# Poverty in the Heartland

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## Data:

A collection of governmental ACS (American Community Survey 2008-2012) census data was used in this research. The data has several columns in which it includes statistics for housing, income, demographics, socioeconomic factors, and number of persons living in poverty. The rows of the data is a single block group. We intend to find a correlation to poverty in Metropolitan areas of Nebraska and Iowa.

## Definitions:

Poverty: As determined by the US government in 2012. Any single household in which earns $11,170 per annum or less and an additional $3,960 per added resident

Metropolitan Statistical Area (MSA): A metro area contains core urban areas of 50,000 or more population.

Principal city: The largest city in a MSA and additional cities qualified if specified requirements are met concerning population size and employment.

Urban: Any block contained within a MSA and contained within a principal city.

Suburban: Currently, there are several classifications about suburban areas. We have defined suburban as any block contained by a MSA but outside of the principal city.

Block: A census block is the lowest level of geographical information that the US Census Bureau uses for data collection. There currently exists over 11 million subdivided sections in the United States.

## Motivation:

There exists significant differences in the profiles of suburban and urban populations in and around the metro of Omaha Nebraska. Over the last several decades there have been governmental and privatized movements in attempting to end poverty, to date; none of them seem to have any major effect. It is our ambitious goal of delivering visualized data, and eagerly expect to assess causal and definitive variables in which could be utilized in a prescriptive approach to poverty.

## Tools:

Our model was constructed in an iPython notebook using both python and R code.

Choropleth maps were produced using d3 and model visuals were produced using ggplot.

Urban/suburban coding was taken from arcGis shapefiles. Census Block Group shapefiles were converted to GeoJSON using ogr2ogr.



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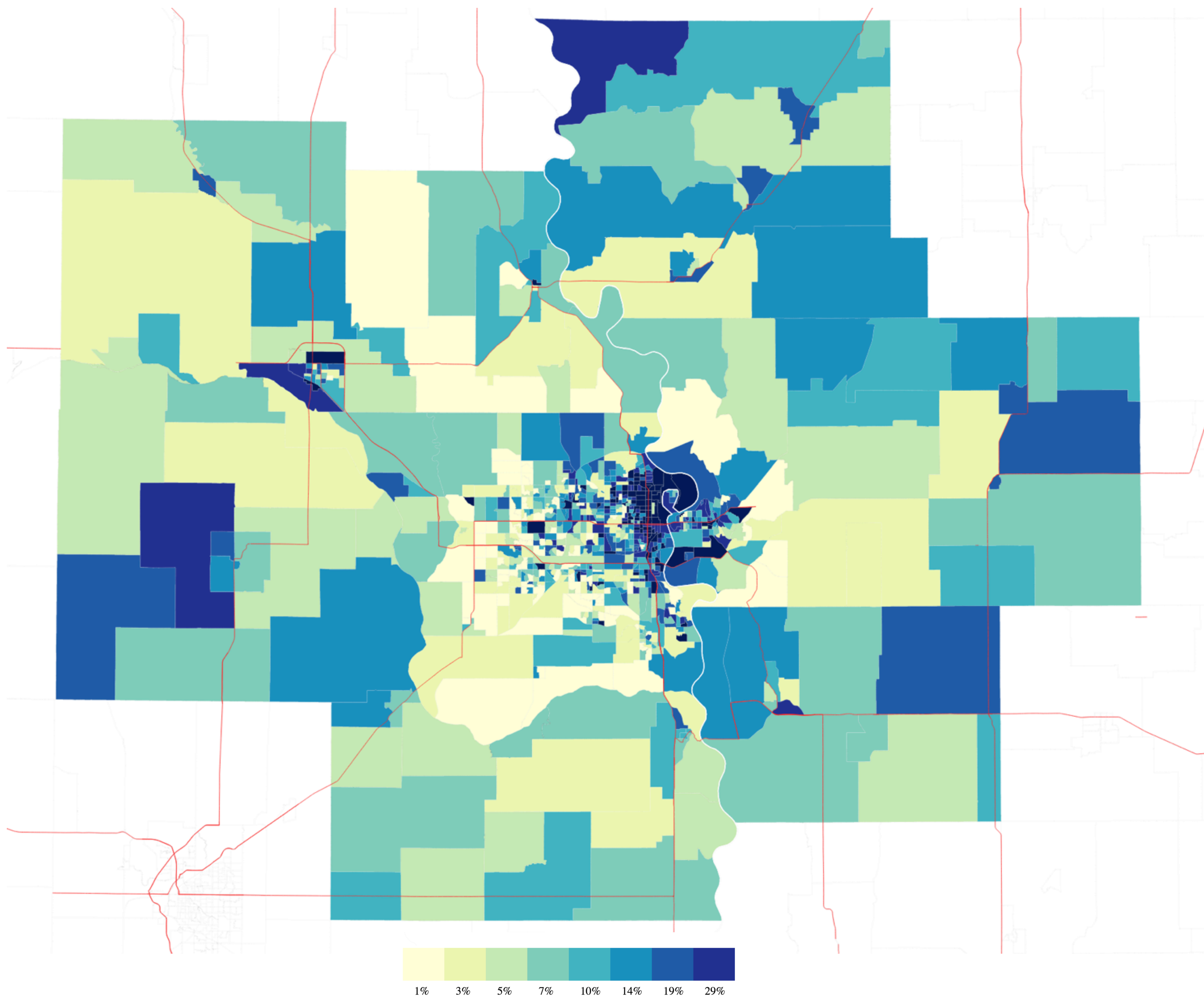
### Poverty in Omaha and Council Bluffs:

