U.S. Census Return Rate Challenge

Finished

Friday, August 31, 2012 $25,000 • 243 teams Sunday, November 11, 2012

Dashboard ▼ Prospect - U.S. Census Return Rate Challenge

Census Visualization Competition

We are looking for interesting/insightful visualizations of census data, especially involving return rates. The sponsor will choose a winner from among the top-voted entries.

The prize is $1000.

Note that there is no data limitation as there was for the prediction competition-- you can make your visualization out of anything.

The restriction that only US citizens or residents can win money still applies, but we welcome anyone to post their visualizations.

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Winner:

The winning visualization entry is "Interactive Visualization of Census 2010 Response Rates" (http://www.geoscore.com/).

Congratulations to Seth Spielman and David C. Folch, both of Boulder, Colo., and Charles R. Schmidt of Bethlehem, Pa., and thanks to everyone for your entries.

Submissions

Please log in to make new submissions

A Closer Look at the Kaggle Census Data
19 votes Proposed by quassi

County Maps of Return Rate and Related Variables
10 votes Proposed by Andrew Landgraf

Interactive Visualization of Census 2010 Response Rates
10 votes Proposed by pipila

Treemap of Census Return Rates by Demographics
4 votes Proposed by kubqr1

Maps And Projections
2 votes Proposed by Alec Stephenson

A Closer Look at the Kaggle Census Data

by the Big Data Social Science @ Penn State Team

This has been edited from an earlier version.

Our team focused, in part, on efforts to understand the social process of "census mail return," as well as the complexities of the operational choices and other procedures that are part of the data generating process. We found anomalies. Some of these have modeling and predictive consequences, while some of them appear to [but probably do not] create minor violations of confidentiality.

Some data have incorrect values

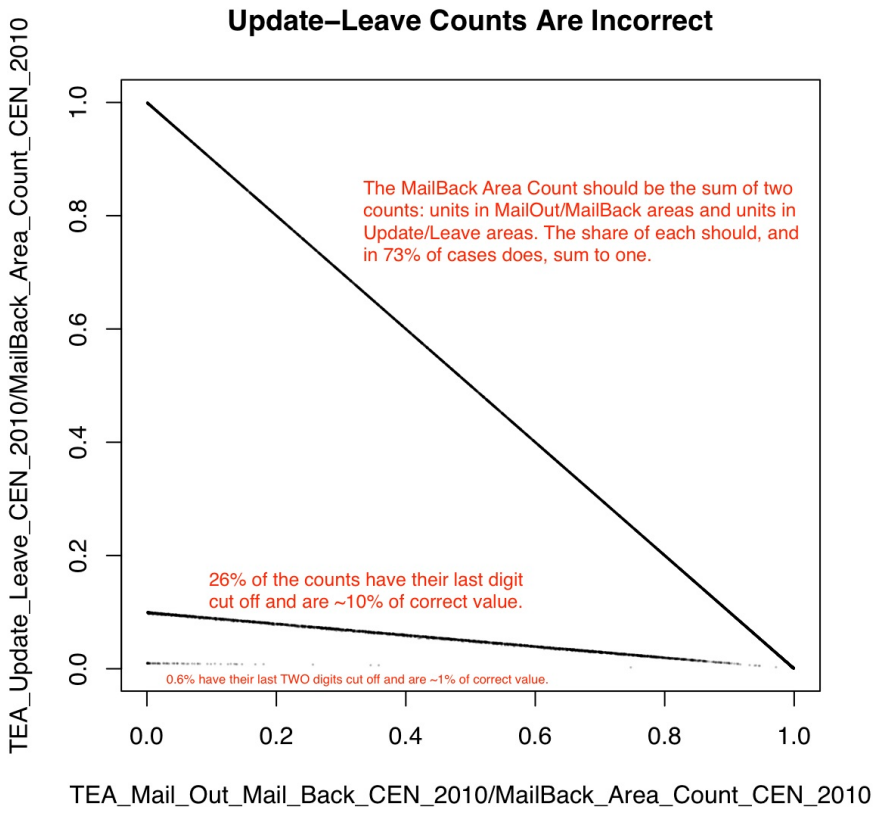
It appears, for example, that at least one key operational variable was simply truncated in about a quarter of its entries.

