A Method to Audit the Assignment of Registered Voters to Districts and Precincts

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The Headlines

Georgia election might be voided after voters were given wrong ballots
- Habersham County, Georgia (May 2018)

With uncanny twists and an allegedly rogue registrar, Virginia House left in limbo
- Fredericksburg, VA (November, 2017)

Redistricting

- Actually a two-step process
  - Defining the districts
  - Matching voters to the districts
- Errors can occur
- Administrative redistricting: when officials move registered voters into a legislative district different than the one they are assigned to by law

How Districts are Defined in Law

1. Metes and Bounds

First district. In the county of Suffolk, that part of the town of Brookhaven bounded by a line described as follows: Beginning at the intersection of Edwards Avenue South and the Brookhaven/South Hampton town line, thence southwesterly along said line to a line extended easterly from the East Moriches census designated place to the Brookhaven/South Hampton town line, thence westerly along said line..
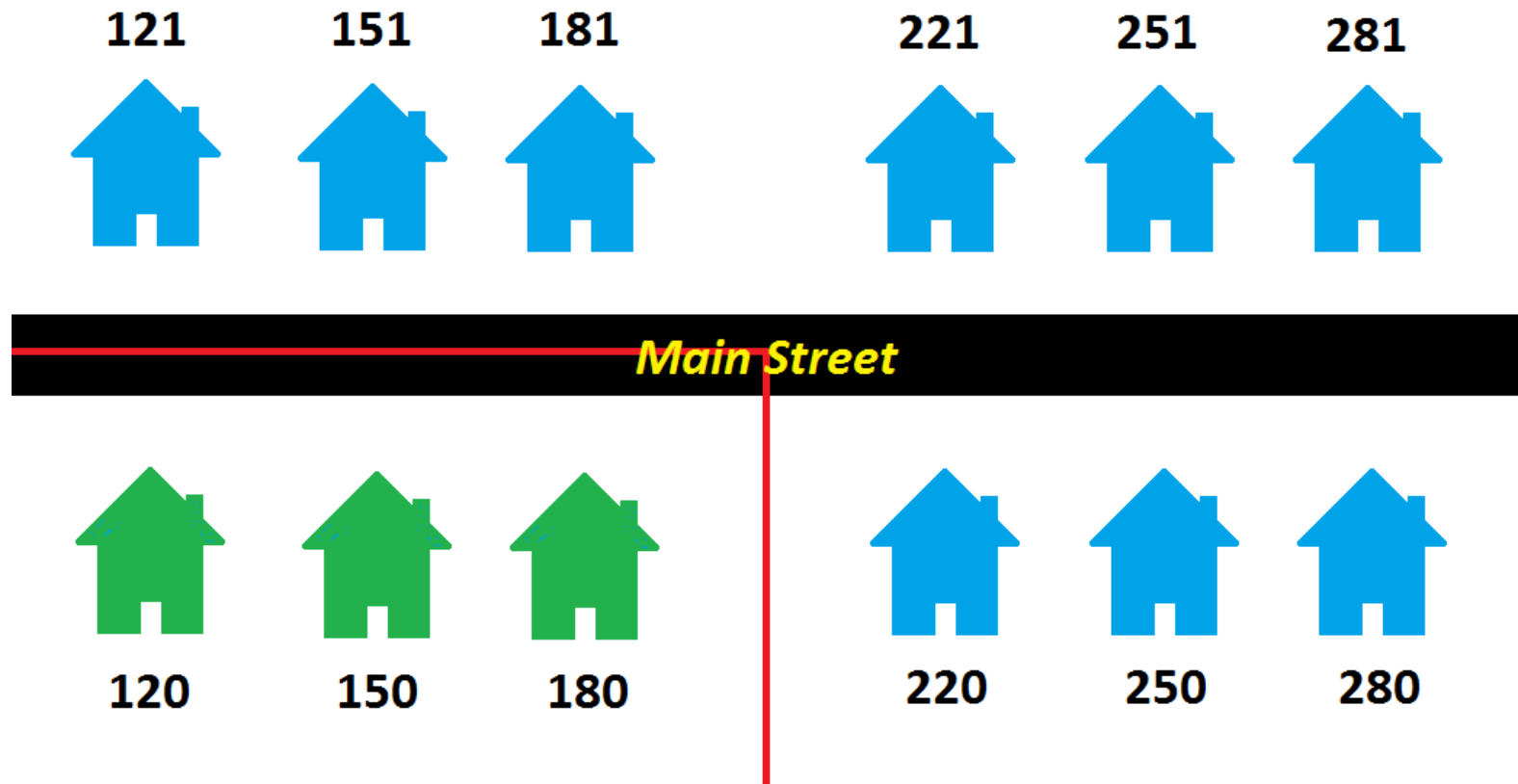
How Districts are Defined in Law

2. Census Geography

Identifying the district each county, precinct, tract, block group, and block are associated with.

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5948        (27) District 27 is composed of:
5949        (a) All of Osceola County.
5950        (b) That part of Orange County consisting of:
5951        1. All of voting tabulation districts 17, 18, 20, 21, 22,
5952    44, 45, 46, 47, 49, 99, 100, 101, 106, 110, 112, 113, 114, 115,
5953    119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 132,
5954    133, 134, 135, 136, 137, 138, 139, 140, 141, 149, 153, 155, 156,
5955    158, 161, 162, 164, 165, 166, 170, 171, 172, 174, 175, 176, 177,
5956    178, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193,
5957    194, 195, 197, 199, 200, 201, 202, 206, 208, and 209.
5958        2. That part of voting tabulation district 116 consisting
5959    of:
5960        a. That part of tract 133 consisting of blocks 1021, 1022,
5961    and 1023.
5962        3. That part of voting tabulation district 117 consisting
5963    of:
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How Voters Are Assigned to Districts

1. Street Segments

| 121 | 151 | 181 | | 221 | 251 | 281 |

Main Street

| 120 | 150 | 180 | | 220 | 250 | 280 |

How Voters Are Assigned to Districts

2. Geographic Information Systems (GIS)

- Link addresses to geographic coordinates through geocoding
  - Exact address match
  - Interpolation within street segments
  - Larger geographic areas

A Method to Audit District Assignments

Our method is similar to the method of assigning registered voters to districts using GIS

1. Geocode voter registration home addresses
   - Innovation: Use several layered geocoders
2. Overlay geocoded addresses onto GIS district boundaries
3. Perform a spatial join to identify instances where voter registration district ≠ GIS district

Causes of Assignment Errors: Geocoding/Street Segment Error

Causes of Assignment Errors:
Street Segment Assignment Error

Causes of Assignment Errors:
Census Bureau Geographic Update

Causes of Assignment Errors:
Odds and Ends

- Random human error

- A district/precinct described in Metes and Bounds, and a road is realigned, a city annexed, etc.

- Location of rural homes, Indian reservations, military bases, school dorms, etc.

Recommendations

- Periodically audit assignment of registered voters to districts

- Use multiple geocoders since companies' GIS products vary

- Better data collection of district boundaries at all levels of government

Where to Go From Here

- Same technique can be used to verify assignments of registered voters to precincts

- Use geocoding to detect address errors. A geocoded address may be an error if:
  - It fails to geocode
  - Is located far from the assigned precinct

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