CRP 558 Final Project

# Visualization of Traffic Crash Data in Iowa

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# Goals

- Create thematic maps for counties in Iowa that shows traffic crashes from 2011 to 2013
- The thematic maps include
  - *Total number of crashes*
  - *Damage of properties in USD*
  - *Types of crashes in 2013*

# Data and Technology

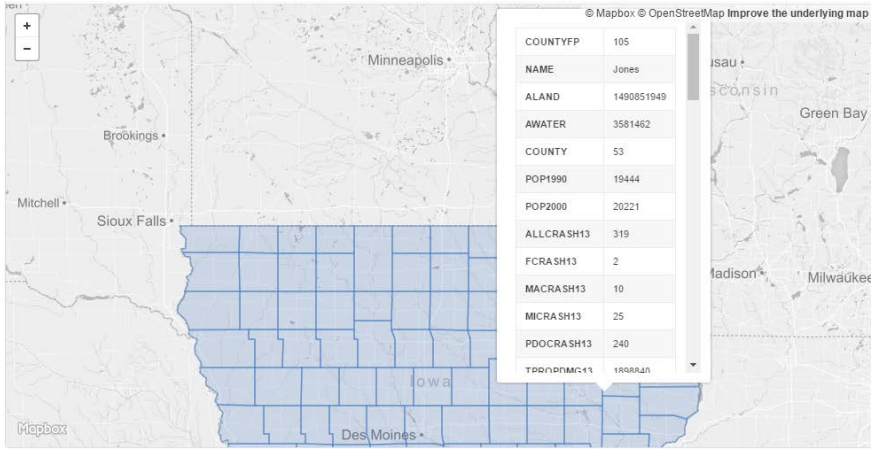
- Data used: Historical traffic crash statistics from Iowa Department of Transportation
- Years of Analysis: 2011 to 2013
- Technology used:
  - *HTML*
  - *JavaScript*
  - *jQuery*
  - *Leaflet*
  - *JSON and geoJSON*
  - *ArcMap Spatial Analysis*
  - *Bootstrap panels*

# Development

- Conversion of .csv data to geoJSON
  - *Spatial join with Iowa counties shapefile*
  - *Filter data for the years 2011-2013*
  - *Convert to geoJSON*

| | COUNTYN | COUNTY | POP1990 | POP2000 | ALLCRASH | FCRASH13 | MACRASH | MICRASH1 | PDOCRAS | TPROPDM | ALLINJS13 | TFATALITY | TMAJINJ1 | TMININJ1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Adair | 1 | 8409 | 8243 | 122 | 2 | 6 | 24 | 71 | 1101426 | 65 | 2 | 6 | 31 |
| 3 | Adams | 2 | 4866 | 4482 | 13 | 0 | 1 | 2 | 9 | 66942 | 4 | 0 | 1 | 2 |
| 4 | Allamake | 3 | 13855 | 14675 | 118 | 4 | 6 | 8 | 89 | 808818 | 47 | 4 | 11 | 12 |
| 5 | Appanoos | 4 | 13743 | 13721 | 227 | 3 | 12 | 31 | 161 | 1110586 | 92 | 3 | 13 | 45 |
| 6 | Audubon | 5 | 7334 | 6830 | 67 | 2 | 4 | 13 | 41 | 619411 | 37 | 3 | 5 | 21 |
| 7 | Benton | 6 | 22429 | 25308 | 202 | 6 | 9 | 38 | 111 | 1515296 | 121 | 8 | 11 | 54 |
| 8 | Black Haw | 7 | 123798 | 128012 | 2388 | 11 | 55 | 195 | 1729 | 14647466 | 886 | 11 | 66 | 258 |
| 9 | Boone | 8 | 25186 | 26224 | 388 | 3 | 24 | 44 | 267 | 2320555 | 170 | 3 | 29 | 63 |
| 10 | Bremer | 9 | 22813 | 23325 | 384 | 1 | 3 | 33 | 306 | 2129116 | 106 | 1 | 4 | 47 |
| 11 | Buchanan | 10 | 20844 | 21093 | 266 | 1 | 6 | 21 | 201 | 1602685 | 77 | 1 | 6 | 22 |
| 12 | Buena Vis | 11 | 19965 | 20411 | 268 | 2 | 6 | 28 | 198 | 2011026 | 98 | 2 | 8 | 40 |
| 13 | Butler | 12 | 15731 | 15305 | 86 | 3 | 4 | 9 | 60 | 558041 | 31 | 3 | 9 | 9 |
| 14 | Calhoun | 13 | 11508 | 11115 | 74 | 0 | 4 | 12 | 39 | 576409 | 42 | 0 | 4 | 12 |
| 15 | Carroll | 14 | 21423 | 21421 | 200 | 2 | 8 | 16 | 135 | 1032883 | 95 | 2 | 10 | 32 |
| 16 | Cass | 15 | 15128 | 14684 | 214 | 3 | 10 | 30 | 145 | 2163153 | 91 | 4 | 10 | 45 |
| 17 | Cedar | 16 | 17444 | 18187 | 396 | 5 | 7 | 27 | 312 | 3097223 | 119 | 5 | 9 | 42 |
| 18 | Cerro Gor | 17 | 46733 | 46447 | 842 | 2 | 23 | 58 | 635 | 4320869 | 268 | 2 | 33 | 72 |
| 19 | Cherokee | 18 | 14098 | 13035 | 196 | 0 | 6 | 19 | 149 | 1372589 | 65 | 0 | 6 | 26 |
| 20 | Chickasaw | 19 | 13295 | 13095 | 104 | 2 | 4 | 15 | 67 | 634757 | 46 | 3 | 6 | 21 |
| 21 | Clarke | 20 | 8287 | 9133 | 159 | 2 | 5 | 12 | 117 | 983558 | 57 | 2 | 5 | 20 |
| 22 | Clay | 21 | 17585 | 17372 | 308 | 2 | 4 | 33 | 223 | 1761665 | 101 | 2 | 5 | 40 |
| 23 | Clayton | 22 | 19054 | 18678 | 205 | 2 | 10 | 25 | 139 | 1257499 | 77 | 2 | 12 | 30 |
| 24 | Clinton | 23 | 51040 | 50149 | 1013 | 2 | 23 | 74 | 755 | 5007377 | 339 | 2 | 27 | 87 |
| 25 | Crawford | 24 | 16775 | 16942 | 247 | 0 | 9 | 14 | 188 | 1525441 | 94 | 0 | 14 | 17 |
| 26 | Dallas | 25 | 29755 | 40750 | 958 | 7 | 17 | 60 | 758 | 5810796 | 262 | 8 | 22 | 81 |
| 27 | Davis | 26 | 8312 | 8541 | 72 | 0 | 2 | 4 | 48 | 510526 | 31 | 0 | 3 | 8 |
| 28 | Decatur | 27 | 8338 | 8689 | 90 | 1 | 4 | 6 | 70 | 651860 | 26 | 1 | 6 | 7 |
| 29 | Delaware | 28 | 18035 | 18404 | 257 | 3 | 6 | 29 | 198 | 1434778 | 87 | 3 | 10 | 40 |
| 30 | Des Moine | 29 | 42614 | 42351 | 689 | 4 | 13 | 73 | 509 | 2970299 | 241 | 4 | 16 | 94 |
| 31 | Dickinson | 30 | 14909 | 16424 | 251 | 1 | 11 | 28 | 178 | 1353316 | 96 | 2 | 11 | 35 |