This was substantively important for the challenge, as the designation of "Type of Enumeration Area" captures prior expectations about the probable success of different mail return operational choices.

Clustering census variables
1 vote — Proposed by OldMilwaukee

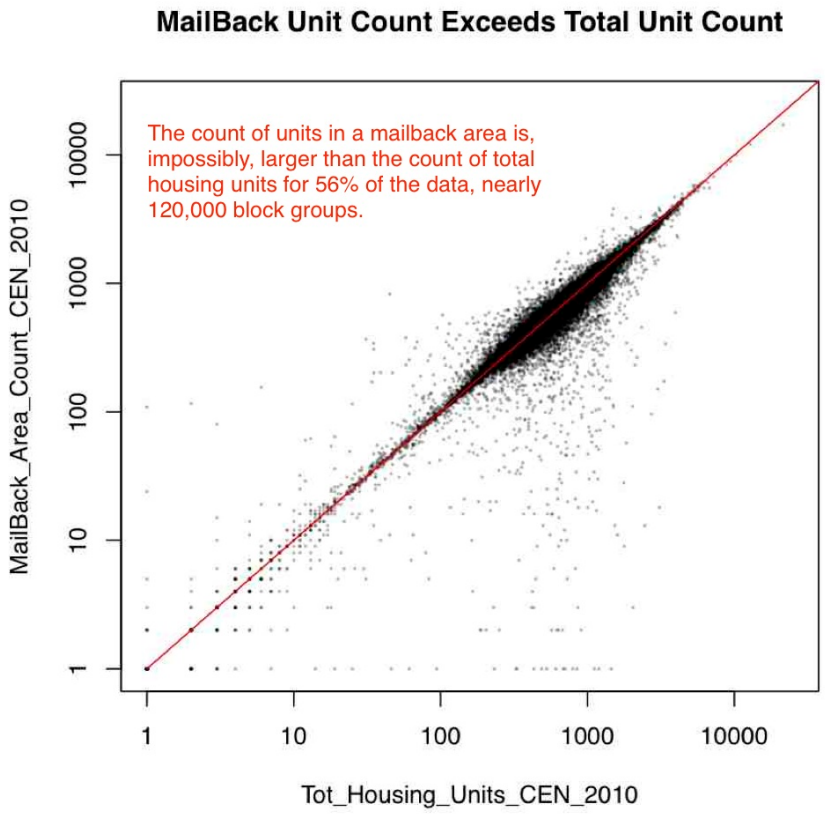
Where we looked: a model for U.S. agency collaboration
1 vote — Proposed by Charlie Turner

Data Exploration and Model Diagnostics
0 votes — Proposed by JMT5802



There are apparent inconsistencies in variable definitions.

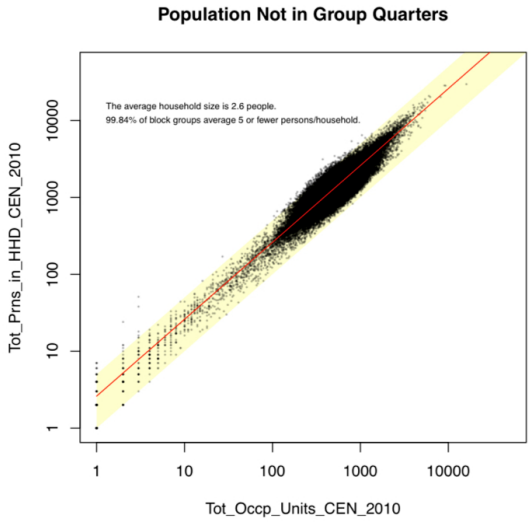
The main variable of interest, mail return rate, is a proportion, the denominator of which is supposed to be MailBack Area Count, the number of "valid housing units in the mailback universe." This should be *smaller* than the total number of units, but in these data is larger more often than not. This could reflect errors in the data, or errors in the definitions provided in the data dictionary.



