visualizing Vancouver crime

Dec 12, 2017

CPSC 547 Final Project

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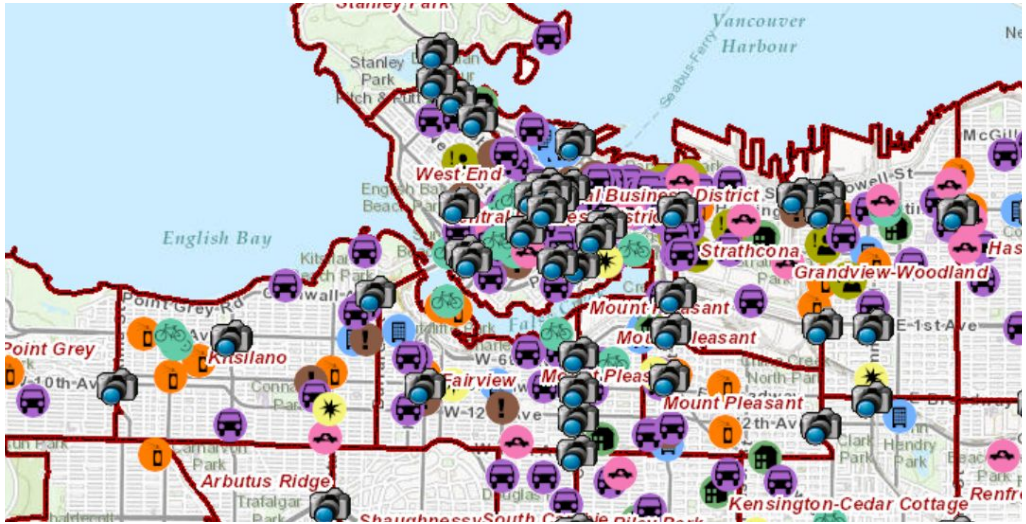
Intro

- Hard to see trends with available vis tools
- How do we aid data analysts?



[GeoDASH: Vancouver Police Department Crime Map]

What-Why-How

What

- tables
- geometry
- dynamic data

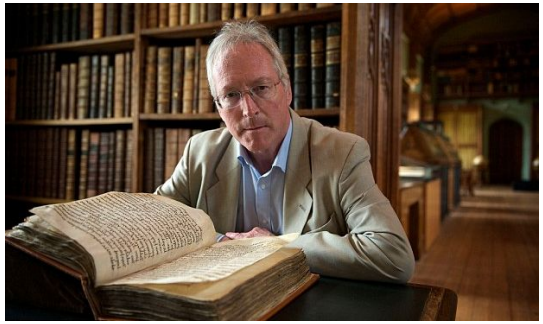
How

- isotype plot: color hue, density, position
- grid map: color saturation, color hue, size, position

Why

- discover, compare, summarize
- trends, outliers, features

What-Why-How



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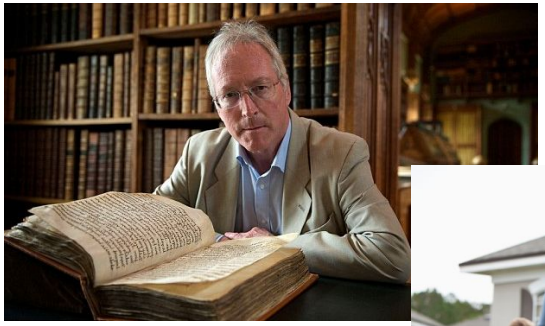

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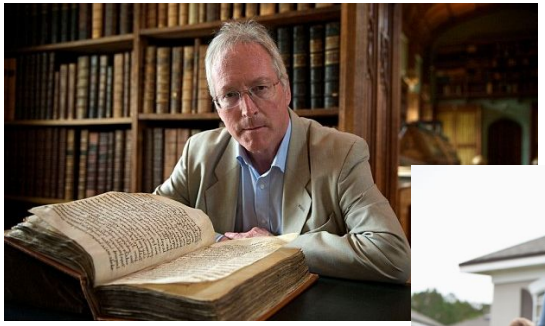

