Urban Mobility Workshop

Bodies, Bits and the Last Mile

Thursdays, 3:00 – 5:00pm
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Summary

Large-scale human mobility data can be collected from mobile phones, road surveillance cameras, and location-based applications while opportunistic methods are revealing movement patterns from the data exhaust of our everyday lives. Turning such raw data into knowledge can provide insights about how cities (and its citizens) operate. The goal of this class is to expose you to general methods that extract useful information from digital traces of human movement. It covers numerical methods to ascertain the structure inherent in daily activities within a population. Lectures are reinforced with case studies and exercises, using data sets from actual applications. At the same time, we will critique and analyze the limitations of such data-centric methodologies to foster a more productive—and human-centered—definition of mobility.

Broadly, we question in what ways are current techniques of understanding human mobility failing to address questions of access, equity, and even pleasurability/sanity for those who have to move across the urban landscape? In what ways can digital data reveal patterns that may assist us in understanding the lived experience of mobility, and how can we leverage this information? In what ways do we evaluate and/or utilize (near) future solutions such as autonomy and distributed/networked mobility in the context of human-centrism?

This course is not intended to be a transportation modeling class, but rather an application of data analysis, locative technology development, data visualization and communication, and interpretation by drawing from the context and challenges of urban mobility. It is for that reason this course addresses a multitude of contexts—from public transportation data from open data platforms to sensor-generated data on activities in a discrete location within the public realm. Through readings and discussions, we will contextualize the opportunities for future practice as well as the limitations of these quantitative processes. The course will question policy, and theorize new mechanisms for evaluating mobility, holistically.

Learning Objectives

We will engage in the critical debates around data and planning to become conversant in these vital conversations of mobility and informatics and learn about how they are being considered through emerging planning practices. We will analyze the ethical implications of data-centric processes and develop responses to professional ethical situations in mobility with the overall ambition of informing future practice.

The class is structured as two parallel tracks, that will expose students to quantitative and policy-analysis tools and techniques:

Analytical: Ability to perform policy analysis regarding mobility; understand last-mile challenges in mobility planning; ability to conceptualize/design around aspects of equity and access;

Quantitative: Ability to analyze large-scale digital data; ability to visualize large-scale digital data; understanding (at least conceptually) of advanced research methodologies

Prerequisites

For the quantitative half of the class, it is recommended that you have basic knowledge of coding and statistics, or the perseverance to find help/answers/resources as you need it. (In other words, you are willing to "hack" your way through the class.) Due to the wide variation is skillsets, the general mantra for the class is that course participants are required, at a minimum, to approach the activities and lectures with enthusiasm and/or perseverance.

Sprints, Assignments and Grading

Analytical Sprints

The class is organized as a series of sprints—each engaging with a topic of urban mobility through the perspective of how data is collected or interpreted. We will begin with a series of small exercises intended to create a shared technical skill base on which everyone can develop their projects in the latter parts of the class. Sprint 1 will consider mobility data at the scale of the city that is commonly a byproduct of operations, such as bus arrival times, bike share data, etc. The second sprint will engage opportunistic data collection, such as social media data as a means of understanding human movement. The third spring revisits William H. Whyte and his investigation of discrete urban space through the use of sensor data. It is not the intent that you will become an expert in all of these practices, but learn enough to begin to frame your inquiries in a knowledgeable and informed way.

In each sprint, we will begin with a topical introduction, and you will choose a research project for the sprint (a list will be provided with some ideas, but you may present your own). In some cases, you will be replicating studies from our precedents and others, taking a slice from a more comprehensive project. Projects are to be completed in groups in about three weeks, with technical lectures and hands-on sessions to aid you in the completion of the project. Each sprint will conclude with a demonstration or a presentation of your research findings. These sprints will be composed of the following:

Research Interrogations Presentations
Each sprint will feature a session dedicated to the research and practices that inform contemporary (cutting edge) practices about data and mobility. One group each week will be asked to present the research papers or practice precedents; each group will offer one of each through the course of the

semester. Groups should prepare for a 30-40 minute presentation, supported by slides, which explores urban mobility within the context of the materials presented. Presentations should touch upon the datasets, approaches, and methods utilized in the materials, and the context in which they operate. Groups are encouraged to introduce outside precedent projects and graphic/visual analysis in their presentations. The group must assess how the topics of the readings/projects contribute to an understanding or vision of contemporary practice, implications on society (including ethical and societal impacts), and speculate how and where the approach could be applied more broadly to mobility planning. The group will then kick off a 20-minute class discussion or activity related to the themes of the presentation.

Group Presentations and Debates

As groups, you will take on the task of establishing the base for conversation around several topics around mobility as it pertains to access and equity in the last mile: public transportation, transportation networked services (aka "shared" or "on-demand"), distributed systems (such as bikes, scooters), and pedestrian mobility. Where do we currently stand, and where is planning failing to address the needs of residents with this type of mobility?

Final Project

The last third of the course is dedicated to a final group project, with an agenda of your choosing and may draw from any/all of the lessons from the course. It should be comprehensive and aggressively considers a problem or opportunity in urban mobility in New York City or the region. You will frame this in a project brief that describes the phenomena you are trying to analyze and the desired medium for your outcome. Further, you will address the data you are using (or creating!), the audiences for the analysis and the subjects involved in the study.

We will conclude the class with a public demonstration of your final projects and will invite data scientists, transportation planners, and members of the City and community to be part.

Grading

Attendance and Participation …………..………………… 10%
Research Interrogations ………………………………… 15%
Topical Presentations ………………………………….... 15%
Sprint Problem Sets (10% each) ………………………… 30%
Final Project ……………………………………………… 30%

Schedule

		Sprint Cycle	Class Topic	Assignment Due
1	Jan 24	Sprint 0	Introduction	
2	Jan 31		A: Contextualizing Mobility B: Understanding Human-Centrism	Getting Setup (Informal)
3	Feb 07	Sprint 1	A: Introduction: Mobility Infraastructures B: Understanding Spatial Data / Hands On	Data Familiarity (Informal)
4	Feb 14		A: Criticalities of Spatial Data and Mobility B: Public Transportation Debate	
5	Feb 21		A: Spatial Visualization / Hands On B: Research Presentation	Assignment 1
6	Feb 28	Sprint 2	A: Introduction: Individual Trajectories (People in Place) B: Pedestrians Debate	
7	Mar 07		A: Holly Whyte 2.0? Bottom Up Sensing B: Research Presentation	
8	Mar 14		A: Technical: Sensor Types and Hardware Overview in Mobility B: TNCs + On-Demand Debate	Assignment 2
	Mar 21	Sprint 4	*No Class*	
9	Mar 28		A: Introduction: Intentional Sensing, Purpose-Driven Sensing B: Research Presentation	
10	Apr 04		A: Understanding Situation Technologies B: Distrubuted "Non-Motorized" Debate	
11	Apr 11		A: Introduction to Graph and Network Science B: Research Presentation	Assignment 3
12	Apr 18	Final Sprint	*Guest: Bill Heinzen, NYC Deputy Commissioner for Policy*	Final Project Proposal
13	Apr 25	Future Sprint	Groups 1+2	
14	May 02		Groups 3+4	
15	May 09		Final Project Presentations	Final Project

Each class is thought of as two blocks: One instructor led, the other student led.