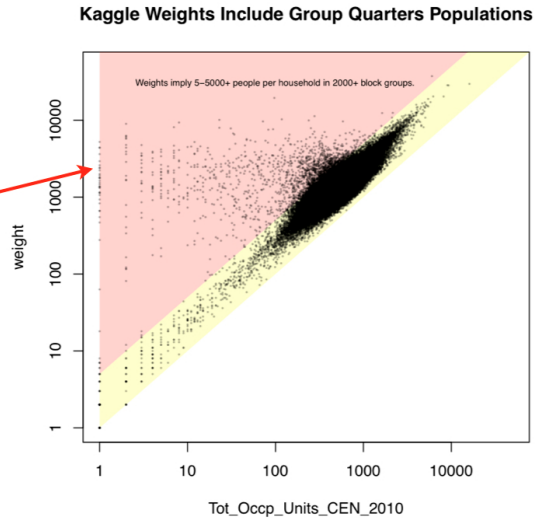
Group Quarters Populations distort evaluation weights

Populations in "group quarters" are not subject to Census mailback procedure and not included in the calculation of mail return rate. Presumably this was obvious for the block groups that contained 100% group quarters population, as they had no mail return rate and were eliminated. But thousands of block groups with as few as one valid mailback household were included. In such cases, the block group contains data for thousands of individuals irrelevant to mail return, all of whom contribute to the evaluation weight of the block group.

Mail Return is a behavior of a household (an “occupied unit”) containing “non group quarters” populations.

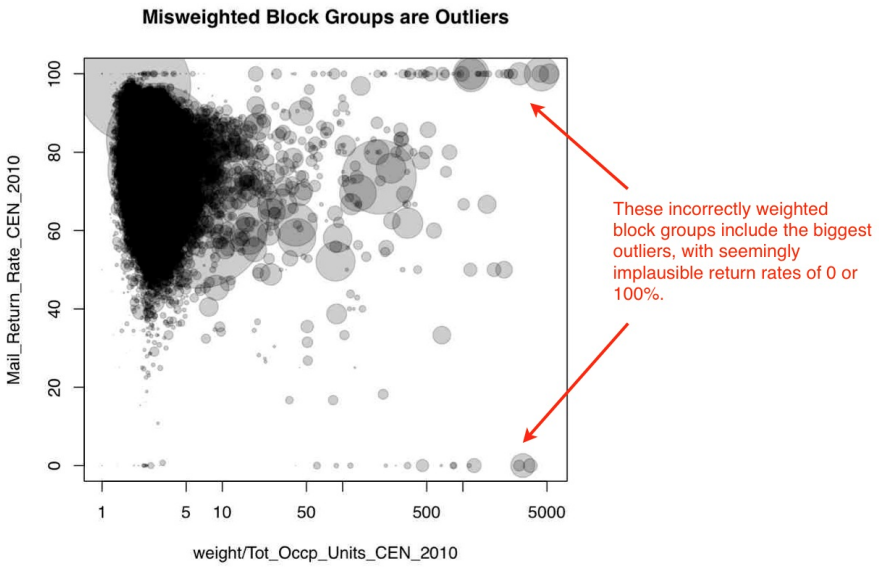


The inclusion of group quarters populations (who receive no mail census form) led to massive overweighting of certain block groups.

