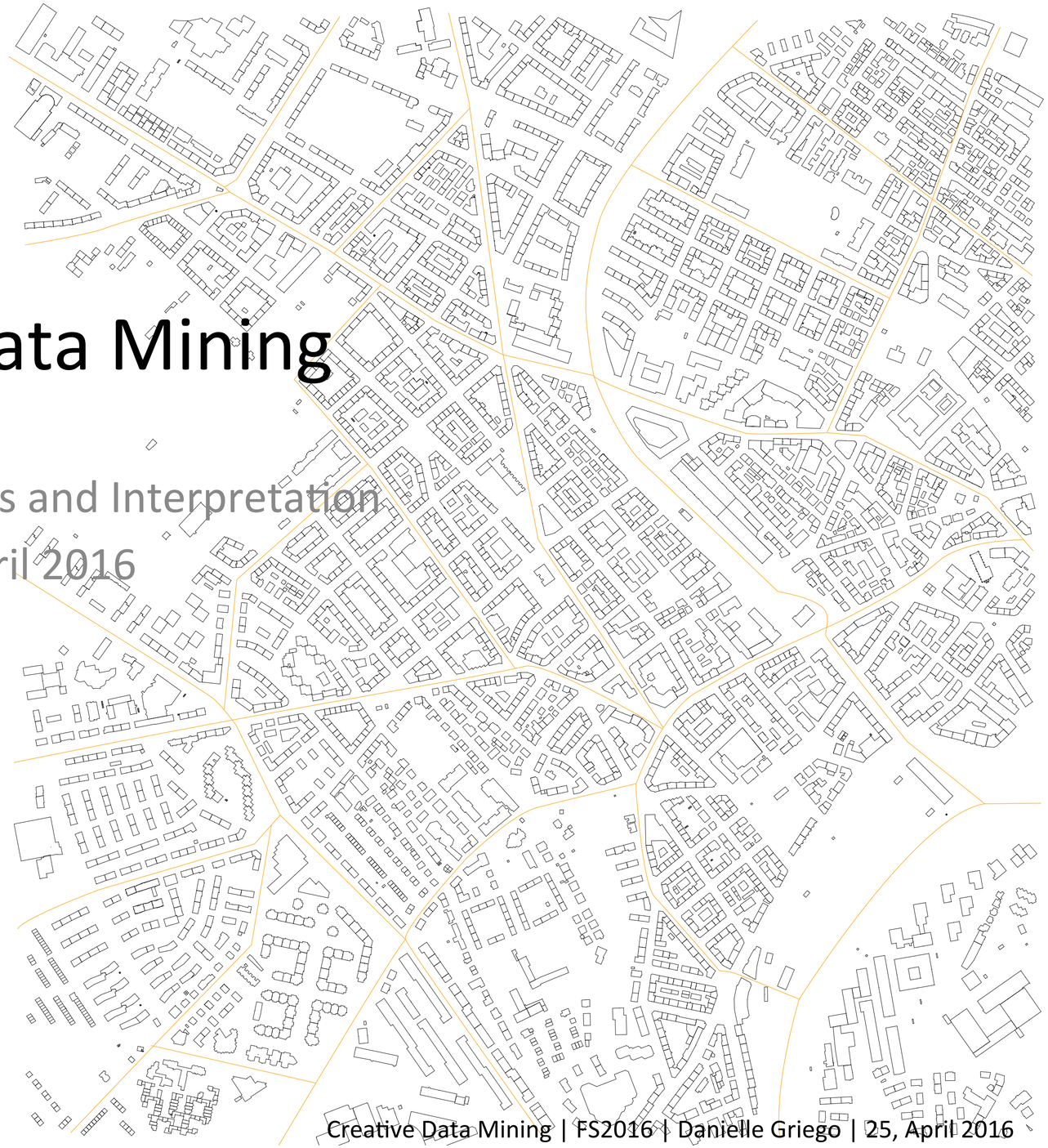
Creative Data Mining

Lecture 08: Analysis and Interpretation

25 April 2016



ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

DARCH iA Chair of Information Architecture

Overview

