

Stepping Up Our Game: Using ArcGIS Model Builder to Automate Data Handling, Analysis, and Mapping

Developing a Food-borne Disease Outbreak and Alert Model

Introductions



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CCBC Geospatial Applications Program
Advanced Geospatial Certificate
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Slide 2

SAJ2

Need to include a good headshot of each of you... if you don't have one I can take a picture of each of you for the presentation

note that I put your completion dates in italics.... you can tell the attendees that you are still in the program but that these are your completion dates

Scott Jeffrey, 1/11/2013



The Assignment

- As part of the Intermediate GIS course students are introduced to a wide variety of skills and techniques that students will need to apply on the job.
- Objectives:
 - take an existing scenario and automate the processes involved using ArcGIS Model builder.
 - create a model that can be applied to any geographic location

Given:

You are working as a GIS analyst for the health department in a metropolitan area. In the past 24 hours your office has received a number of identified cases of food-borne Hepatitis A.

Evidence shows that:

- none of the patients ate at restaurants which served alcohol.
- most patients ate lunch within 2-3 blocks of where they worked (500 foot buffer).

Receivables:

A file geodatabase containing the following data:

Address tables

Patients home

Patients work place

Food source locations

Feature classes for metropolitan area

Street Centerline

Sidewalks

Buildings, Neighborhoods

Project Deliverables:

Develop a model which will:

A: Geocode the locations of the patients, their workplaces, and food sources in a metropolitan area

B: Break the Food Sources provided by the metropolitan area into five classes:

- Bakeries

- Restaurants

- Groceries

- Convenience Stores

- No Category

C: Buffer all of the patients work addresses with a 500 foot buffer

D: Create a table of addresses of Food Source buildings that are completely within the 500 foot buffer that might be the source of the outbreak

E: Create a layer of Food Source locations from [d] above

Methodology

- A. Create and populate required fields for future use with address locator and geocoding
- B. Streamline existing data (recalculate/re-organize....)
- C. Parse out all food sources into designated categories
- D. Create Address locator for the metropolitan area
- E. Geocoding (e.g. infected patient, work and food source locations)
- F. Select food source location by travel distance (500 feet)
- G. Buffer travel /infected patient distances vs. food sources

Process

- Add detail fields to prepare data for Geocoding
 - (e.g. city, state etc. and populate fields accordingly)
- Split source table based on type
 - (e.g. table to table and build SQL expression)
- Separate alcohol serving establishments and rejoin tables
 - (append five categories into one table)
- Geocode all tables
- (e.g. metropolitan area create address locator, match filed name to alias name, rematch address to improve accuracy, etc.)
- Buffer workplaces (500 feet)
- Select by location for food sources which meet specified criteria
 - (location must be completely within buffer layer)
- Save to a layer file and place in a gdb

