GIS & SPATIAL ANALYSIS - SOC SCI, 2023

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Homework 3: Centro Graphic Statistics

Using the USA census tracts shapefile, I converted the tracts to centroids and selected those within the contiguous U.S. I then saved this data using the North America Albers Equal Area Conic CRS, setting the stage for deeper analysis. Upon encountering missing values labeled "-99" for the 2009 population, I replaced them with the respective mean values to maintain data integrity during spatial mean and standard deviational ellipse calculations. Next, I explored the 2009 population data and, with it as a weight, determined both its mean center and standard deviational ellipse. Subsequently, I analyzed the demographic of those aged 65 and over in a similar manner and observed distinct differences between the two groups. Expanding the study, I investigated the distribution patterns of Black Americans and noticed marked disparities when compared to both the senior population and the general populace of 2009. The map below illustrates these findings, highlighting the mean centers and their respective ellipses:

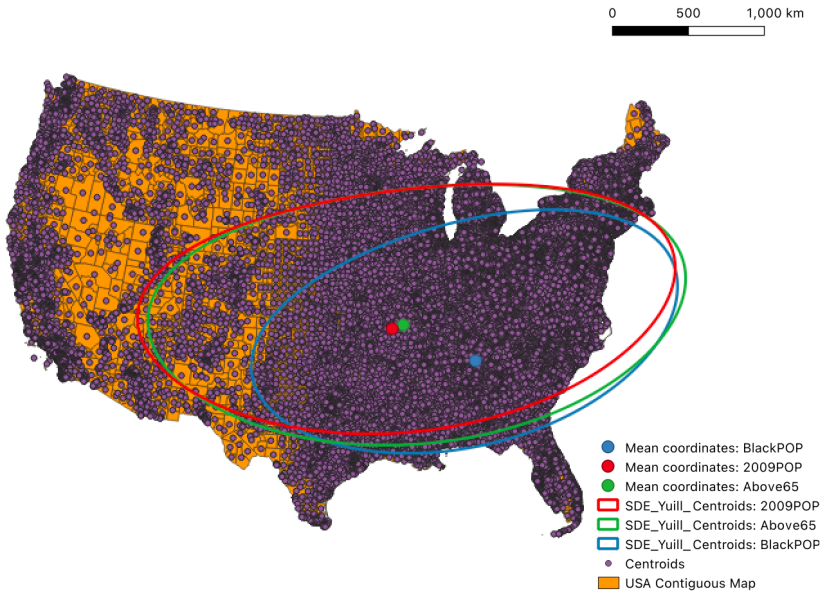

Figure 1 Mean Centers and Standard Deviational Ellipses for the 2009 US Population, Elderly, and Black Americans.

The map displays the contiguous United States densely populated with purple centroids, overlaid with colored ellipses representing different demographic datasets: a red ellipse for the 2009 total population, blue for those aged 65 and above, and green for the Black American population. Accompanying these ellipses are respective mean center points in blue, red, and green. An orange outline delineates the USA's boundary, and a scale bar at the top provides distance context, spanning 0 to 1,000 kilometers. This visualization encapsulates the spatial distribution and central tendencies of these demographic groups across the country.

Upon examining the map, the ellipses and their respective mean centers elucidate spatial distribution tendencies for each demographic group. The centroids densely populate the map of the contiguous United States, with a more concentrated distribution in the eastern half and along the coastal regions. In contrast, the central-western and mountainous areas display a sparser distribution of centroids. The red ellipse, representing the total population in 2009, is broad and slightly tilted towards the southeast, indicating a wider distribution with a center leaning eastward. In contrast, the blue ellipse for those aged 65 and above is narrower and more vertically oriented, suggesting a tighter clustering along the north-south axis. The green ellipse for Black Americans is distinctively oriented towards the southeastern part of the U.S., corroborating historical population settlements. The mean center points of each group align well within their corresponding ellipses, providing a central reference for the spatial distribution of each demographic.

