BIAS DETECTION VIA DEMOGRAPHIC VIEW OF POLICE ACTIVITIES IN BOSTON

JACOB LEVY, ADNAN IBRIC, MAXIME HULLINGER
EPFL

ABSTRACT

Through this project, we expand upon the issue of racial bias in police behaviour by relying on The Police Data Initiative which promotes accountability between communities and the law enforcement agencies that serve them. To do so, we rely on a combined dataset of census and police records to study how unevenly stops in the city of Boston were taking place.

When analyzed, this dataset revealed that African-Americans where being stopped consistently through time at rates greater than the ones at which they were present in the census area and that they took place despite African-Americans earning more than the median income or being employed at higher rates than the metropolitan average.

American Communities Survey Data (2010)

Contains a set of socio-demographic aggregated indicators for all US mainland territories as well as the corresponding geostatistical framework needed for our study. Among all available information, we extract the following for the city of Boston.

☑ **Geostatistical data**:
   Grid of 204 census tracks with median track area of 1.52 km^2
☑ **Socioeconomic data**:
   Median/std income per capita per census track and per ethnicity.
☑ **Demographic data**:
   Total population per census track and percentage of population by ethnicity.
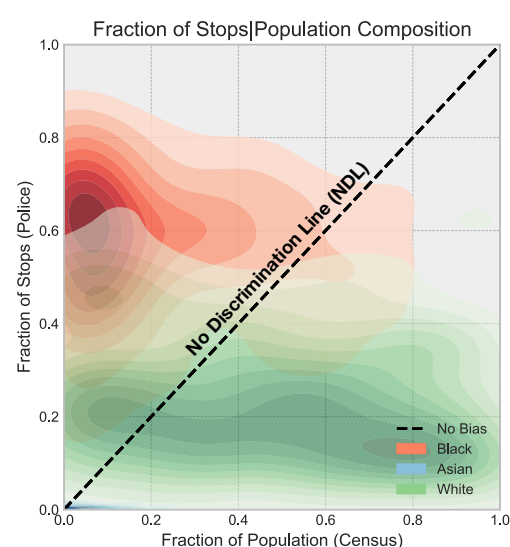
Boston Police Stops (2011-2015)

Encompasses a wide range of interaction between the Boston Police Department (BPD) and private individuals. Specifically this corpus records 152,230 stops mades but Boston Police officers between January 2011 and June 2015. Information contained:

☑ **Individual data**:
   Officer and supervisor's ID + race of stopped citizen
☑ **Stop data**:
   Textual address of street where stop happened, type of stop (interrogation/ search…), hour of the day when the stop happened

Data combined by placing each stop within corresponding census track giving access to the demographic composition of the area where the stop happened.

Bias Detection

H0 (no bias): Fraction of stops per race should follow the rate at which that population is present

Results:
☑ African-Americans are being stopped at rates significantly greater than the rate at which they are present.
☑ Asians are consistently below the NDL at different concentrations.
☑ Caucasians are over-stopped only when they reside in areas where they represent less than 20% of the population.
☑ Above that threshold, center of mass shifts under the NDL.

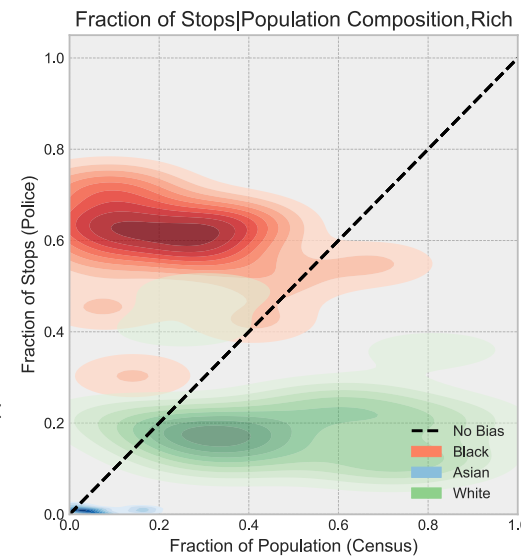Fraction of Stops|Population Composition

Bias+Socioeconomic Status (SES)

H0 (OK bias but due to SES inequalities): Fraction of stops per race should follow the rate at which that population is present when median income is above average for all ethnicities

We now select stops only occurring in areas where the income per capita is above the national average for all races.

