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SocialComplexityLab small fix History

1 contributor

Raw Blame

153 lines (153 sloc) | 9.82 KB

# Assignment 1.

## Formalia:

Please read the assignment overview page (https://github.com/suneman/socialdata2021/wiki/Assignment-1-and-2) carefully before proceeding. This page contains information about formatting (including formats etc), group sizes, and many other aspects of handing in the assignment.

*If you fail to follow these simple instructions, it will negatively impact your grade!*

**Due date and time**: The assignment is due on Monday March 1st, 2021 at 23:55. Hand in your files via `http://peergrade.io` (http://peergrade.io/).

**Peergrading date and time**: *Remember that after handing in you have 1 week to evaluate a few assignments written by other members of the class.* Thus, the peer evaluations are due on Monday March 8th, 2021 at 23:55.

## Part 1: Temporal Patterns

We look only at the focus-crimes in the exercise below

In [4]:

```
focuscrimes = set(['WEAPON LAWS', 'PROSTITUTION', 'DRIVING UNDER THE INFLUENCE', 'ROBBERY', 'BURGLARY', 'ASSAULT', 'DRUNKENNESS', 'DRUG/NARCOTIC', 'TRESPASS', 'LARCENY/THEFT', 'VANDALISM', 'VEHICLE THEFT', 'STOLEN PROPERTY', 'DISORDERLY CONDUCT'])
```

*Exercise*: More temporal patterns. During week 1, we plotted some crime development over time (how each of the focus-crimes changed over time, year-by-year).

In this exercise, please generate the visualizations described below. Use the same date-ranges as in Week 1. For each set of plots, describe the plots (as you would in the figure text in a report or paper), and pick a few aspects that stand out to you and comment on those (a couple of ideas below for things that could be interesting to comment on ... but it's OK to chose something else).

- *Weekly patterns*. Basically, we'll forget about the yearly variation and just count up what happens during each weekday. Here's what my version looks like (https://raw.githubusercontent.com/suneman/socialdata2021/master/files/weekdays.png). Hint for comment: Some things make sense - for example `drunkenness` and the weekend. But there are some aspects that were surprising to me. Check out `prostitution` and mid-week behavior, for example!?
- *The months*. We can also check if some months are worse by counting up number of crimes in Jan, Feb, ..., Dec. Did you see any surprises there?
- *The 24 hour cycle*. We'll can also forget about weekday and simply count up the number of each crime-type that occurs in the entire dataset from midnight to 1am, 1am - 2am ... and so on. Again: Give me a couple of comments on what you see.
- *Hours of the week*. But by looking at just 24 hours, we may be missing some important trends

- *Hours of the week*. But by looking at just 24 hours, we may be missing some important trends that can be modulated by week-day, so let's also check out the 168 hours of the week. So let's see the number of each crime-type Monday night from midninght to 1am, Monday night from 1am-2am - all the way to Sunday night from 11pm to midnight.

## Part 2: Thinking about data and visualization

*Excercise:* Questions for the second video lecture (https://www.youtube.com/watch?v=yiU56codNlI).

- As mentioned earlier, visualization is not the only way to test for correlation. We can (for example) calculate the Pearson correlation. Explain in your own words how the Pearson correlation works and write down it's mathematical formulation. Can you think of an example where it fails (and visualization works)?
- What is the difference between a bar-chart and a histogram?
- I mention in the video that it's important to choose the right bin-size in histograms. But how do you do that? Do a Google search to find a criterion you like and explain it.

## Part 3: Generating important plot types

*Excercise*: Let us recreate some plots from DAOST but using our own favorite dataset.

- First, let's make a jitter-plot (that is, code up something like **Figure 2-1** from DAOST from scratch), but based on SF Police data. My hunch from inspecting the file is that the police-folks might be a little bit lazy in noting down the **exact** time down to the second. So choose a crime-type and a suitable time interval (somewhere between a month and 6 months depending on the crime-type) and create a jitter plot of the arrest times during a single hour (like 13-14, for example). So let time run on the $x$-axis and create vertical jitter.
- Now for some histograms (please create a crime-data based versions of the plot-type shown in DAOST **Figure 2-2**). (I think the GPS data could be fun to understand from this perspective.)
  - This time, pick two crime-types with different geographical patterns **and** a suitable time-interval for each (you want between 1000 and 10000 points in your histogram)
  - Then take the latitude part of the GPS coordinates for each crime and bin the latitudes so that you have around 50 bins across the city of SF. You can use your favorite method for binning. I like `numpy.histogram`. This function gives you the counts and then you do your own plotting.

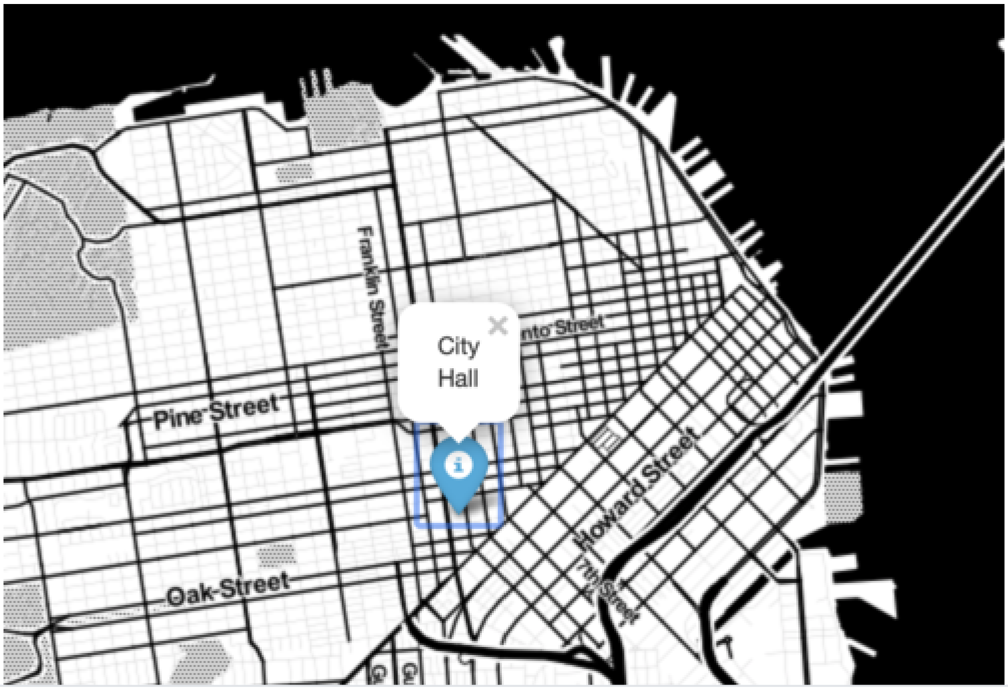
## Part 4: A bit of geo-data

*Exercise*: A new take on geospatial data using Folium (see the Week 4 exercises for full info and tutorials).

Now we look at studying geospatial data by plotting raw data points as well as heatmaps on top of actual maps.

- First start by plotting a map of San Francisco with a nice tight zoom. Simply use the command `folium.Map([lat, lon], zoom_start=13)`, where you'll have to look up San Francisco's longitude and latitude.

- Next, use the the coordinates for SF City Hall `37.77919, -122.41914` to indicate its location on the map with a nice, pop-up enabled maker. (In the screenshot below, I used the black & white Stamen tiles, because they look cool).


Franklin Street
nto Street
City Hall
Pine Street
Oak Street
Howard Street
7th Street