11.522 – Research Seminar on Urban Information Systems

Instructor: Joe Ferreira, jf@mit.edu

Monday, 6-8 PM in **Room** 9-451

- Opportunity for students to build on basic skills in GIS and urban analytics in order to explore urban planning implications of improved urban information systems
- Students present structured discussion of journal articles and undertake small research projects
- Helpful in formulating research project, thesis exploration, …

Class homepage: http://mit.edu/11.522

11.522 – Research Seminar on Urban Information Systems

- Modern information and communication technologies (ICT) provide new opportunities for urban sensing and analytics that can impact all aspects of urban planning.

- 11.522 provides a setting in which to discuss and investigate the urban planning and policy implications of ICT advancements.

- Much of this research involves geographic information systems (GIS), location-based computing, visualization methods, and the design and prototyping of urban planning tools and metrics for accumulating and using 'city knowledge.'

- Some of the work also involves institutional analysis, new theories about planning strategies, collaborative urban design, the economics of place, urban information infrastructure, and land use and transportation interactions.

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11.522 – Research Seminar on Urban Information Systems

- Seminar topics are usually tied to ongoing Urban Information Systems (UIS) research in DUSP.
  - Urban analytics, urban indicators and performance measures
  - Urban modeling: from back-of-the envelope to complex land use and transportation models
  - PSS, PPGIS, VGI, urban information infrastructure
  - Not always highly quantitative: e.g., technology adoption, comparative study of 'smart city' efforts, …
- Examples from recent theses and student papers

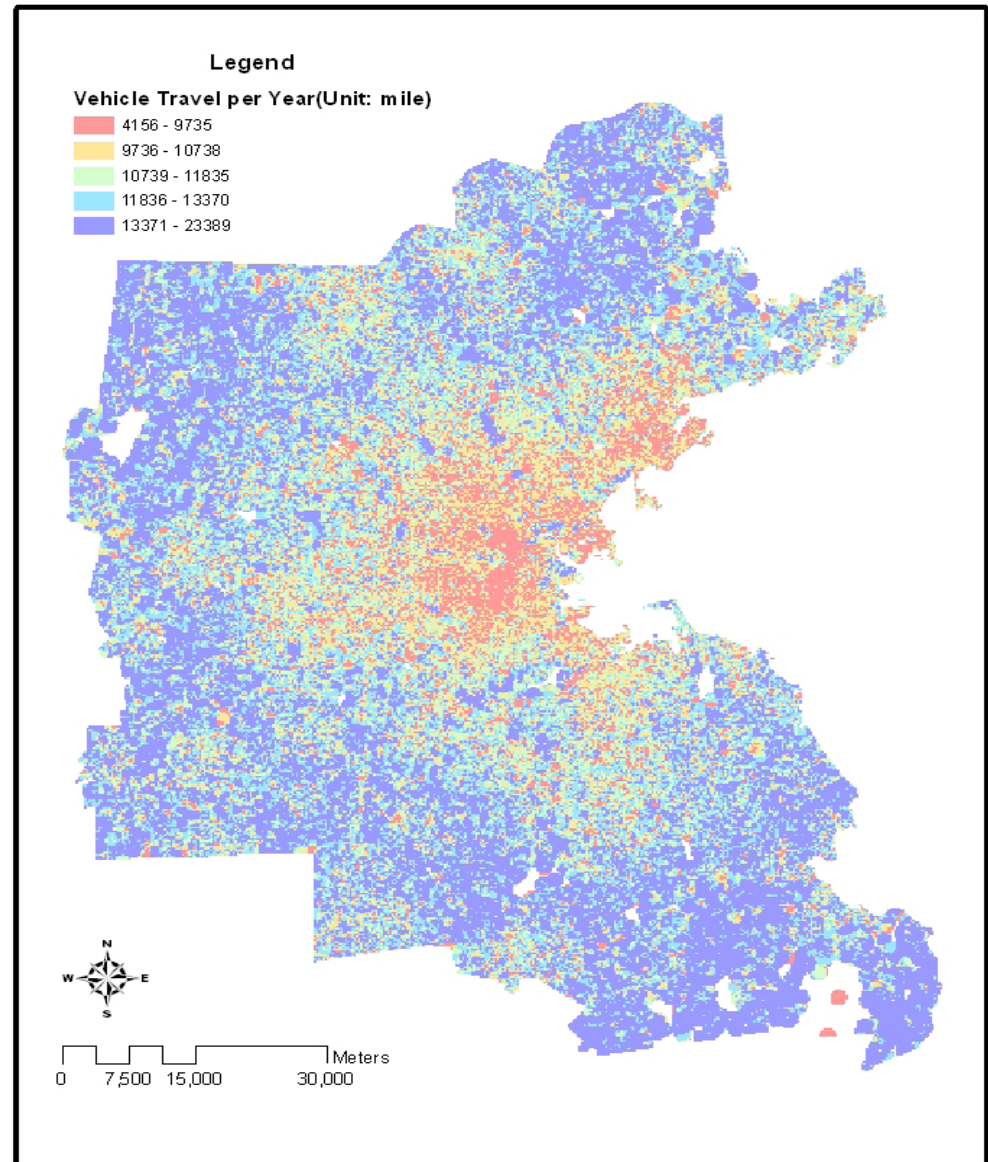Class homepage: http://mit.edu/11.522

Examples from Recent Theses & Projects

- Vehicle miles travelled patterns:
  - Mi Diao, PhD dissertation (2010), "Sustainable Metropolitan Growth Strategies: Exploring the Role of the Built Environment"
  - Jingsi Xu, class project & **Transactions in GIS** paper
- A day in the life of Singapore
  - Shan Jiang, Singapore 'Future Urban Mobility' project and **Data Mining & Knowledge Discovery** paper
- 'Smart City' strategies
  - Tuan Yee Ching, MCP thesis, "Smart Cities: Concepts, Perceptions and Lessons for Planners"
- Implementation of planning support systems technology
  - Rob Goodspeed, PhD dissertation (2013), "Planning Support Systems for Spatial Planning Through Social Learning"
- 'Big Data' analyses of transit card data
  - Yi Zhu, PhD dissertation (2014), "Spatio-temporal Learning and Geo-visualization Methods for Constructing Activity-travel Patterns from Transit Card Transaction Data

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Estimated VMT per Vehicle per Year

- VMT *per vehicle* average for each 250x250m grid cell
  - Data for 2.8 million vehicles
  - Grid cells with 12+ cars
    - Average annual mileage of all "good" cars in grid cell.
  - Grid cells with few/no vehicles
    - Spatial interpolation
    - Inverse distance weighted average of the VMT of 12 closest "good" cars

- VMT is more sensitive to built environment than indicated in earlier studies

Legend

Vehicle Travel per Year(Unit: mile)

- 4156 - 9735
- 9736 - 10738
- 10739 - 11835
- 11836 - 13370
- 13371 - 23389

Meters
0   7,500   15,000   30,000

From Mi Diao dissertation and forthcoming EP-A paper

Singapore Temporal Activity Patterns: (a weekday)

Legend (right side):
- Other
- Civic
- Rec.
- Personal
- Shopping
- Trans.
- Schl.
- Work
- Home

9:30

Source: S. Jiang, J. Ferreira, M. Gonzalez using LTA HITS 2008 travel survey & Google Map.

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