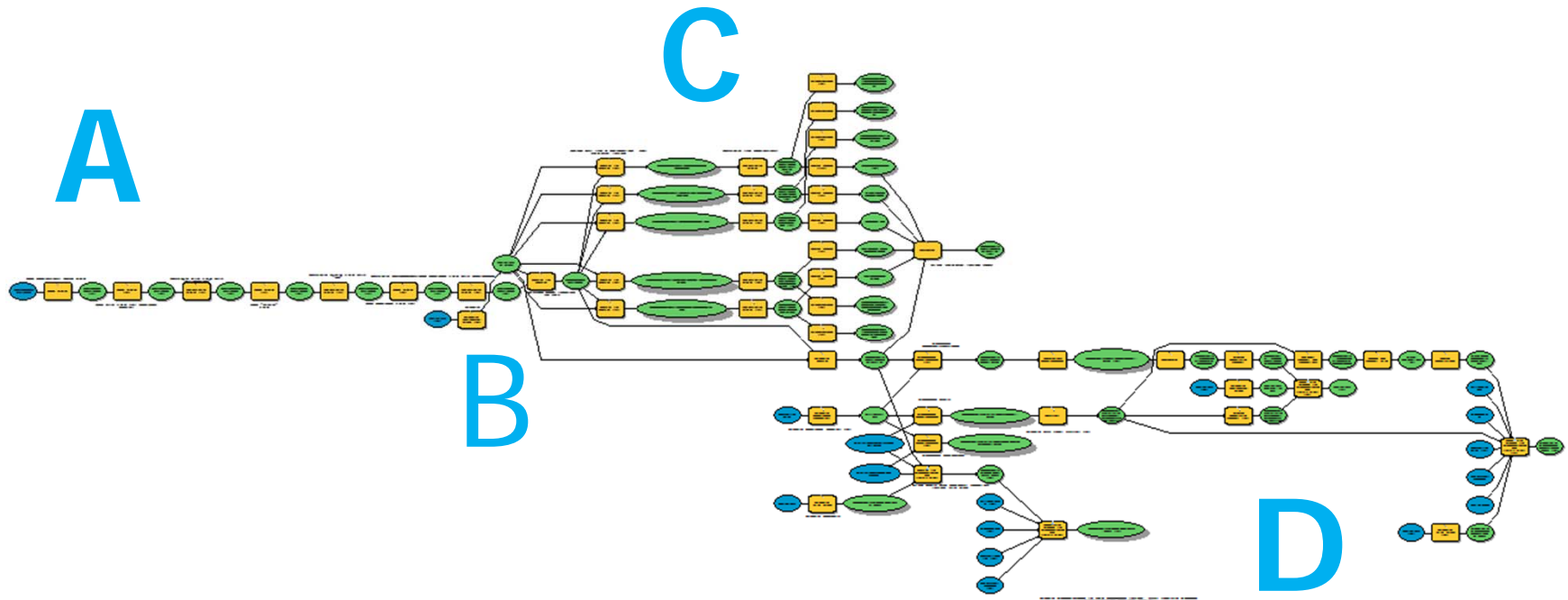
Methodology: overview

A: Data Preparation

B: Reorganization of data

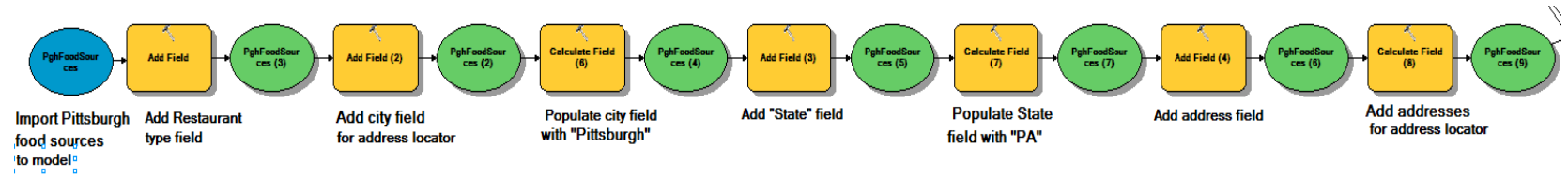
C: Data Classification

D: Geocoding and Analysis



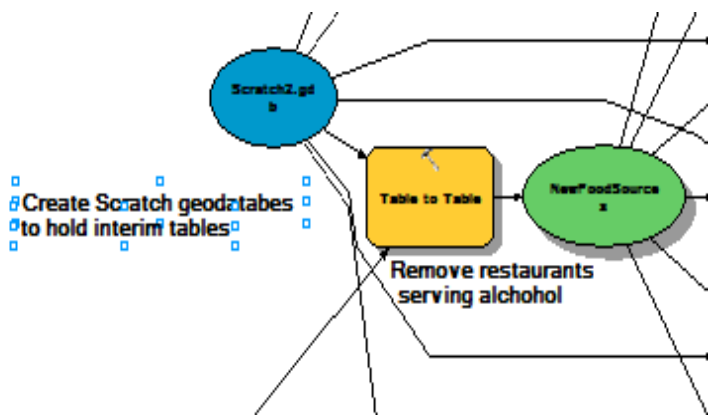
Methodology

A



Data prep (add new fields and populate)