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Dataset

Type	Year	Month	DAY	Hour	Minute	Hundred Block	Neighbourhood	X	Y
Vehicle Collision or Pe...	2003	2	15	12	43	SE MARINE DR / NAN...	Victoria-Fraserview	495,662.00	5,450,521.00
Theft from Vehicle	2003	9	10	2	0	9XX E CORDOVA ST	Strathcona	493,844.21	5,458,804.80
Break and Enter Resi...	2003	4	29	11	20	5XX CASSIAR ST	Hastings-Sunrise	497,761.47	5,458,596.15
Break and Enter Resi...	2003	5	18	21	16	5XX CASSIAR ST	Hastings-Sunrise	497,761.47	5,458,596.15
Break and Enter Resi...	2003	10	8	7	0	5XX CENTENNIAL RD	Strathcona	493,462.55	5,459,359.85
Offence Against a Per...	2003	8	16	*null*	*null*	OFFSET TO PROTECT ...	*null*	0.00	0.00
Mischief	2003	5	31	19	11	X W 23RD AVE	Riley Park	492,348.61	5,455,239.48
Mischief	2003	9	8	7	0	X W 20TH AVE	Riley Park	492,360.08	5,455,555.67
Theft from Vehicle	2003	8	20	14	0	19XX PENDRELL ST	West End	489,642.41	5,459,595.07
Break and Enter Resi...	2003	2	15	16	0	5XX COMMODORE RD	Fairview	491,555.74	5,457,210.53
Break and Enter Resi...	2003	8	14	9	20	5XX COMMODORE RD	Fairview	491,555.74	5,457,210.53
Break and Enter Resi...	2003	11	9	6	0	5XX COMMODORE RD	Fairview	491,555.74	5,457,210.53
Break and Enter Resi...	2003	11	19	11	30	5XX COMMODORE RD	Fairview	491,555.74	5,457,210.53
Theft from Vehicle	2003	4	6	2	0	9XX E CORDOVA ST	Strathcona	493,844.21	5,458,804.80
Break and Enter Resi...	2003	11	20	23	0	5XX COMMODORE RD	Fairview	491,555.74	5,457,210.53
Break and Enter Com...	2003	9	26	2	30	10XX ALBERNI ST	West End	491,067.65	5,459,114.22
Theft from Vehicle	2003	9	13	23	0	9XX E BROADWAY AVE	Mount Pleasant	493,930.70	5,456,638.79
Theft from Vehicle	2003	8	29	13	0	E 23RD AVE / MAIN ST	Riley Park	492,648.77	5,455,280.57
Break and Enter Resi...	2003	6	11	22	20	14XX E 4TH AVE	Grandview-Woodland	494,551.61	5,457,133.66
Break and Enter Resi...	2003	6	14	16	15	14XX E 4TH AVE	Grandview-Woodland	494,551.61	5,457,133.66
Mischief	2003	5	15	0	0	21XX COLUMBIA ST	Mount Pleasant	492,032.63	5,457,089.39
Break and Enter Resi...	2003	6	16	1	15	14XX E 4TH AVE	Grandview-Woodland	494,551.61	5,457,133.66
Break and Enter Resi...	2003	7	22	16	55	14XX E 4TH AVE	Grandview-Woodland	494,551.61	5,457,133.66

