CPLN 675 – Land use & Environmental Modeling

Instructors: Michael Fichman, MCP, Jamaal Green, PhD

**Final Project 2021: Urban Growth Modeling –** Due May 11th at noon Eastern

In anticipation of the region’s next large-scale comprehensive planning process, the local Metropolitan Planning Organization (MPO) has asked you to forecast urban development in 2021.

Your task is to find a region of interest[[1]](#footnote-1) and gather land cover data from the USGS[[2]](#footnote-2) and land use/population/development data from federal (census), state and local open data websites.

You will then construct a binary logistic regression model that predicts change in development from 2001 to 2011. You must employ the same goodness of fit metrics that we’ve used in the past. Spatial cross-validation is optional. You will then come up with two planning scenarios – one forecasting a supply change and one, a demand change.

1. **Demand-side change:** In this scenario, you will find or approximate 2021 population projections for your study area and then distribute the ‘new’ population among all the census tracts in the region[[3]](#footnote-3). You will use your population forecast and 2011 data to predict where new development will occur in 2021.
2. **Supply-side change:** In this scenario, you will “plan” a new large-scale development, like a new highway or public transportation line. You will draw this new development in ArcGIS or the mapedit package (if it requires new infrastructure) and you will briefly describe the nature of this new development (What is it? What kind of new demand do you expect it to generate?). Please be creative in how you design/describe your intervention. After drawing the new development, you will come up with some population projections for that area and forecast for 2021.

Keep in mind that once you have a model that gives, for each grid cell, the ‘probability of development’, you need to come up with an **allocation procedure**. Do you bulldoze all wetlands or just a portion? Should this portion be decided by county or by neighborhood? Be clear on your allocation procedure.

**Deliverables:**

**1) As a 2-person team**, your job is to prepare a planning memo communicating the planning rationale of the project, showing some exploratory maps/tables, presenting/discussing the data/feature engineering process, presenting model validation and results **in a 1000 word write-up with lots of data visualizations.** Please show your work (regression tables, confusion matrices /maps, etc.). You will be **judged on your ability to communicate this to planners.** The best approach is to relate ideas like development demand and allocation in a way that planners will understand. As always, bonus points for ggplot data visualizations/maps. Many of you should consider how this can be used as a portfolio item. Markdown is optional (but encouraged). Cross-validation (generalizability) tests are also optional.

**2) As individuals,** please prepare an 8.5” x 11” ‘poster’ that communicates the analysis. Use brief annotations, but try not to make it too wordy.

1. Find a region that isn’t totally built out. Make sure there is room for sprawl [↑](#footnote-ref-1)
2. You will need the *change data -* ‘[NLCD 2001 to 2011 Land Cover Change](http://www.landfire.gov/bulk/downloadfile.php?TYPE=nlcd2011&FNAME=nlcd_2001_to_2011_landcover_change_pixels_2011_edition_2014_10_10.zip)’; the *baseline 2001 data:* ‘[NLCD 2001 Land Cover (2011 Edition)](http://www.landfire.gov/bulk/downloadfile.php?TYPE=nlcd2001v2&FNAME=nlcd_2001_landcover_2011_edition_2014_10_10.zip)’; & the baseline 2001 data ‘NLCD 2011 Land Cover’ - https://www.mrlc.gov/nlcd11\_data.php [↑](#footnote-ref-2)
3. You have to come up with an algorithm to do this, but you can find an example in the markdown, Section 5.2. [↑](#footnote-ref-3)