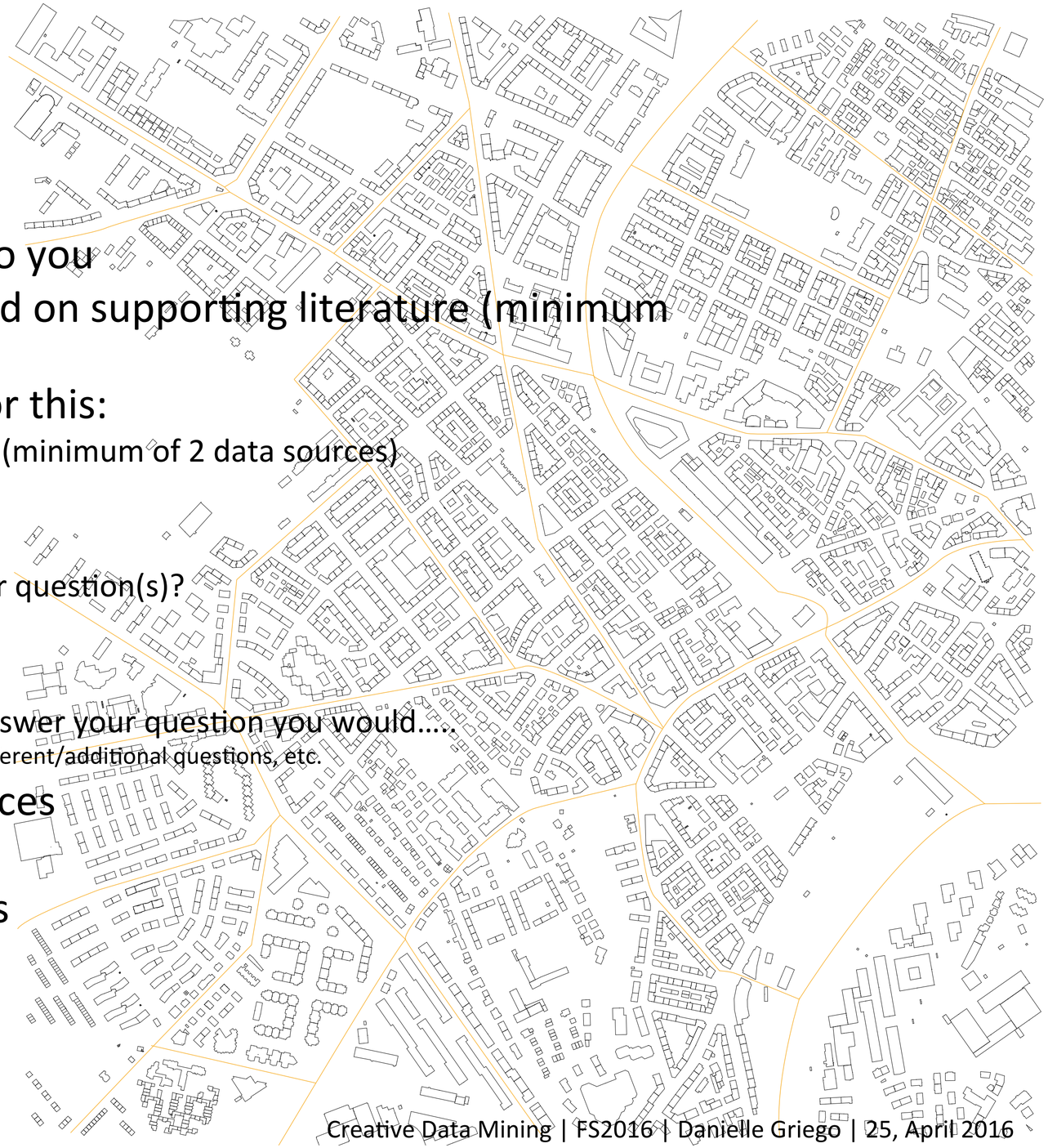
- The data is now available: http://www.ia.arch.ethz.ch/l08-analysis-and-interpretation/
- Additional thoughts from the experiment to assist with your final projects
- Workshop style course today: Q&A on your projects

