

Assignment #1 – due 2/6 – IN-CLASS HARD COPY

Urban Informatics for Smart, Sustainable Cities

Spring 2017

Prof. Kontokosta

NYU

A science of cities strives to develop universal, principled, and mathematically-derived laws of urban form and function. The work of Geoffrey West and others has established the potential existence of scaling across various urban functions and outcomes and population size. In addition to this work, there has been increasing interest in determining if there is an “optimal” city size and density. In other words, is there an ideal population size and density that will maximize the efficiencies of transportation systems, resource consumption, etc. and that will create the greatest outcomes in terms of quality of life metrics (safety, public health, economic equity, etc.)?

For this assignment, you are being asked to begin to explore this question by conducting a cross-sectional comparative analysis of U.S. cities with respect to carbon emissions. Climate change and sustainability are major challenges facing cities, and understanding possible relationships between city size and density and carbon emissions could reveal important lessons for city planning and design.

You will need to extract the following data:

-Urban population and population density from the U.S. Census for all cities/metro areas with populations greater than 100,000. Please note that the definition of a “city” is up to you: you may use MSAs, your own selected agglomerations of urban Counties, Primary MSAs, etc. You should justify your selection. You should use data from the 2000 decennial census to match the carbon data below.

-Per capita carbon emissions from the ASU Vulcan Project (<http://vulcan.project.asu.edu/>). This dataset provides County-level carbon emissions from multiple sectors. **You should download annual data for 2002** and “total” from the “sectors” option. You will **need to normalize total emissions by County** population. You will also need to aggregate multiple Counties to geographically align to your Census data for each city.

Your analysis should include the following:

1. Brief literature review on the effect of urban **population density on carbon emissions**
2. Data description and cleaning/normalization/**merge process**
3. Analysis to examine correlations between **city size, city density, and carbon emissions**
 - a. Scatterplots of relationships
 - b. Ranking of cities by per capita emissions
 - c. Linear (or nonlinear) bivariate correlation analysis
 - d. Additional charts/graphs/maps as you **see appropriate**
4. Discussion of findings and how they support **or contradict the possibility of an “optimal” city size**

Your write-up and analysis should be no more than 5 pages, not including charts/graphs.