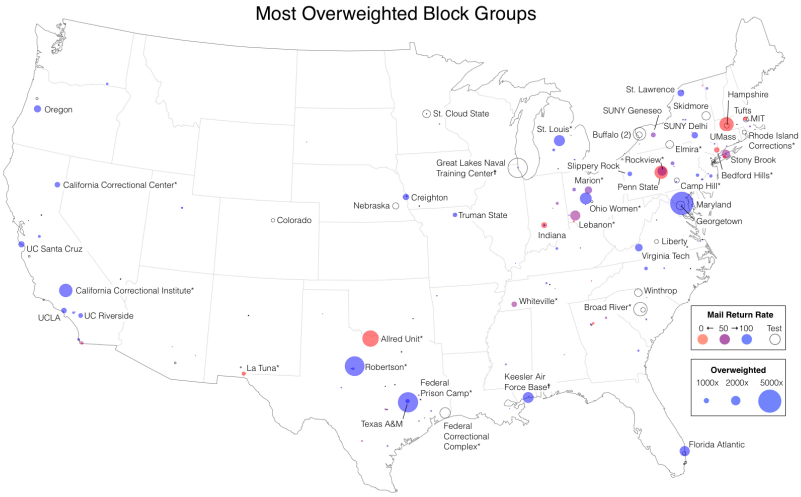


This has important consequences for the contest

This led to wild outliers. We improved our score substantially just by reweighting the data. If we had many more entries, we could simply have guessed 0/100, 0/50/100, 0/33.3/66.7/100, and so on for the extreme cases in the test data until we matched them perfectly.



Of the 50 most over-weighted block groups, 30 contain college campuses, 18 contain prisons, and two contain military bases. Of these, 32 are in the training data and have mail response rates of 100 (21 cases), 0 (6), 50 (3), or 66.7 (2). Open map at larger size.



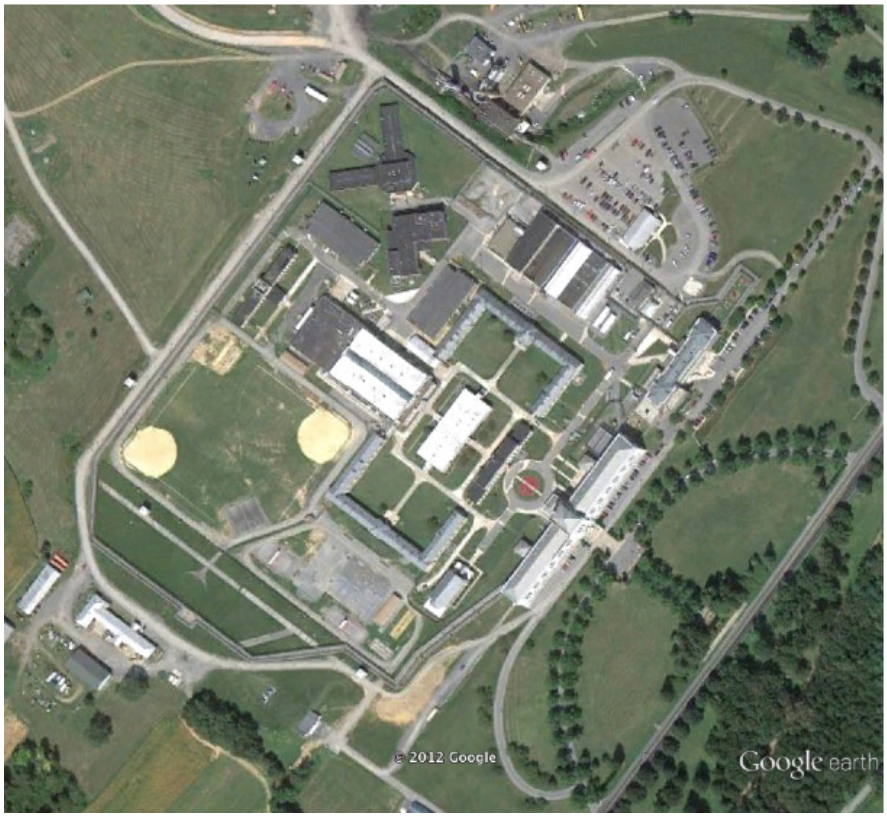
The most overweighted block groups contain group quarters populations from college dorms, *prisons, and †military facilities.