Open Data Catalogue

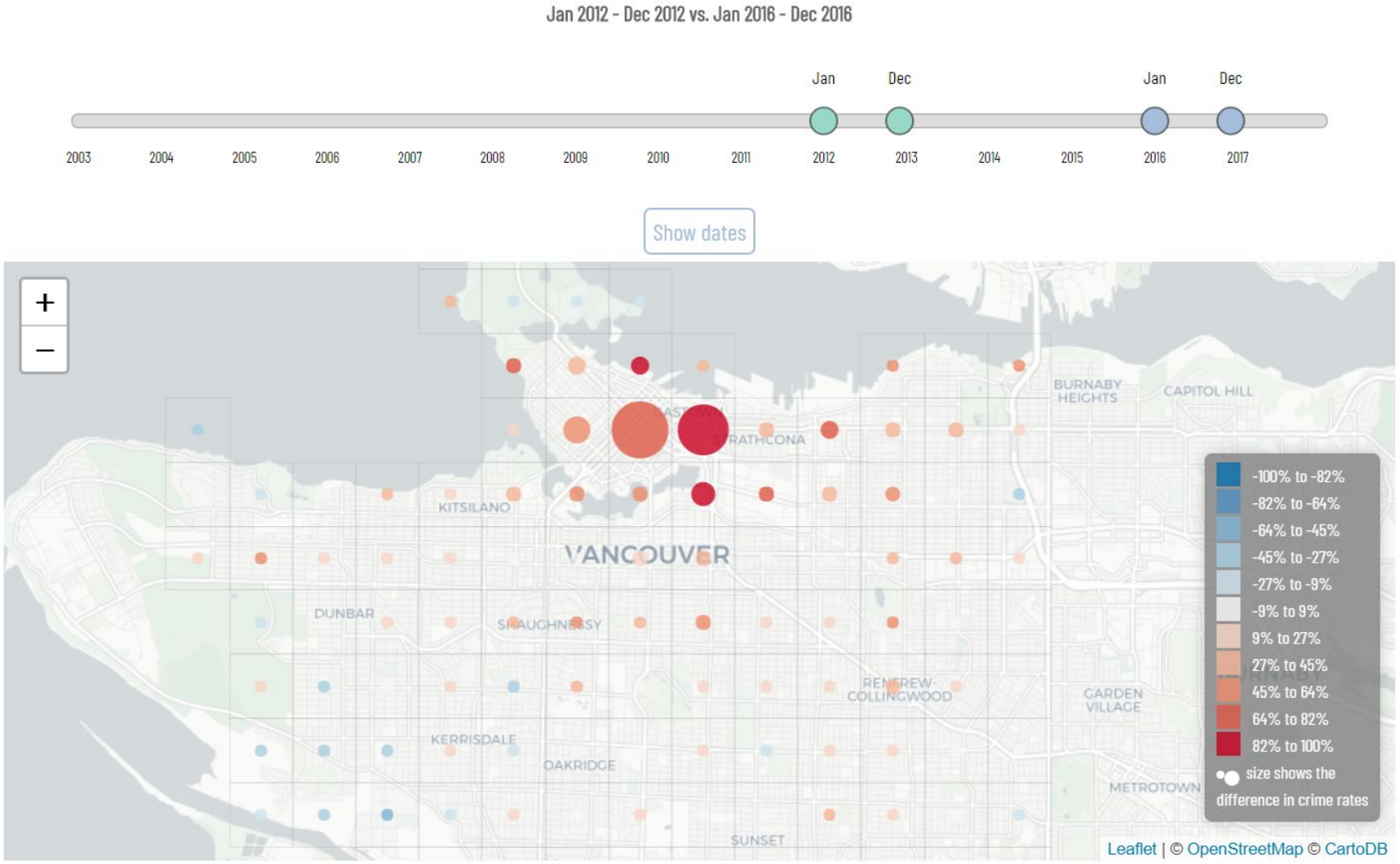
Crime

Data custodian	Vancouver Police Department
Data currency comments	The data on this site is scheduled to be updated every Sunday morning. Note: there can be a delay of up to a week between when data is updated in its home system and the publication to the Open Data feed.
Data set description	This is a dataset of crime data on a year-by-year basis beginning in 2003. **Legal Disclaimer from Vancouver Police Department** The release of Vancouver Police Department (VPD) crime data is intended to enhance community awareness of policing activity in Vancouver. Users are cautioned not to rely on the information provided to make decisions about the specific safety level of a specific location or area. By using this data the user agrees and understands that neither the Vancouver Police Department, Vancouver Police Board nor the City of Vancouver assumes liability for any decisions made or actions taken or not taken by the user in reliance upon any information or data provided. While every effort has been made to be transparent in this process, users should be aware that this data is designed to provide individuals with a general overview of incidents falling into several crime categories. The information provided therefore does not reflect the total number of calls or complaints made to the VPD. Please refer to the FAQ for further details. The data provided is based upon information contained in the VPD Records Management System. The crime classification and file status may change at any time based on the dynamic nature of police investigations. The VPD has taken great care to protect the privacy of all parties involved in the incidents reported. No personal or identifying information has been provided in the data. Locations for reported incidents involving Offences Against a Person have been deliberately randomized to several blocks and offset to an intersection. No time or street location name will be provided for these offences. For property related offences, the VPD has provided the location to the hundred block of these incidents within the general area of the block. All data must be considered offset and users should not interpret any locations as related to a specific person or specific property.