Source:

Final Project Requirements

- Formulate 1-2 specific question(s) of interest to you
- State your hypothesis/expected outcome based on supporting literature (minimum one source) your expertise, and intuition
- Answer that question through your analysis, for this:
  - Select the best available data sources for your question (minimum of 2 data sources)
  - Include a time series and/or clustering analysis
- Summarize your results
  - Show a clear conclusion, does your analysis answer your question(s)?
- Conclusions
  - Lessons learned
  - If you had more time, if you were to run the study to answer your question you would…..
    - Collect additional data, have different types of participants, ask different/additional questions, etc.
- Also include sources of inspiration and references

<u>Update:</u> you may choose to pair-up and work in 2's



Example of a Project Question

1. How do citizens respond to the change in isovists (narrow to open) in an urban environment?
    1. We first need to check if people actually respond as expected at each path:
        1. Do the survey results show the expected experience of the path at each of the 5 instances of Open to closed?
        2. How do these vary for each of the 5 instances and at the varying intensities of the isovist analysis?

Verification points

1. How does each individual respond to survey question 9 and 14?
    1. Same exact point
2. How does each individual respond to survey question 8 and 13?
    1. Same intersection, different perspectives

Statistical check

- How does each path (network) and open space (node) compare to one another?
- Calibrate each person's BF
  - Perhaps use the first section as the baseline?

Source:

Additional research questions/Future work

- Temporary street-level visual barriers?
  - Has this been taken into consideration in urban isovist analysis?
  - Do we have enough information to estimate this? Best methods?

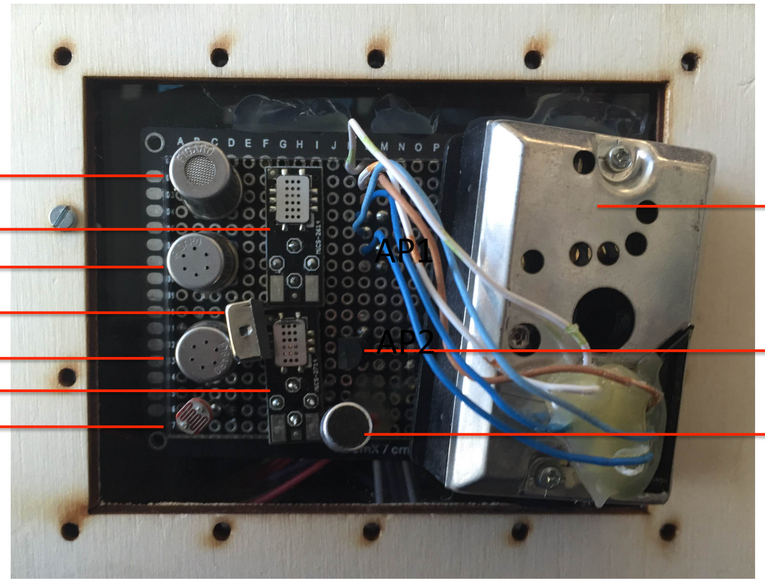
Source:

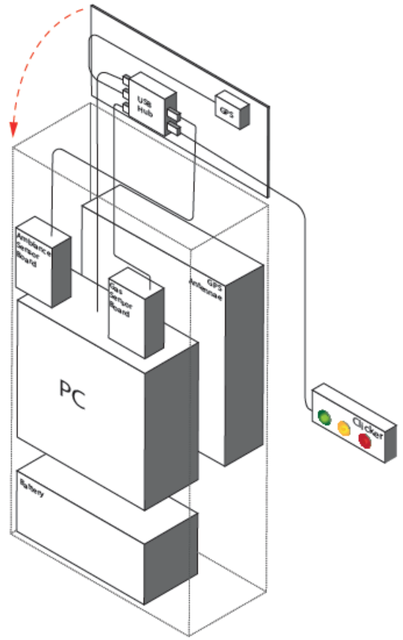
Lessons learned/ Recommendations for future studies

