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Assessing Neighborhood Change using Markov Transitions and the Importance of Data Classification

Data Classification can have a tremendous effect on the interpretation of results, particularly when dealing with spatial data. The concept of “lying with facts” can be observed in this analysis of demographic transitions in King County, Washington, USA.

The following analysis of demographic shifts in King County uses two sets of data classification; the first (Map 1) defines rates of demographic shifts by a low of 10% (L), 11 to 80% as medium (M), and 90%+ as high (H). This categorization conceals many demographic changes because the tails are too small, and not fit for the distribution of minorities in King County.

The histogram of the distribution of minorities across neighborhoods in the county (graphs 1 and 2) shows that the data skews positively – reflecting patterns of segregation found in the region. Therefore, the distribution of minorities throughout King County does not result in a normal distribution, and classifying a category medium as one that has from 11% to 89% minority proportion will keep certain demographic shifts under the radar.

Central District is an excellent example; aggressively gentrified over the past thirty years, data shows that all blocks had a shrinking minority population over the past 10 years, with many showing a decrease of as much as 21%. The classification used however, does not show substantial demographic change in a single census block in the Central District (map 1). Because the mid-range is so large, one of the blocks (OID_ 1261) that experienced a change from 67% to 46% for example, is coded as a medium-to-medium minority shift.

A better categorization

By standardizing the data using z-scores, a better depiction of the changes is achieved. A z-score of 0 - the mean – represents a 30 % minority, with a standard deviation of 18%. Anything below a z-score of -1 (or 12%) is considered low range. Values within a z-score of -1 and +1 are medium (12% to 48%) and above a z-score of +1 (48%+) are within the high range.

The second map (map 2) employs these range classification; as a result, it shows more demographic shifts and portrays the intensity of these shifts more accurately. It shows the gentrification in the Central District, and more accurately showcases the higher concentration of minorities in the suburbs, away from the city core – a common recent trend in U.S major cities

Matrices

1) Probability Matrix

Based on: Low <10%, Medium at 10% to 89.99%, High at 90% or more.

2010 State of Proportion Minority

Observed Counts	2000 State of Proportion Minority			Total
	(1) Low	(2) Medium	(3) High	
(1) Low	115	162	0	277
(2) Medium	6	1130	2	1138
(3) High	0	4	2	6

2) Transition Matrix

Based on: Low <10%, Medium at 10% to 89.99%, High at 90% or more.

2010 State of Proportion Minority

2000 State of Proportion Minority	2010 State of Proportion Minority			
	(1) Low	(2) Medium	(3) High	
(1) Low	0.4151	0.5848	0	1.0
(2) Medium	0.0052	0.9929	0.0017	1.0
(3) High	0	0.6666	0.3333	1.0

1) **Probability Matrix**

Based on: Low <12%, Medium at 12% to 47.99%, High at 48% or more.

2010 State of Proportion Minority

Observed Counts	2010 State of Proportion Minority			Total
	(1) Low	(2) Medium	(3) High	
(1) Low	198	202	0	400
(2) Medium	6	762	126	894
(3) High	0	13	114	127