Data accuracy comments	The Vancouver Police Department's GeoDASH Crime Map remains the authoritative source. Note: GeoDASH stands for Geographic Data Analysis and Statistics Hub. It is a crime mapping tool used by Vancouver Police Department (VPD) to inform residents on the crime activities happening in Vancouver.
Attributes	▪ TYPE ▪ YEAR ▪ MONTH ▪ DAY ▪ HOUR ▪ MINUTE ▪ HUNDRED_BLOCK ▪ NEIGHBOURHOOD ▪ X ▪ Y

data.vancouver.ca/datacatalogue/crime-data.htm

DEMO

Jan
Dec
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
months
= 15 crimes
Break and Enter Commercial
Break and Enter Residential-Other
Mischief
Theft of Bicycle
Theft of Vehicle
Theft from Vehicle
Other Theft
Vehicle Collision or Pedestrian Struck (with Fatality)
Vehicle Collision or Pedestrian Struck (with Injury)
Jan 2013
Feb 2013
Mar 2013
Apr 2013
May 2013
Jun 2013
Jul 2013
Aug 2013
Sep 2013
Oct 2013
Nov 2013
Dec 2013
Central Business District
Fairview
Kitsilano
Arbutus Ridge


Jan 2012 - Dec 2012 vs. Jan 2016 - Dec 2016
Jan
Dec
Jan
Dec
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Show dates
+
−
BURNABY HEIGHTS
CAPITOL HILL
STRATHCONA
KITSILANO
VANCOUVER
DUNBAR
SHAUGHNESSY
RENFREW-COLLINGWOOD
GARDEN VILLAGE
KERRISDALE
OAKRIDGE
METROTOWN
SUNSET
-100% to -82%
-82% to -64%
-64% to -45%
-45% to -27%
-27% to -9%
-9% to 9%
9% to 27%
27% to 45%
45% to 64%
64% to 82%
82% to 100%
size shows the difference in crime rates
Leaflet | © OpenStreetMap © CartoDB

Tools

- d3.js (v 4)
- leaflet.js (v 1.2.0)
- HTML, CSS, Javascript
- python3

Preprocessing

- UTM to Latitude-Longitude
- Binning crimes by geography, and by type x neighbourhood

Limitations

- Data limitations
  (sensitive crimes, e.g. *homicide*, are not visualizable)
- Finest granularity window is measured in days
- All shown data is aggregated
- Grid size is not adjustable

Future

- Adjustable grid sizes
- Aggregate across discontinuous similar windows
    (day vs night, seasons)

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Thanks!

images:
http://geodash.vpd.ca
http://i.dailymail.co.uk/i/pix/2012/08/04/article-2183663-121153A0000005DC-701_634x392.jpg
http://www.humanresourcecouncil.org/images/housing/HOMEBUYER_section_FAMILY.jpg
http://i.imgur.com/XvLIlye.jpg
https://d3js.org/
http://leafletjs.com/
http://www.vegetalindia.com/personalcare/wp-content/uploads/2017/06/Anti-Wrinkle-Cream_Day-Night-Cream.jpg