B



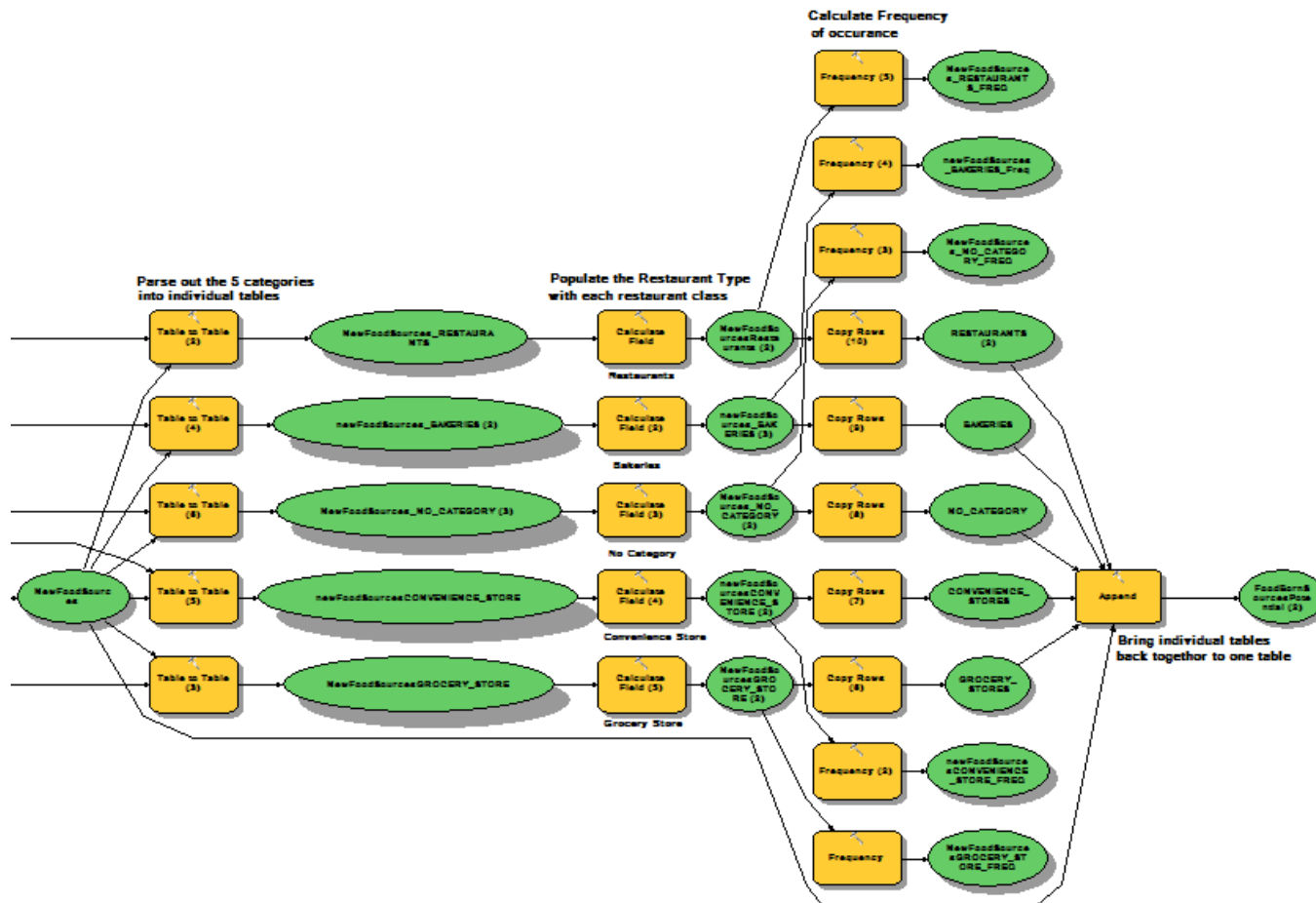
- Scratch2.mdb
 - FoodBornSourcesPotential
 - NewFoodSources
 - newFoodSources_BAKERIES
 - NewFoodSources_NO_CATEGORY
 - NewFoodSources_RESTAURANTS
 - newFoodSourcesCONVENIENCE_STORE
 - NewFoodSourcesGROCERY_STORE

OBJECTID*	STREET	NAME	ZIP	TYPE	Restauant_Type	City	State
1	1272 Benton Ave	Seach Bakery	15212	Bakery	BAKERIES	Pittsburgh	PA
2	1272 Benton Ave	A & W Bake Shop	15212	Bakery	BAKERIES	Pittsburgh	PA
3	1818 Brownsville Rd	Happiness Is Homemade	15210	Bakery	BAKERIES	Pittsburgh	PA
4	2816 Brownsville Rd	Carrick Cookie Store	15227	Bakery	BAKERIES	Pittsburgh	PA
5	4131 Butler St	Jenny Lee Bakery	15201	Chain Bakery	BAKERIES	Pittsburgh	PA
6	2101 Centre Ave	Emmanuel Pastries Connection	15219	Bakery	BAKERIES	Pittsburgh	PA
7	528 E Ohio St	Prory Fine Pastries	15212	Bakery	BAKERIES	Pittsburgh	PA

Remove food sources serving alcohol;
create series of scratch data bases for each major stage of process

Methodology

C



Re-categorize into separate food sources and append



Problems

- Geocoding
 - Addresses were initially missing fields
 - Address re-matching-hard to get to work
 - Correct selection of geocoding locator type
- Alcohol serving establishment needed to be separated
- Database write errors from testing
- Selection formatting
 - Some tools require particular formats for input
 - Conversions may be needed to pass output on to other tools
- Learning to “think” as the computer

Best practices

A. Design is not linear but circular

- A. Pitfalls or stopping points may force you to rethink previous parts of the model
 - a. Model might not be doing what you intend

B. Step wise refinement

- A. Build and test your model in small increments
 - a. Small segments are easier to work with
 - b. Make sure each segment is working properly before moving forward.
 - c. Place output into successive scratch databases
 - 1. Easier to see what model is actually doing and where errors are occurring.

C. Think through every sub process

- A. Manually perform the task that each small "tool" will be doing.