Above is a choropleth map of Omaha metropolitan area. Regions of Southeast Omaha, South Council Bluffs, and North Omaha have the most prevalent level of poverty. Papillion, La Vista, and west Omaha are most affluent. There are several regions of high poverty outside of the metro area. The qualities of this poverty are likely to be very different from inner city poverty, yet both contribute to the overall poverty rate.



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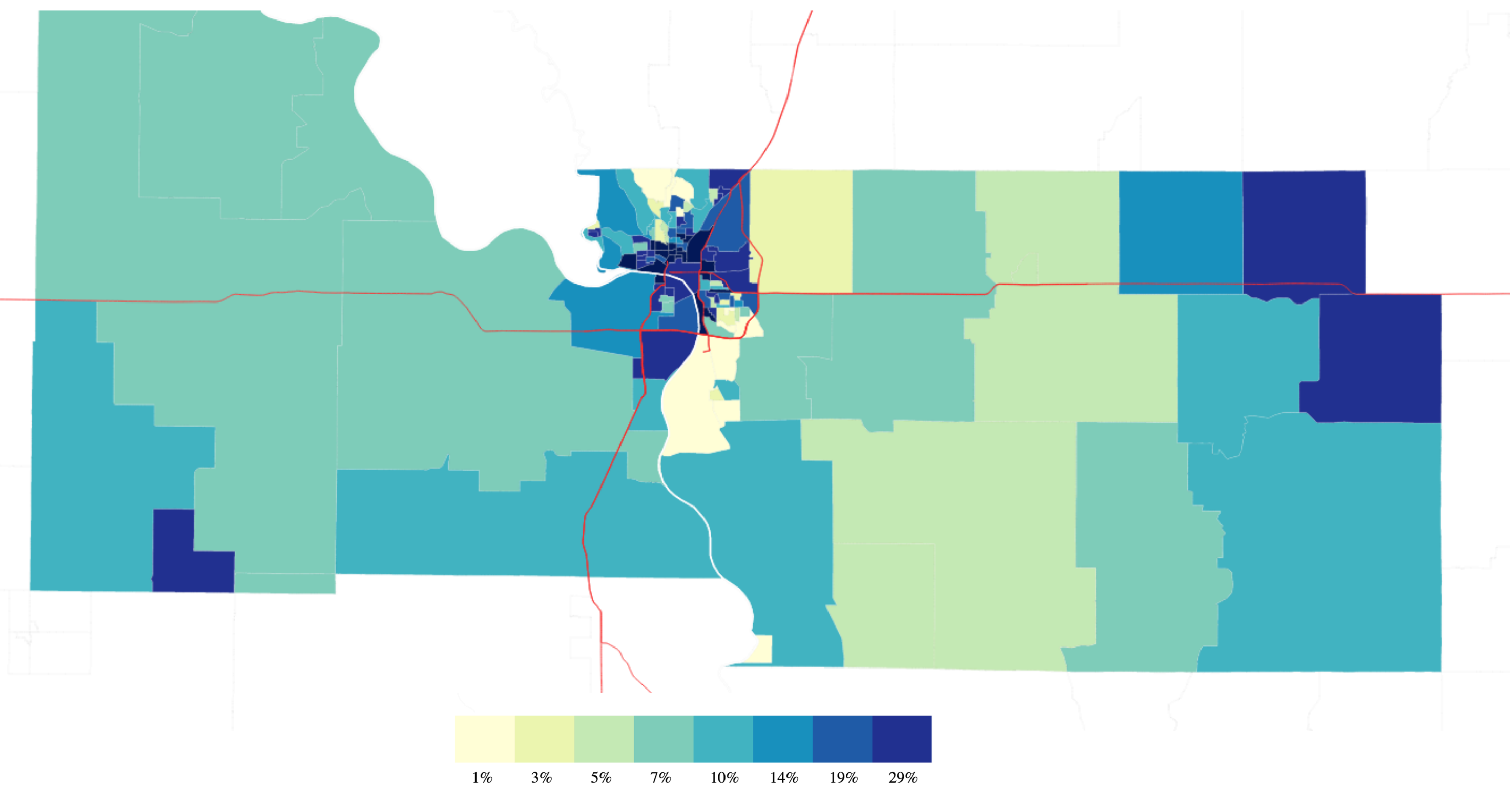
### Poverty in Sioux City:

There are three instantly noticeable observations that can be made. Sioux City, Nebraska has a very evenly distributed level of poverty. Downtown Sioux City, Iowa has a dense poverty population. Lastly, the suburbs in east Sioux City are an apparent affluent part of Sioux City.