2) **Transition Matrix**

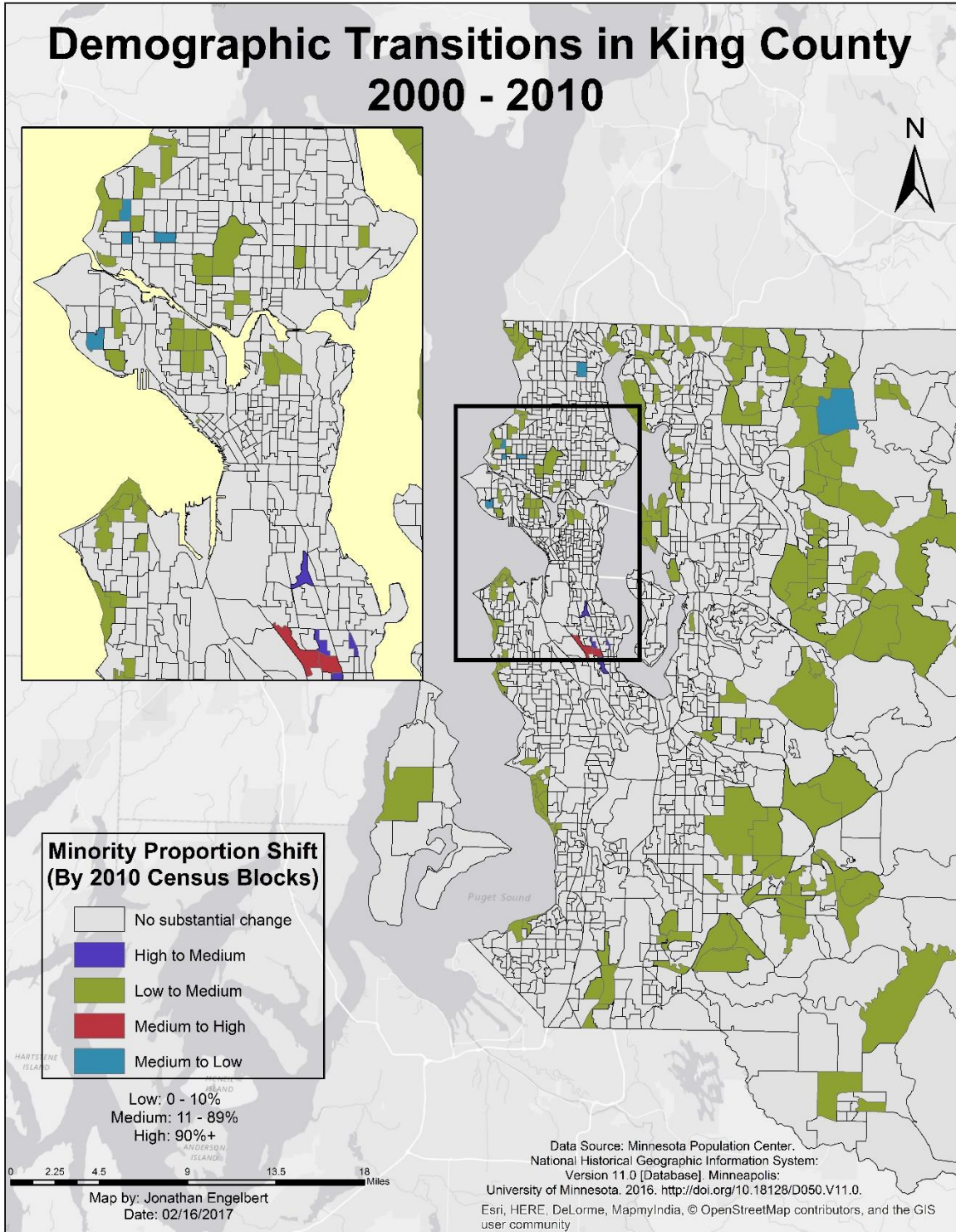
Based on: Low <12%, Medium at 12% to 47.99%, High at 48% or more.

2010 State of Proportion Minority

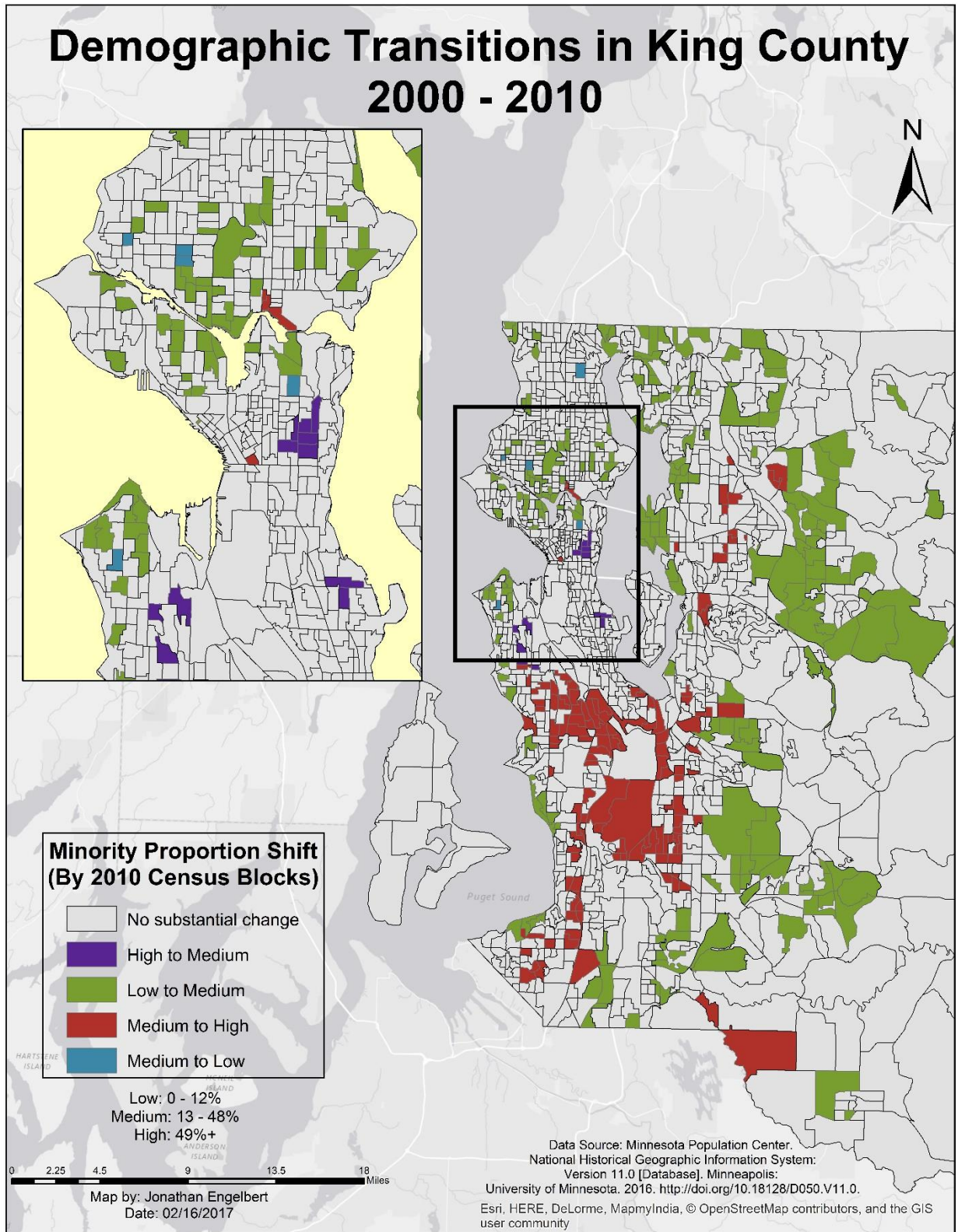
2000 State of Proportion Minority	2010 State of Proportion Minority			
	(1) Low	(2) Medium	(3) High	
(1) Low	0.495	0.505	0	1.0
(2) Medium	0.0052	0.9929	0.0017	1.0
(3) High	0	0.1023	0.8976	1.0

