Visualization of Moving Violation Data in Washington D.C. 2015

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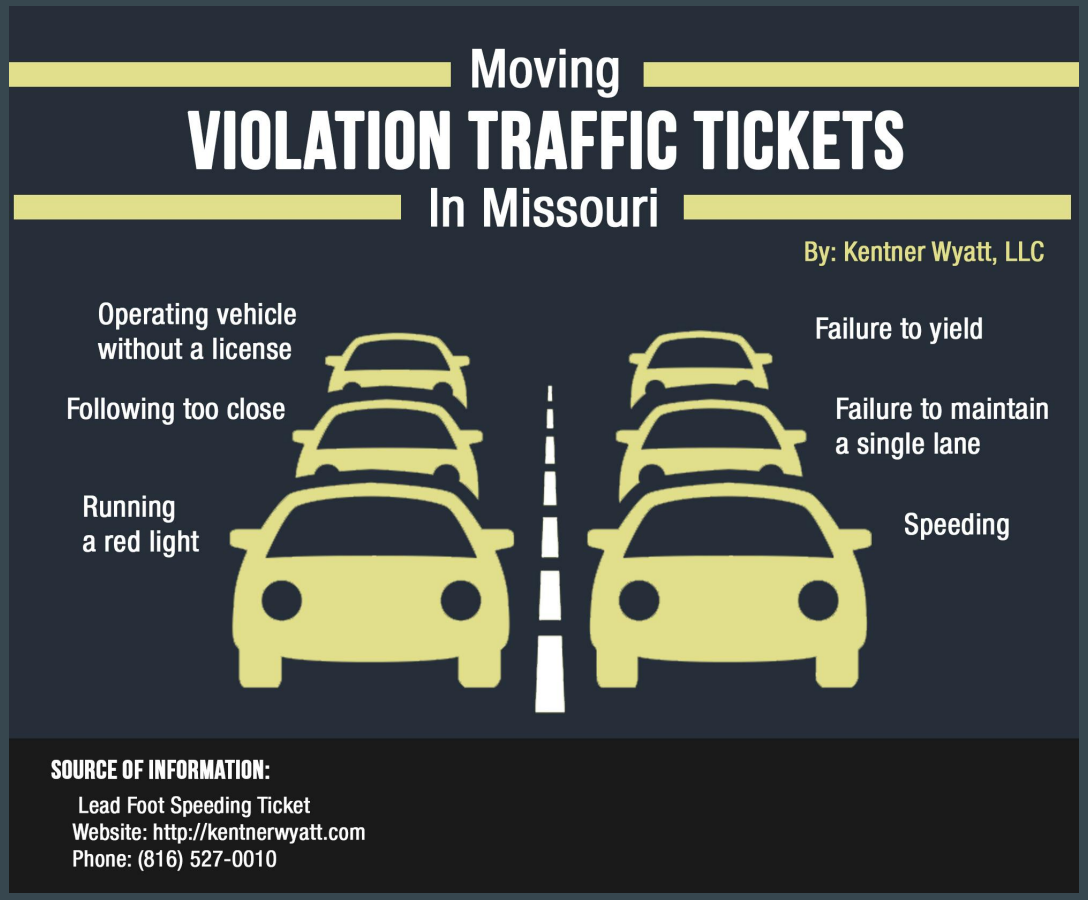
Background

- Moving violations and traffic safety



Data

- Open Data DC
- Moving violations summary 2015
- Conditions:

Violation Type

- Low Speeding (Under 20mp)
- High Speeding (above 20mph)
- Unsafe Driving
- Unsafe Vehicle
- Unsafe Operator
- Other

Time

- Am no rush
- Am rush
- Pm no rush
- Pm rush
- Evening
- Overnight
- No time

More about Data ...

