down the SQL statement:

- ii) Try to find out all temporary structure which is larger than 100m², and write down the SQL statement:

Task 3 Combinations of Attribute and Spatial Query

In this task, one of your clients wants to rent a shop (building) in this region but it needs to fulfil the following criteria:

1. It must next to the tramway or a road; AND
2. It must near a car park; AND
3. It must not near either a cemetery or a hospital; AND
4. It should be as large as possible.

He asked you to find out the location and area of the building using GIS. Thus, please follow the procedures below and try to work out the result step by step:

- i) Please write down where we can find the required information:

Building (Feature Class: _____ Attribute: _____)

Tramway (Feature Class: _____ Attribute: _____)

Road (Feature Class: _____ Attribute: _____)

Car Park (Feature Class: _____ Attribute: _____)

Cemetery (Feature Class: _____ Attribute: _____)

- ii) Produce 2 buffers for tramway and roads separately.

For tramway, the definition of 'near' is 'within 20 meters';

For roads, the definition of 'near' can be divided into 2 categories:

20 meters for roads which have name;

10 meters for roads which have no name:

(HINTS: you may need to add a field to distinguish roads with/without name and set the different buffer distance before you start the buffer wizard)

- iii) Produce a buffer for car park as well as cemetery.

For car park, make a buffer for 100 meters

For cemetery and hospital, make buffers for 600 meters

- iv) Overlay the buffer of tramway and roads, then overlay this result with buffer of car park. Name the result to be 'yeszone'. Which kind of overlay operations (merge, clip, union, intersect) will you use to make the above 2 layers?

- v) On the other hands, overlay the buffer of cemetery and hospital to make another new layer. Name the result to be 'nozone'. Which kind of overlay operation will you use?

- vi) You need to exclude the area of 'nozone' from 'yeszone' so as to produce the final result. There is no direct way to do this so a rather complicated approach need to be used

Firstly, add a field in the table of 'nozone' (e.g. cut) and assign a single value (e.g. 99) to all records.

Secondly, union the 'nozone' and 'yeszone', produce a new layer named 'final'.

Thirdly, select the records which cut value are 99 and delete all those records, save the result.

You need to also add a field (namely dissolve) and assign a single value to this field (e.g. 1) to all records, then use 'dissolve features based on an attribute' to dissolve the borders of the records.

What are these mean? Please explain the purposes of the above procedures using your own words briefly.

- vii) Use the command 'select by location' and input appropriate statement (HINT: only those building polygons which are completely within the 'final' should be selected.)

Browse the selected records and find out the record with largest area. How large is this building?

Examine the procedures once again. May you suggest another way to accomplish this task?