We set out to evaluate whether or not police use of force, in response to suspected criminal activity, could be predicted probabilistically by key demographic variables and other census data. For instance, what is the relationship between socioeconomic status—i.e. poverty rates, workforce participation rate, population density, and unemployment rates—by council district, with police use of force? Ultimately, we hoped to develop a model that could explain how variation in those key demographic variables could predict, probabilistically, a use of force incident.

We utilized opensource data on the city of Austin from the state government’s archives. For our statistical analysis we utilized data from an annual crime report from 2015, use of force records from 2015, and socioeconomic census data from 2015. We also found geojson maps of the council districts and census tracts in Austin, and intended to overlay elements of our analysis on the map utilizing geopandas.

After careful consideration we decided to evaluate two different models. The first was a standard regression model, evaluating how a number of socioeconomic variables relate to rates of criminal activity. Regressing criminal activity (“crim\_frequency”) on [……………..] we found clear, statistically significant relationships between the covariates and our dependent variable. Our R^2 score, (.84), suggests that our model accounts for a significant amount of variation in rates of criminal activity by council district. While the coefficient estimates attached to our independent variables are quite small, they are each statistically significant. Our F-statistic, where P > F = 0.000, also corroborates our theory and provides grounds to reject the joint null hypothesis that the model has no explanatory power regarding variation in criminal activity.

In our second model, we ran a probit regression, regressing use of force (a binary) on a similar set of key demographic and socioeconomic variables as our first model. While the p-values on our coefficient estimates suggest that each variable in the model was statistically significant, their “economic” significance and magnitude must be interpreted with greater caution.

**Analytical Hurdles & Other Issues:**

While both models are valid and statistically significant, our analysis was hampered by some inconsistencies in the reporting and recording of use of force and annual crime data. For instance, of more than 40,000 criminal incidents and greater than 1,600 use of force incidents, only about 10% of those have common data. This severely restricted the sample size in our probit model, and thus the type and sort of variation in each independent variable. With more shared data between the two data sets, we would have more precise coefficient estimates and a better sense for the strength and magnitude of the relationship between use of force and key demographic data.

**Questions for Further Analysis:**

* What factors outside of those considered in our models are the strongest predictors of UF incidents?
  + While there is clear correlation between district levels of education, poverty, criminal activity and use of force, none are individually, nor collectively, robust predictors of UF incidents according to our analysis.
* Why are there so few use of force incidents with common data in the overall records of criminal activity?
  + The majority of UF incidents don’t meet the threshold for being classified as a crime by APD.
    - UF incidents are simply more likely to occur with ‘gentle’ incidents
    - A UF incident occurs, and because it occurs the crime is not committed.
    - UF incidents preclude situations from turning into incidents reported as crimes.
  + Shoddy data collection and reporting
* What factors outside of those considered in our models are the strongest predictors of UF incidents?
  + While there is clear correlation between district levels of education, poverty, criminal activity and use of force, none are individually, nor collectively, robust predictors of UF incidents according to our analysis.