Results:
☑ African-Americans are still being stopped at rates significantly greater than the rate at which they are present.
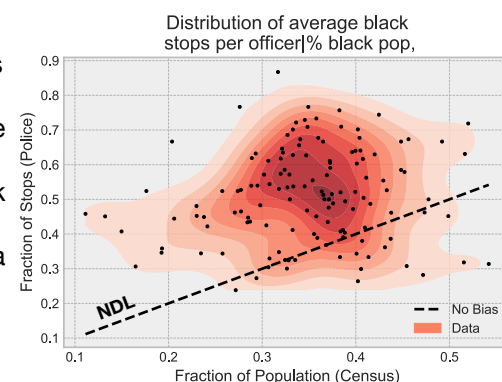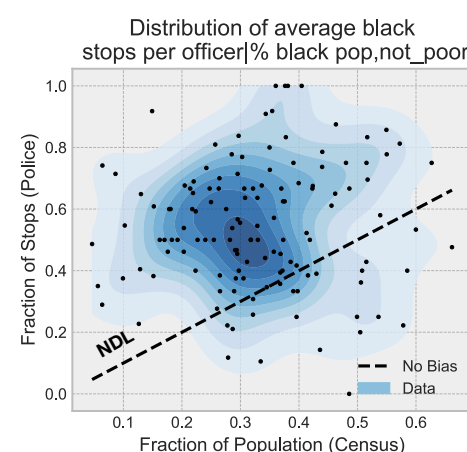☑ Asians and Caucasians stop distribution now well below the NDL.

Bias in police stops even when controlling for socioeconomic inequalities

Fraction of Stops|Population Composition,Rich

Structural Analysis of Bias

H0 (OK real bias but due to some few bad officers): Bias observed so far is a result of a reduced set of officers which actions shift the distributions above the NDL.

Methods:
☑ Focus on stops involving White/Black Citizens
☑ Aggregate per officer ID
☑ Get officers in the upper 25% of the distribution of stops/officer
☑ Officer data placed in plane (% black population, % stops)
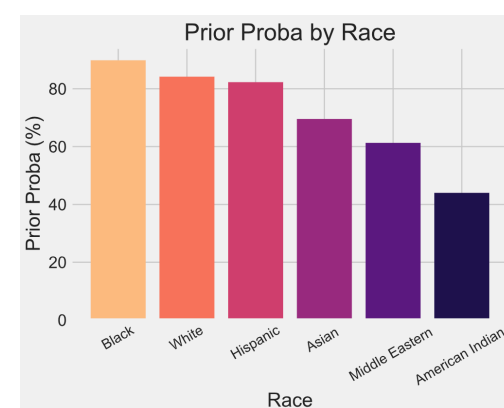☑ Position: average of officer stop data weighted by his/her #stops

Distribution of average black stops per officer|% black pop,

Distribution of average black stops per officer|% black pop,not_poor

Results:
☑ Most officers stop African-American citizens at a greater rate than they are actually present within the population
☑ Trend still observed when considering only stops made by officers within census tracks where both population hold above median income

Bias is encoded at the finest grained level of the judicial system, that is at the officer level.

Full Picture is a bit more complicated …

☑ Results don't account exclusively for cognitive biases in the way police officers carry out their stops
☑ Other systemic issues are also masked within these distributions
☑ Analysis of probability that a stopped individual has prior arrest records given his race.
☑ >85% of stopped Black individuals ethnicity hold a prior judicial record.
☑ Issues in judicial system as a whole

Prior Proba by Race

CONCLUSIONS

- Combined dataset of census and police records to study how unevenly stops in the city of Boston were taking place
- Analysis revealed that African-Americans were being stopped consistently through time at rates greater than the ones at which they were present in the census area and that they took place despite African- Americans earning more than the median income or being employed.
- Not only to issues in how police treat differently citizens according to their race but also recursive issues in America's justice system as a whole