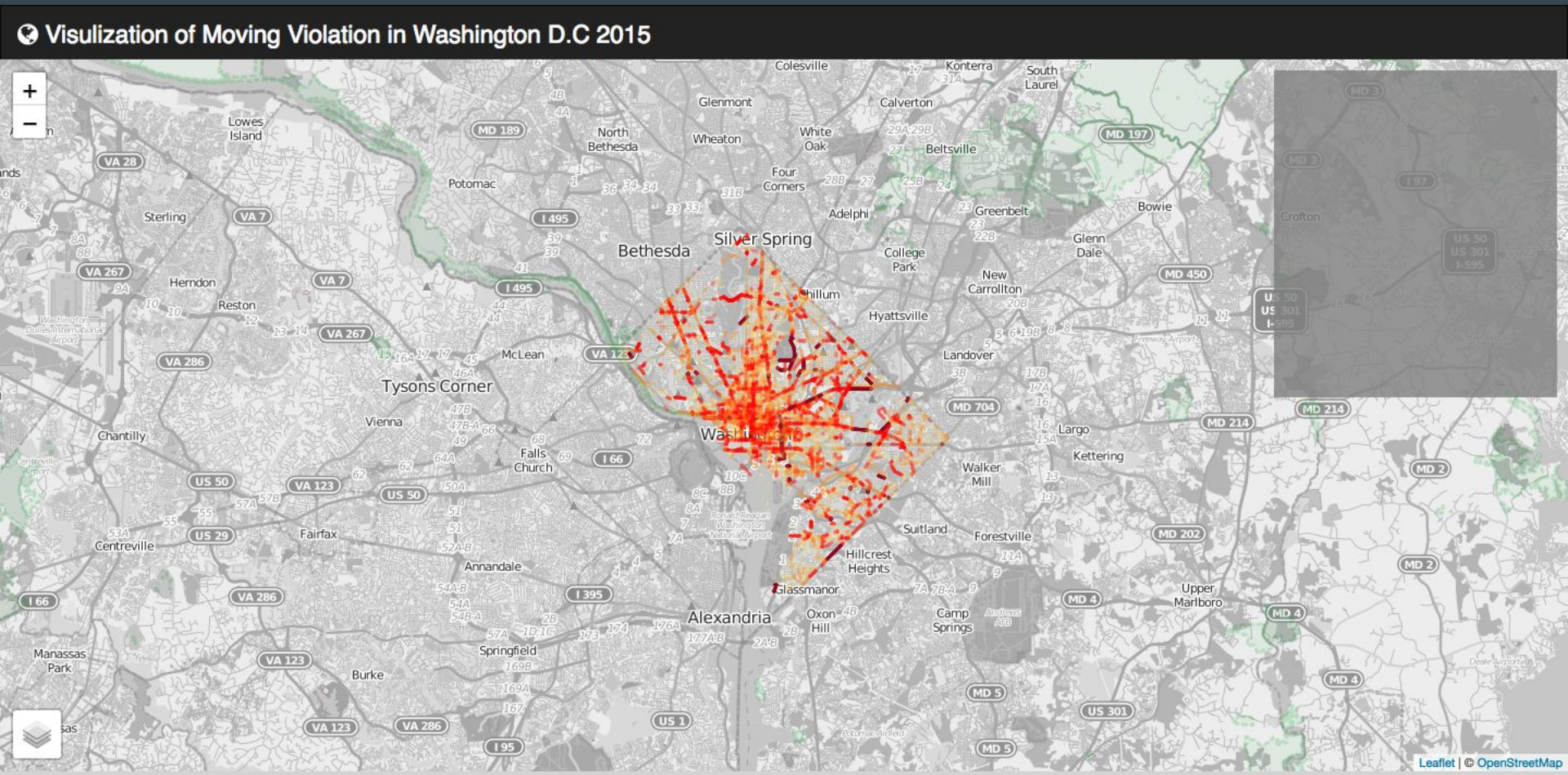
- Overlapping features
- 23138 total rows
- 4800 distinct street segments

Row 1	Street segment 1	Week 1
Row 2	Street segment 1	Week 2
...	...	...

Application Structure

- Carto
  - Drap and Drop dataset
  - Call to SQL API: handle both GET and POST request
  - Sample SQL API call : https://zhiqiyu.carto.com/api/v2/sql?format=GeoJSON&q=select * from moving_violations_summary_for_2015
- HTML libraries:
  - Bootstrap
- JavaScript Libraries:
  - Leaflet
  - D3.js

User Interfaces



More about UI ...

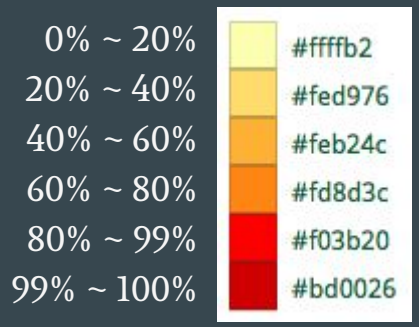
- Base map:
  - 3 Tile layers

```
var Stamen_Toner = L.tileLayer('https://stamen-tiles-{s}.a.ssl.fastly.net/toner/{z}/{x}/{y}.{ext}', {
    attribution: 'Map tiles by <a href="http://stamen.com">Stamen Design</a>, <a href="http://creativecommons.org/licenses/by/3.0">CC BY 3.0</a> &mdash; Map data &copy;
    subdomains: 'abcd',
    minZoom: 0,
    maxZoom: 20,
    ext: 'png'
});

var OSM_BlackAndWhite = L.tileLayer('http://{s}.tiles.wmflabs.org/bw-mapnik/{z}/{x}/{y}.png', {
    maxZoom: 18,
    attribution: '&copy; <a href="http://www.openstreetmap.org/copyright">OpenStreetMap</a> '
});

var Thunderforest_TransportDark = L.tileLayer('https://{s}.tile.thunderforest.com/transport-dark/{z}/{x}/{y}.png?apikey={apikey}', {
    attribution: '&copy; <a href="http://www.thunderforest.com/">Thunderforest</a>, &copy; <a href="http://www.openstreetmap.org/copyright">OpenStreetMap</a>',
    apikey: 'a00a69ca12ad40ee891f0e98e60dd005',
    maxZoom: 22
});
```

More about UI ...