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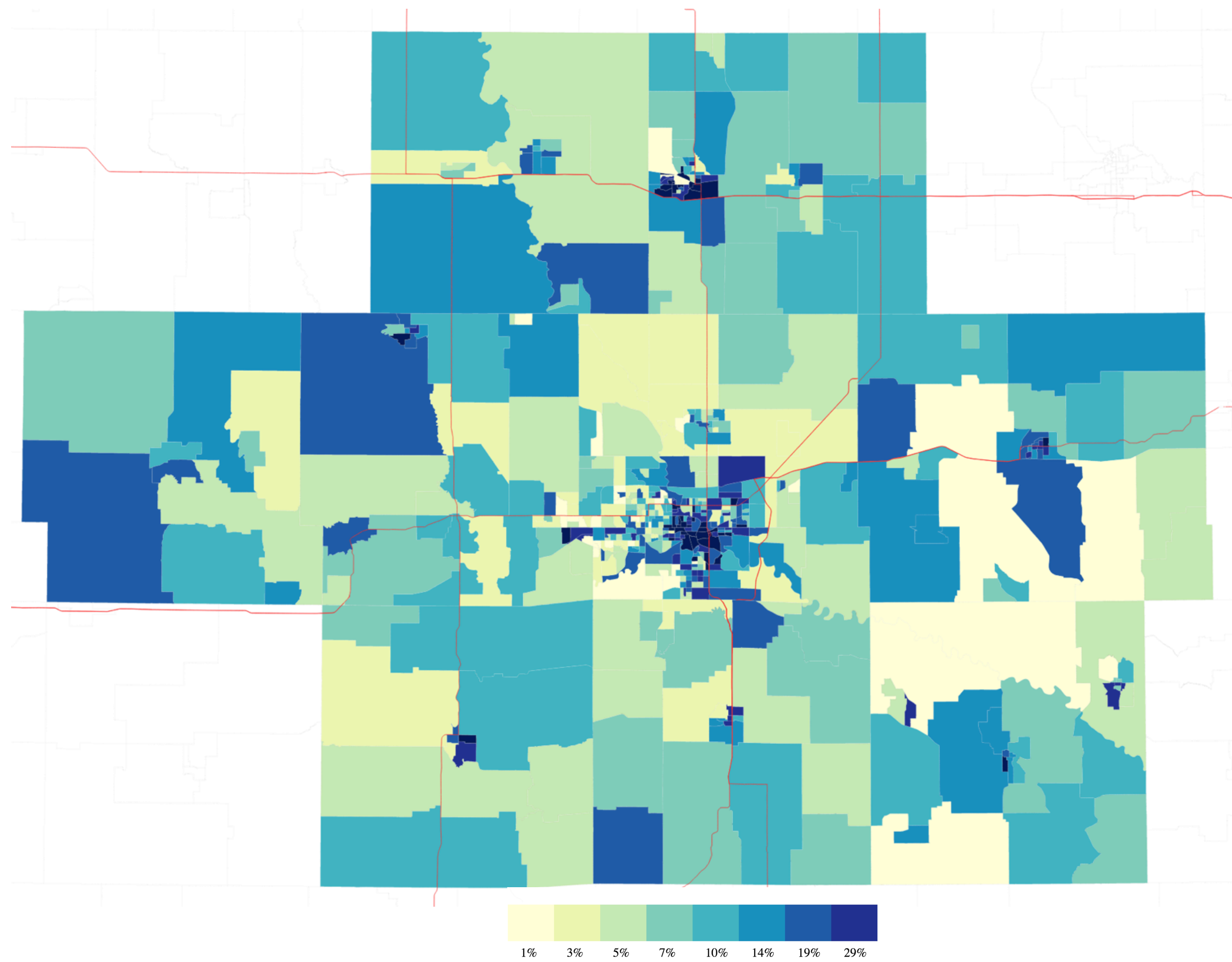
### Poverty in Des Moines:

The central region of Des Moines contains the most predominance of poverty. It appears that by moving further from downtown the poverty levels becomes scattered. The area of West Des Moines is the most affluent.

## Model:

Our model utilizes a binary indicator variable and a separate interaction term for each model parameter. We use standardized variables with a lasso penalty to perform some initial variable selection.

$$Log(\frac{y_i}{1-y_i}) = \beta_0 + \sum_{j=1}^{p} \beta_{(j,1)} x^*_{(i,j)} + \sum_{j=1}^{p} \beta_{(j,2)} x^*_{(i,j)} x_{(i,urban)}$$

$$x^*_{i,j} = \frac{x_{i,j} - \bar{x}_j}{\sigma_{x_j}}$$

### Model Results

To the right is a bar graph, presenting the relative effect of each covariate on the poverty rate.

"Married Households" and "College Graduates" are strongly correlated with lower poverty rates, in both urban and suburban areas.

"Crowd Occupied" housing, that is households with more than one person per room, is very strongly correlated with poverty.

The differences between urban and suburban areas are most distinct where parameter estimates diverge in sign. For instance, a higher population of males is associated with poverty in urban areas but not in suburban areas.

There are several obvious correlations with poverty confirmed, such as with mobile home occupation, denser housing, and lack of high school education.