Maps

Map 1: Based on: Low <10%, Medium at 10% to 89.99%, High at 90% or more.

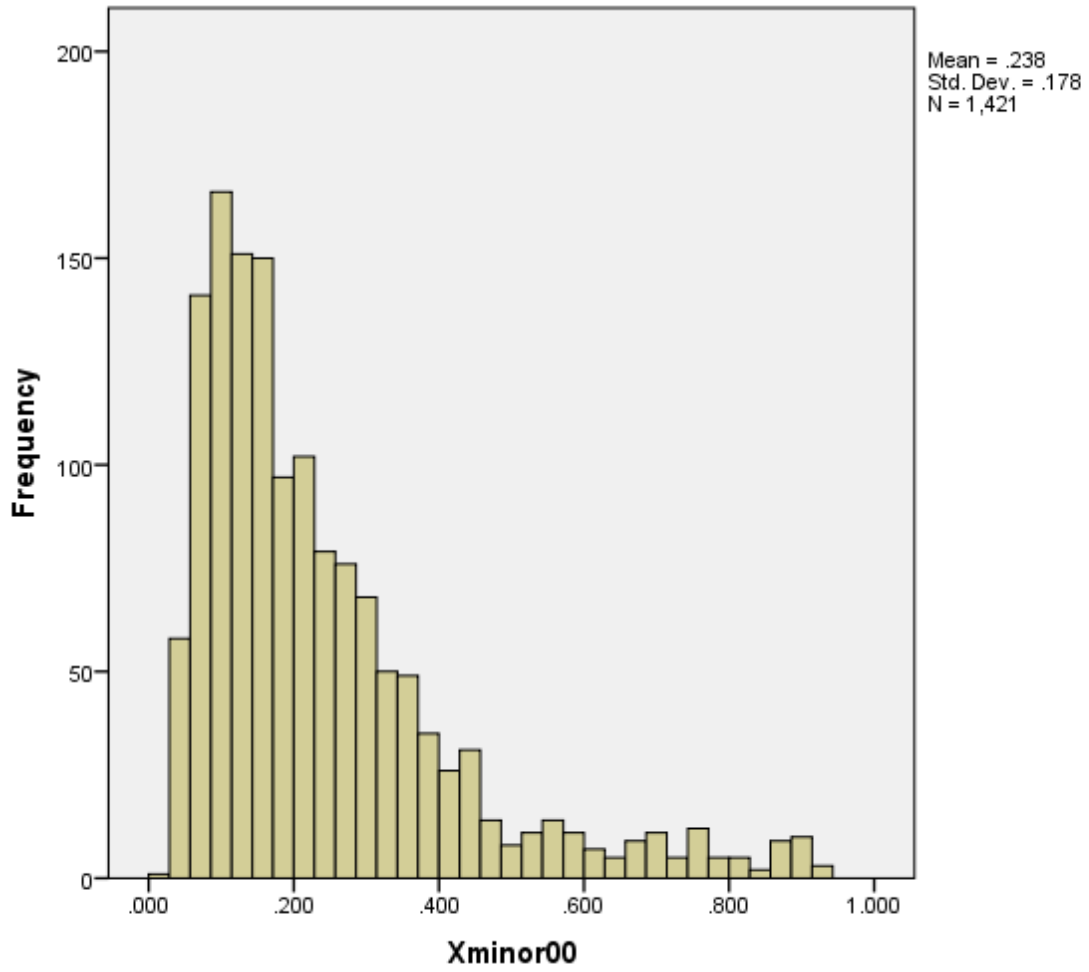


Map 2: Based on: Low <12%, Medium at 12% to 47.99%, High at 48% or more.



Graphs

Graph 1: Minority distribution across King County in 2000



Graph 2: Minority distribution across King County in 2010