- Overlay layer:
  - GeoJson layer from SQL api call
  - Color scheme from ColorBrewer
  - Opacity represent the number of weeks that have violations

Sequential multi-hue color scheme



Computations behind coloring

For each feature

⬇

Get street segment id

⬇

Get rows contain this id

⬇

Accumulate numbers across rows

⬇

Color each feature based on its count

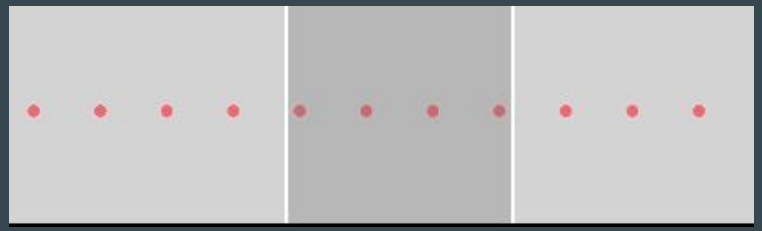
More about UI ...

- Info window
  - Total number of violations
  - Table of detailed counts

Violation Summary: 234

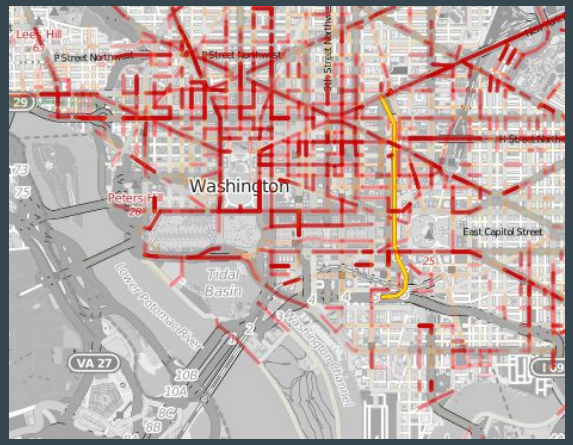
Condition	Counts
unsafeoper_pm_norush	81
unsafeoper_pm_rush	43
unsafeoper_overnight	39
unsafeoper_evening	27
unsafeoper_am_rush	24
unsafeoper_am_norush	20
highspeed_am_norush	0

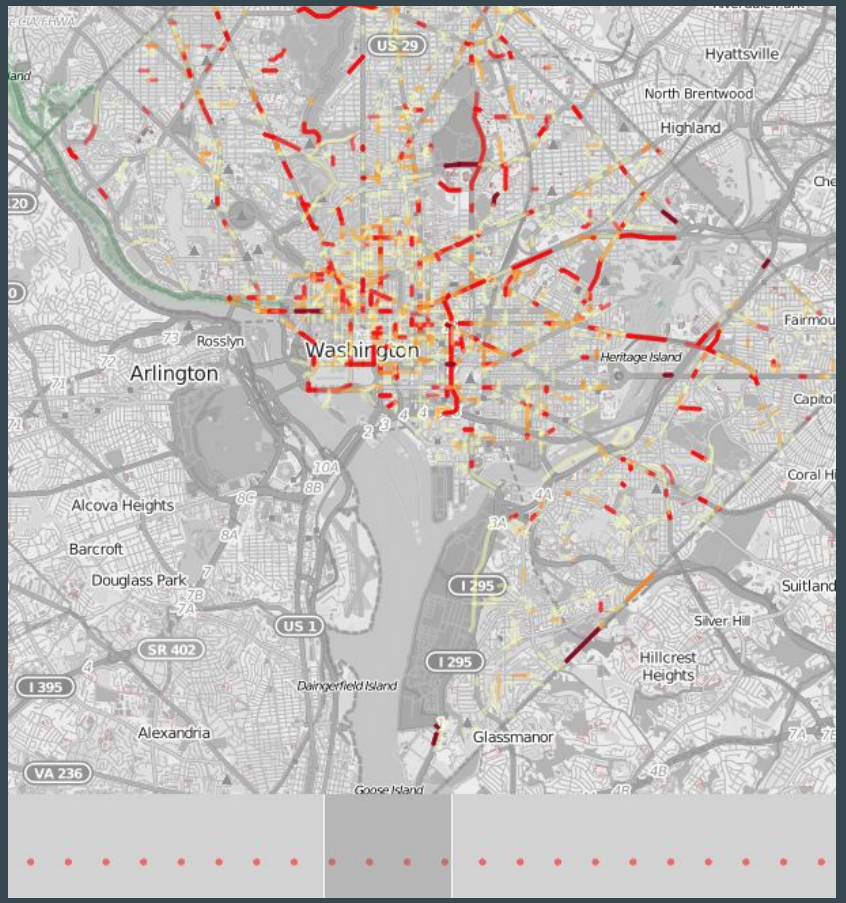
- Time bar
  - Discrete time series
  - Dots = week number



Interactions

- Mouse interactions on map:
  - Zoom in & out: scroll up & down
  - Browse features: move mouse
  - Check detail: click & Enter
- Brushing interaction:
  - Select time frame
  - Move time frame





Demo