CSV data




Converted to geoJSON

# Filtering data

- Filtered the variables of interest using jQuery
  - *Total number of crashes*
  - *Total fatalities*
  - *Total property damage in USD*
  - *Types of crashes*
    - Alcohol and drugs
    - Normal bus
    - School bus
    - Pedestrian
    - Truck
    - Motorcycle

```
var allCrash13 = new L.GeoJSON.AJAX(myURL, {
  style: styleCrashes13,
  onEachFeature: function(feature, layer) {
    text1 = "<strong> " + feature.properties.NAME + "</strong><br>";
    text2 = "Total Crashes: " + feature.properties.ALLCRASH13 + "<br>";
    text3 = "Fatality: " + feature.properties.TFATALITY1 + "<br>";
    text = text1 + text2 + text3;
    layer.bindTooltip(text);
  }
})
```

Data filtering example

# Classify and assign colors

- Each dataset were assigned classes and colors
- Define styles

```
function getColorCrashes(d) {
  return d <= '100' ? 'blue' :
  d <= '300' ? 'green' :
  d <= '700' ? 'lightgreen' :
  d <= '1500' ? 'yellow' :
  d <= '2500' ? 'orange' :
  'red'
    //  "#FFFFFF"; //white
}
```

```
function styleCrashes13(feature) {
  return {
    fillColor: getColorCrashes(feature.properties.ALLCRASH13)
    weight: 2,
    opacity: 1,
    color: 'black',
    fillOpacity: 0.6
  };
}
```

# Bootstrap panels

- Panels were created using bootstrap for
  - *Map*
  - *Buttons*

```
<div class="col-sm-14">
    <div class="panel panel-info">
        <div class="panel-heading">
            Types of Crashes in 2013
        </div>
        <div class="panel-body">
            <button type="button" id="alcdrug" class="btn btn-success"> Alcohol and Drug </button>
            <button type="button" id="nbus" class="btn btn-success"> Normal Bus </button>
            <button type="button" id="sbus" class="btn btn-success"> School Bus </button>
            <button type="button" id="ped" class="btn btn-success"> Pedestrian </button>
            <button type="button" id="trk" class="btn btn-success"> Truck </button>
            <button type="button" id="moto" class="btn btn-success"> Motorcycle </button>
            <button type="button" id="clrcrtype" class="btn btn-success"> Clear All </button>
        </div>
    </div>
</div>
```

# Legends

- Legend controls were created to interact with active layers

```
var legendCrashType = L.control({
  position: 'bottomright'
});

legendCrashType.onAdd = function(map2) {
  var div = L.DomUtil.create('div', 'info legend'),
    grades = [0, 4, 9, 13, 18, 24],
    labels = [],
    from, to;
  for (var i = 0; i < grades.length; i++) {
    from = grades[i];
    to = grades[i + 1];
    labels.push('<i style="background:' + getColorCrashType(from + 1) + '"></i> ' + from + (to ? '&ndash;'
+ to : '+'));
  }
  div.innerHTML = labels.join('<br>');
  return div;
};

$("#alcdrug").click(function() {
  map.addLayer(allALCDRUGCR13);
  map.removeLayer(allNBUSCR13);
  map.removeLayer(allSBUSCR13);
  map.removeLayer(allPEDCR13);
  map.removeLayer(allTRKCR13);
  map.removeLayer(allMOTOCR13);
  map.removeLayer(allPropDmg13);
  map.removeLayer(allPropDmg12);
  map.removeLayer(allPropDmg11);
  map.removeLayer(allCrash13);
  map.removeLayer(allCrash12);
  map.removeLayer(allCrash11);
  map.removeControl(legendCrash);
  map.removeControl(legendPropDmg);
  map.addControl(legendCrashType);
});
```

# Final Product

- Thematic map
  - *Total crashes filtered by year*
    - Fatality information in tooltip
  - *Total property damage filtered by year*
  - *Types of crashes in 2013*