Some of the data appear to be easily de-anonymized

This focus on group quarters populations led us to notice what appeared to be minor breaches of confidentiality (but which in actuality simply accentuate the motivation for ignoring or downweighting block groups with high group quarters populations). In the most extreme cases, a block group is represented by a single household. Two of these extreme outliers happen to be in Centre County, Pennsylvania, home of Penn State.

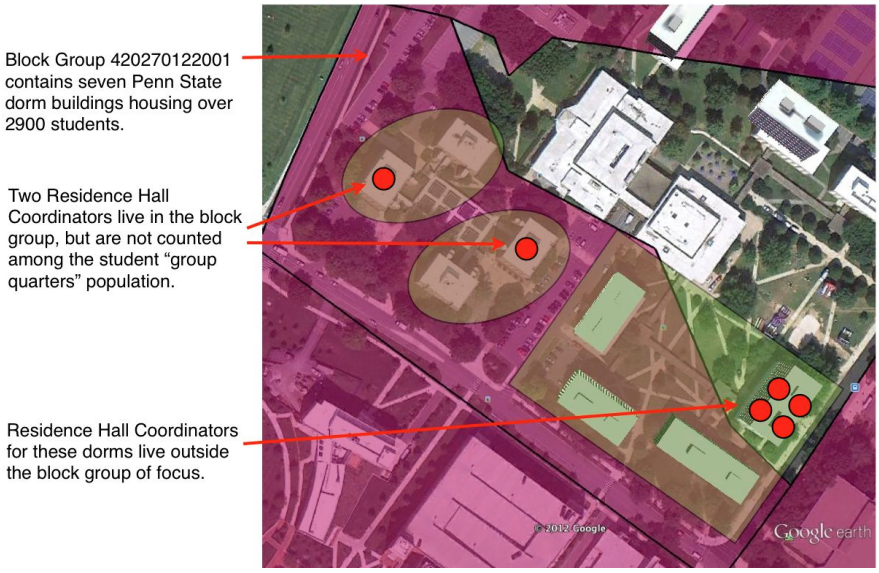
Block Group 420279812021 (Row 30090) is the 18th most overweighted block group in the data. It has a population of 1999, 1997 of whom lived in group quarters. In fact, these 1997 people — 1935 of them men — lived in Rockview Prison, a few miles from us. Somewhere on or near the Rockview property

are two housing units in the "mailback universe." One of these is recorded as unoccupied, but the other was recorded as rented by a married couple with no children who returned their census form. This “100%” mail return rate is counted for 1999 returned forms in the Kaggle data.



Block Group 420270122001 (Row 110760) is the 10th most overweighted block group in the data. It has a population of 2936, 2935 of whom lived in group quarters. These 2935 people were almost entirely freshmen at Penn State University, living in the East Dorms a few hundred yards from where we write. One other single individual, unmarried, male (because there are 0 "female household, no husband present" households) was recorded as living in the lone mailback household to receive a mailback census form. He is coded as not returning it, and this “0%” mail return rate is counted for 2936 unreturned forms in the Kaggle data. We did confirm that there are generally two Residence Hall Coordinators who live on site in the block group, receiving housing as part of their compensation. If using this as a permanent address, either of these could be counted in this block group, but outside the group quarters population of students.

After our original posting, and discussion with Census, we note it is standard practice at Census for data with low numbers of households to maintain statistical properties but mask sensitive individually identifiable information through techniques like data-swapping and synthetic data. By design, we cannot be certain of any individual match, as is appropriate. This does, however, accentuate the need in modeling to downweight or ignore these block groups. In such cases we not only have very little relevant data for mail return rate, but the data we have are unlikely to be accurate.



Comments

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Jason Tigg on 2012-11-11 21:06

thanks?

quassi on 2012-11-13 14:32

Where can I find the data used in this competition, please?

ZW on 2013-02-07 22:27

Please log in to comment