Using GIS to Analyze Census Data: Implementing Poverty Mapping in Pakistan

Murtaza Haider, Ph.D.
School of Urban Planning
http://www.milute.mcgill.ca
murtaza.haider@mcgill.ca
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Seminar Outline

• Introduction to GIS
• Analysis of Census data in Canada
• Demonstration of US census data analysis and modeling
• Analysis of census data for NWFP
• What needs to be done
What are Geographic Information Systems?

- GIS are spatial database systems used to collect, store, and manipulate geo-referenced data
- GIS comprise of an integrated set of hardware and software tools
- GIS are capable of performing complex spatial and other queries using SQL syntax
- GIS can display spatial information as maps, thematic maps, and animations capturing temporal evolution of spatial change

The Power of GIS

- Correlation
- Analysis
- Visualisation
Components of GIS

- **Hardware**
  - Computer systems: Servers, Microcomputers, Digitizers, Scanners

- **Software**
  - OS
  - TransCad, MapInfo, Arcview

- **People**
  - GIS Specialists & End Users

- **Methods**
  - Data Storage & Analysis Techniques

- **Geo-referenced DATA**

Work Trip Mode Splits, Selected CMAs (1996)

<table>
<thead>
<tr>
<th>City</th>
<th>Auto-DRV</th>
<th>Auto-PASS</th>
<th>Transit</th>
<th>Walk</th>
<th>Other</th>
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<tr>
<td>Montreal-M</td>
<td>74.56%</td>
<td>3.35%</td>
<td>15.21%</td>
<td>4.85%</td>
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<td>Montreal-F</td>
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<td>20.42%</td>
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<td>16.34%</td>
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<td>Toronto-F</td>
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<td>Vancouver-M</td>
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</table>

Montreal and Toronto CMAs depict similar mode splits

Obvious differences in commuting choices between female and male commuters

Source: Statistics Canada
Transit Ridership in Montreal

Work Trips by Public Transit (Total)
Montreal Census Metropolitan Area, 1996

Source: Statistics Canada (1996)

Transit Ridership (Male)

Work Trips by Public Transit (Male)
Montreal Census Metropolitan Area, 1996

Source: Statistics Canada (1996)
Transit Ridership (Female)

Work Trips by Public Transit (Female)
Montréal Census Metropolitan Area, 1996

Source: Statistics Canada (1996)

Dwelling Density-CT-2001

Dwelling Density (Per sq. km)

Source: Statistics Canada
Defining Suburbia-Factor Analysis

Housing Values in the GTA, 1996
Live GIS Analysis of US Census Data

- Moving beyond the pretty maps!

Spatial Correlations: Race and Poverty

Percent Below Poverty Line

Concentration of Black Households
3-D Rendering of Population Density

Sex Ratio and Literacy by Gender
Crowding and Urban Density

Female Literacy Ratio in Pakistan at Tehsil Level (10 years & above Female Population)
What needs to be done

- A repository of GIS data in the civilian setup for dissemination and analysis of national, provincial, and local level data
- Web-based dissemination of GIS data on Pakistan
  - Examples are the GIS labs at the Universities of Toronto and McGill
- Scope of the task ahead

<table>
<thead>
<tr>
<th>Province/Region</th>
<th>Division</th>
<th>District</th>
<th>Tehsil/Taluka</th>
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<th>Total</th>
<th>Metro/Corp</th>
<th>Municipal Committee</th>
<th>Town Committee</th>
<th>Cantonment</th>
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(Sources: Population Census 2006)