- Wear tennis shoes/soft soul shoes
- Program the app to time-out when no longer connected to the backpack (NUC or Meshlium down)
- Turn off hibernate mode on the NUC
- The biofeedback wristband works best when it is in record mode (no connection to the visualization app); if it is on then this can distract the participants
- You cannot predict the weather
- Always schedule more participants than you need, for backup/cancelation purposes
- Make an electronic form for the survey to reduce post-study data entry (ie survey monkey)

Source:

Sensorbackpack-Environmental Sensors





Sensors

Device	*Sensor/ Measurement*	*units*	*Measurement range*	*Measurement frequency*	*Accuracy*	*Response time*
WaspCity	Sound Pressure	dB	50-100 dB	0.4 Hz	±2.5 dB	Not Given
	Luminosity	%	0-100% (400- 700 nm)	0.4 Hz	Resistive sensor 20MOhm (Darkness) 5-20 kOhm(Light)	Not Given
	Dust	mg/m3	Typical 0.5V/(0.1mg/m3)	0.4 Hz	Operating supply voltage 5±0.5V	10±1ms
WaspGas	Temperature	C	-40 ~ 125 C	0.25 Hz	±2 C(0-70 C), ±4 C(<0 C, >70C)	1.65 seconds
	Atmospheric Pressure	kPa	15 - 115 kPa	0.25 Hz	<±1.5% V	20 ms
	Humidity	%RH	0-100% RH	0.25 Hz	<±4% RH (a 25C, range 30-80%), ±6 %RH(range 0-100)	<15 seconds
	O3/VOC	V - kohm	0.01 ppm	0.25 Hz		
	CO2	V - kohm	350-1000 ppm	0.25 Hz	44-72 mV variation between voltage at 350ppm and 3500ppm	90 seconds
	NO2	V - kohm	0.05 - 5 ppm	0.25 Hz	6-100 (typically 55, ratio between the resistance at 0.25ppm and in air)	30 seconds
	AP1(C4H10, CH3CH2OH, H2, CO, CH4)	V - kohm	1-100 ppm	0.25 Hz	Sensitivity: 0.3 ~ 0.6; includes	30 seconds
	AP 2 (C6H5CH3, H2S, CH3CH2OH, NH3, H2)	V - kohm	1-30 ppm	0.25 Hz	Sensitivity: 0.15 ~ 0.5	30 seconds
Meshlium Scanner AP	Wifi Scanner	MAC address	Wifi Scanner (50-200m) Bluetooth Scanner (20-30m)	push values @ 0.016 Hz	Measurement range depends on he antenna and line of sight to the device	60 seconds
	Wifi Scanner	AP		push values @ 0.016 Hz		
	Wifi Scanner	RSSI (Received Signal Strenght Indicator)	-40 dBm (nearest node) to -90 dBm (marthes nodes)	push values @ 0.016 Hz	distance of 10m ~=(50dBm), 50m ~=(75dBm)	
Mobile Device	GPS	Lat/Long	outdoor only	variable, dependent on device satellite connection		
	Survey	12 questions, scale -2 to 2	NA	At checkpoint		
GPS	GPS	Lat/Long	outdoor only	1 Hz		
Biofeedback Wristband	PPG (Photoplethysmography)	Sensor output: Blood Volume Pulse (BPV)		64 Hz	0.9 nW/Digit	
	EDA (Electrodermal Activity)		0.01 mSiements -100 mSiemens	4 Hz		
	Skin Temperature Infrared thermopile	C	-40-115 C	4 Hz	±0.2 C within 36-39 C	
	3 Axis accelerometer	x, y, z		32 Hz		

Survey

Source:

Visualizing data in QGIS

- Download QGIS: https://www.qgis.org/en/site/forusers/download.html
- Downloading the Openlayers plugin: http://gis.stackexchange.com/questions/12814/how-to-add-osm-layer-to-qgis
- Creating a raster image: http://gis.stackexchange.com/questions/80488/how-to-clip-an-openlayers-osm-background-to-a-vector-boundary