How to deal with data?

IFT6758, Fall 2020; Lecture 1

Data is variable

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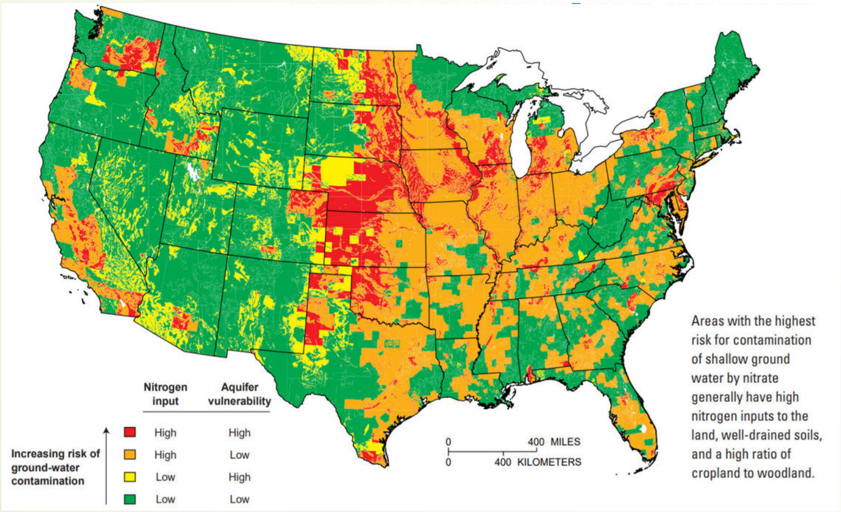
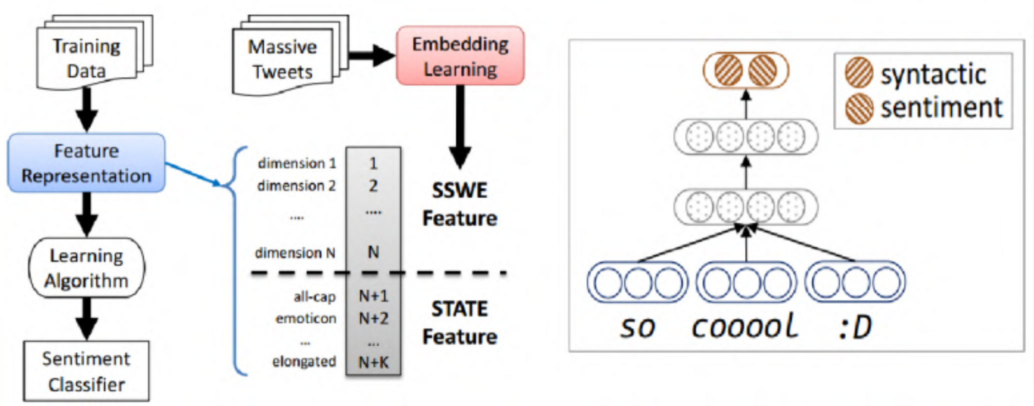
- Data is varied across domains and within domains





Data wrangling

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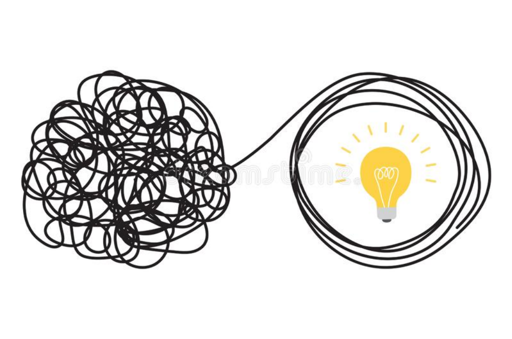
      Tidy data

      Tidy data in Python

You just got some data



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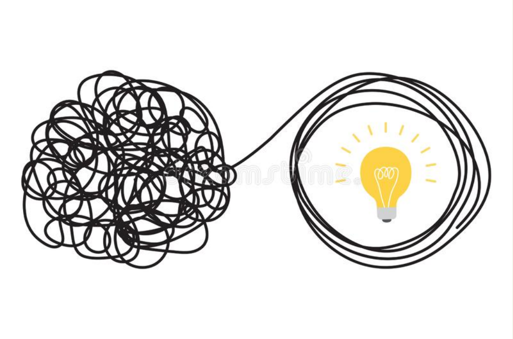
- Understand what the variables are



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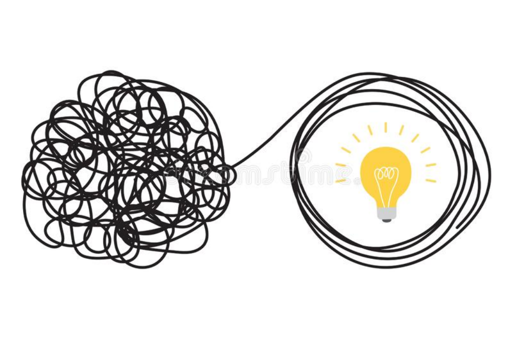
- Manage column types



