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 urban modeling and the urban planning and policy implications of ICT advances.

• 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

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Examples from Recent Theses & Projects

• Vehicle miles travelled patterns:

• ‘Smart City’ strategies

• Implementing planning support systems

• ‘Big Data’ analyses

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Estimated VMT per Vehicle per Year

- **VMT per vehicle** average for each 250x250m grid cell
  - Grid cells with 12+ “good” 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

- VMT results were used to compare implications of alternative growth scenarios

One Day’s Activities in Singapore (a weekday animation)

Urban Analytics: Interpreting ‘One Singapore Day’

• Extracting activity patterns from travel surveys and cellphone data: (from Shan Jiang’s research)
  – Eigenvector decomposition and k-mean clustering:
    • 8 prototypical patterns: regular worker, early-bird worker, long-day worker, ...
  – Common ‘tours’ or ‘motifs’:

• Linking patterns to place-of-residence:

Regular Workers

Long-day Workers
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