Below are the relevant maps to see the data more clearly:

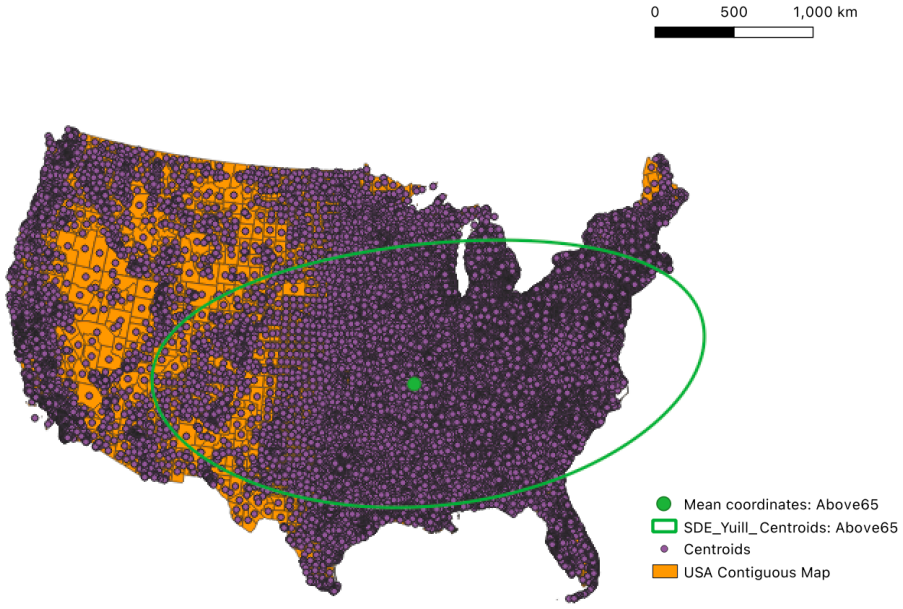

Figure 2 Mean Centers and Standard Deviational Ellipses for the Elderly

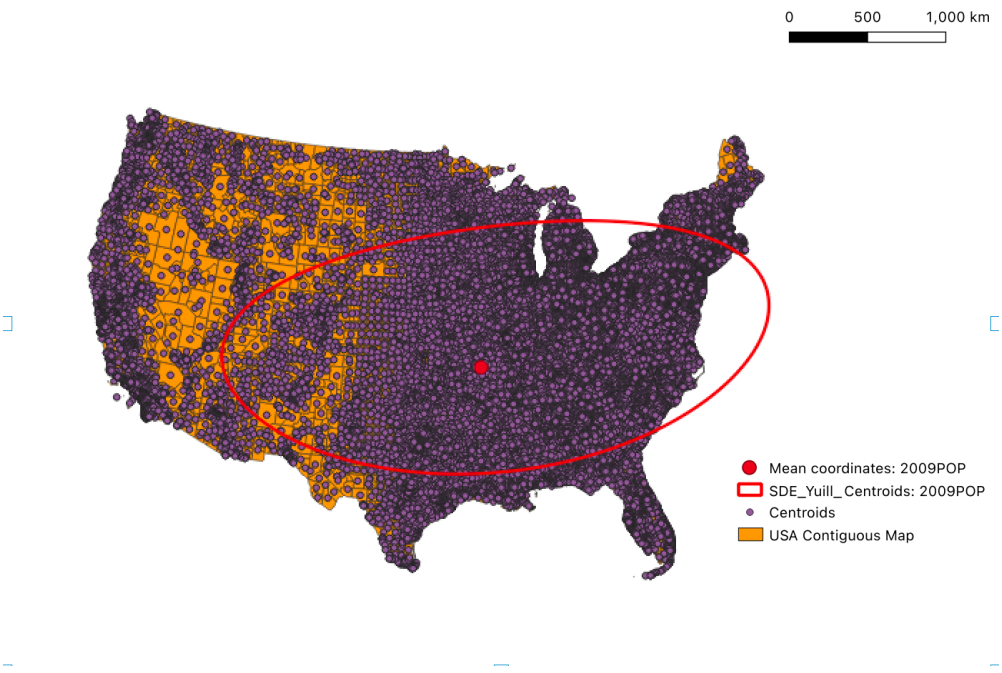

Figure 3 Mean Centers and Standard Deviational Ellipses for the 2009 US Population

