7-2009

Use of Spatial Boundary Matrices in Web Based Community Characteristics and Public Involvement Strategy Tools

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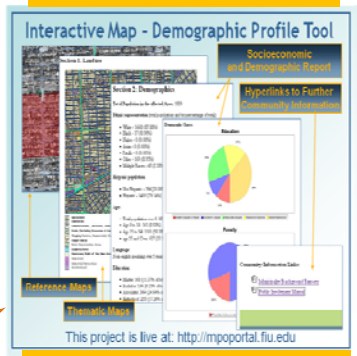
ABSTRACT

This poster demonstrates the current state of an interactive mapping and reporting tool created by FIU for Miami Dade County MPO, Florida *(see also http://mpoportal.fiu.edu)*. We propose a new method based a distance matrix for an automated identification of urban features that are associated with a neighborhood and should be considered in the automated generation of a micro community background report.

CURRENT STATE: A WEB-BASED PIS TOOL

Currently there are three components of the Web-based Community Characteristics Program (CCP)

1. An interactive mapping and reporting tool built upon ESRI's ArcGIS Server Technology



Through a guided search, a pre-compiled demographic report with charts, maps, and summaries can be retrieved for a user-defined micro-neighborhood

2. A set of pre-compiled community background reports

3. A set of public involvement strategies for transportation planners based upon the demographic profile provided by 1 and 2

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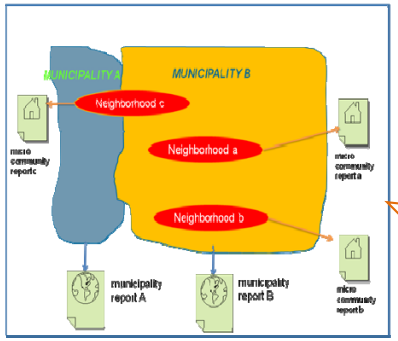
PROBLEM STATEMENT

The CCP interface guides the user through a linear spatial search which will eventually point to one single related or matched community background report. To accurately assess the characteristics of a community of a municipality or a predefined neighborhood such as census designated places, or a user-defined boundary, we must also include its neighbors, as the dynamics of one might be drastically different from its neighbor in terms of demographic composition. For instance, "*Design District,* which is an upcoming, affluent, artists district, is a neighborhood completely inside *City of Miami*, and its closest neighbor is *Little Haiti,* one with high rate of poverty and unemployment .

SOLUTION



Ideally, a composite of spatially related communities' background reports, rather than one single pre-defined report should automatically be retrieved when examining the intricate urban neighborhoods. The figure shows that "Neighborhood *c* has two micro-neighbors *a* and *b*, and is 45% contained by Municipality A and 55% by Municipality B." In this composite picture, a planner can better determine the community characteristics, particularly for user-defined urban boundaries, where the area of interest falls in between neighborhood and municipalities.

We propose to store the spatial relationships of all predefined boundaries of municipalities and micro-neighborhoods. We simplify spatial relationships into intersect, containment, and adjacency, and then measure them in distance. The following tables illustrate the containment status and percentage of containment among a sample of six neighborhoods (a to c) and three municipalities (A to B).

In the distance matrix, 0 indicates two neighborhoods sharing one of the three spatial relations. The smaller the distance, the closer are the neighborhoods to each other. A value <> 0 represents the proximal distance between 2 polygons (nearest points).

	A	B	a	b	c
A	0	0	5	6	0
B	0	0	0	0	0
a	5	0	0	7	4
b	6	0	7	0	8
c	0	0	4	8	0

Distance Matrix (in miles)

	A	B	a	b	c
A	1	0	0	0	.45
B	0	1	1	1	.55
a	0	1	1	0	0
b	0	1	0	1	0
c	.45	.55	0	0	1

Containment Matrix (0-1)

The containment matrix shows the percentage of containment, where 0 indicates no overlap, and 1 indicates 100% containment.

CONCLUSION

To store the polygon spatial relationships explicitly in boundary matrices can enhance the related information retrieval in geo-spatial web for political and urban boundaries searches. The presented approach is an alternative to that of spatial ontology, where each object, its location in the spatial hierarchy, and its properties are defined and stored separate from the geometry.

The study presented in this poster is funded by Metropolitan Planning Organization (MPO) of Miami Dade and Palm Beach counties.