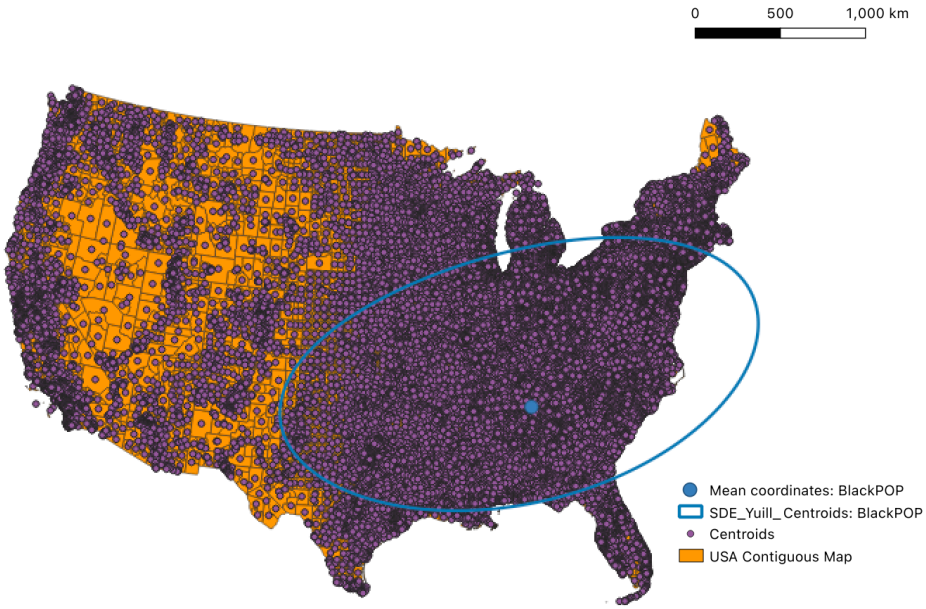

Figure 4 Mean Centers and Standard Deviational Ellipses for the Black Americans

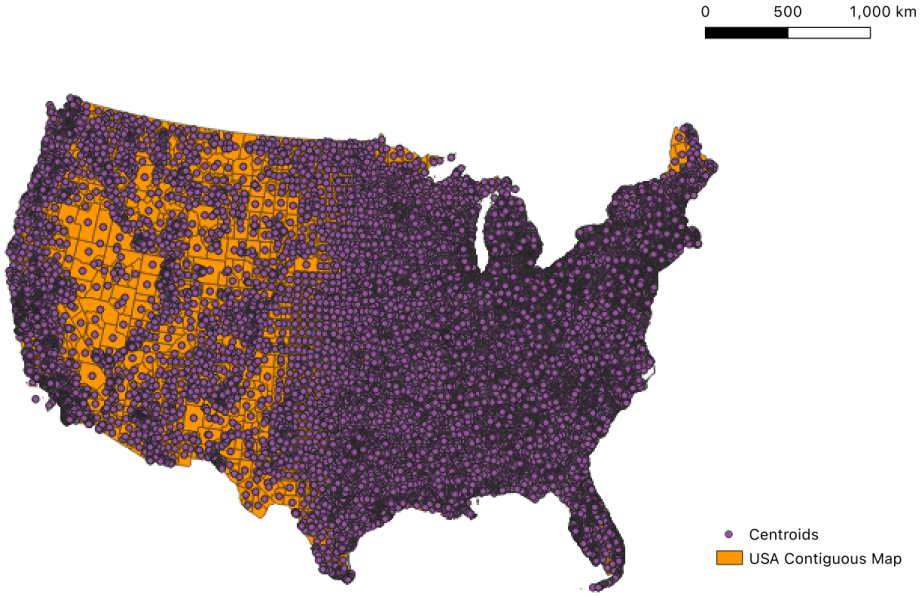

Figure 5 USA Contiguous Map and Centroids