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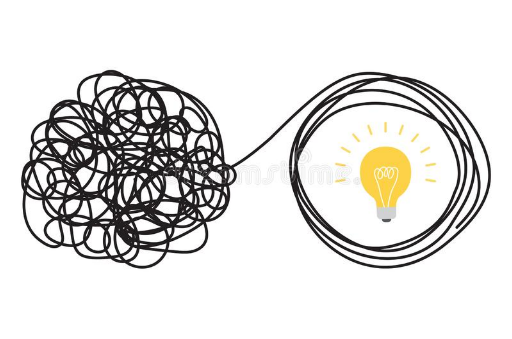
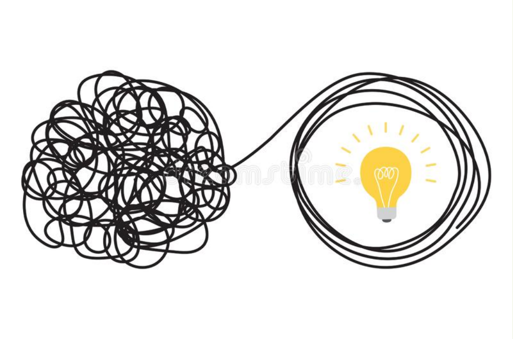
- Handle missing values



You just got some data

- Understand what the variables are
- Manage column types
- Handle missing values
- Join, reorganize, and tidy



Understand the data: Metadata

- What do the tables mean?
- What do the columns mean?
- How were the data collected?

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emlployee_id	first_name	last_name	nin	department_id
44	Simon	Martinez	HH 45 09 73 D	1
45	Thomas	Goldstein	SA 75 35 42 B	2
46	Eugene	Cornelsen	NE 22 63 82	2
47	Andrew	Petculescu	XY 29 87 61 A	1
48	Ruth	Stadick	MA 12 89 36 A	15
49	Barry	Scardelis	AT 20 73 18	2
50	Sidney	Hunter	HW 12 94 21 C	6
51	Jeffrey	Evans	LX 13 26 39 B	6
52	Doris	Berndt	YA 49 88 11 A	3
53	Diane	Eaton	BE 08 74 68 A	1
54	Bonnie	Hall	WW 53 77 68 A	15
55	Taylor	Li	ZE 55 22 80 B	1

Data

Metadata

Column	Data Type	Description
emlployee_id	int	Primary key of a table
first_name	nvarchar(50)	Employee first name
last_name	nvarchar(50)	Employee last name
nin	nvarchar(15)	National Identification Number
position	nvarchar(50)	Current postion title, e.g. Secretary
department_id	int	Employee deparmtnet. Ref: Departmetns
gender	char(1)	M = Male, F = Female, Null = unknown
employment_start_date	date	Start date of employment in organization.
employment_end_date	date	Employment end date. Null if employee sti

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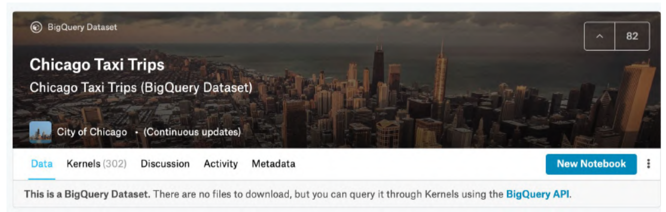
  - Chicago Taxi Trips (BigQuery Dataset)
  - includes taxi trips (7000 licensed taxicabs) from 2013 to the present



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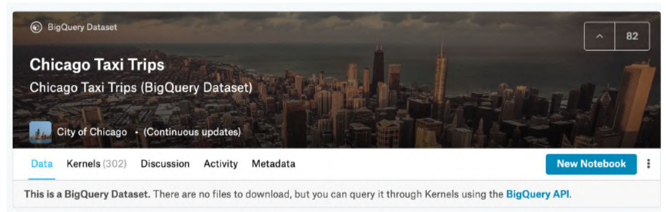


```
In [6]:
taxi.dtypes
Out [6]:
unique_key                    object
taxi_id                       object
trip_start_timestamp          object
trip_end_timestamp            object
trip_seconds                 float64
trip_miles                   float64
pickup_census_tract          float64
dropoff_census_tract         float64
pickup_community_area        float64
dropoff_community_area       float64
fare                         float64
tips                         float64
tolls                        float64
extras                       float64
trip_total                   float64
payment_type                  object
company                       object
pickup_latitude              float64
pickup_longitude             float64
pickup_location              float64
dropoff_latitude             float64
dropoff_longitude            float64
dropoff_location             float64
dtype: object
```

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- Use **Python datetime package** and pandas' timestamp and to_datetime
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```
import datetime

x = datetime.datetime(2018, 6, 1)

print(x.strftime("%B"))
```

June

Managing types: Dates

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- Lets you convert **arbitrary strings into datetime objects**

"22-01-2019T15:00:02" → datetime.datetime(2019, 1, 22, 15, 0, 2)

Once it is in datetime format, new attributes can be derived

```
import datetime

x = datetime.datetime.now()

print(x.year)
print(x.strftime("%A"))
```

```
2020
Friday
```

Managing types: Categoricals

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Common issues

- Overwhelming number of levels

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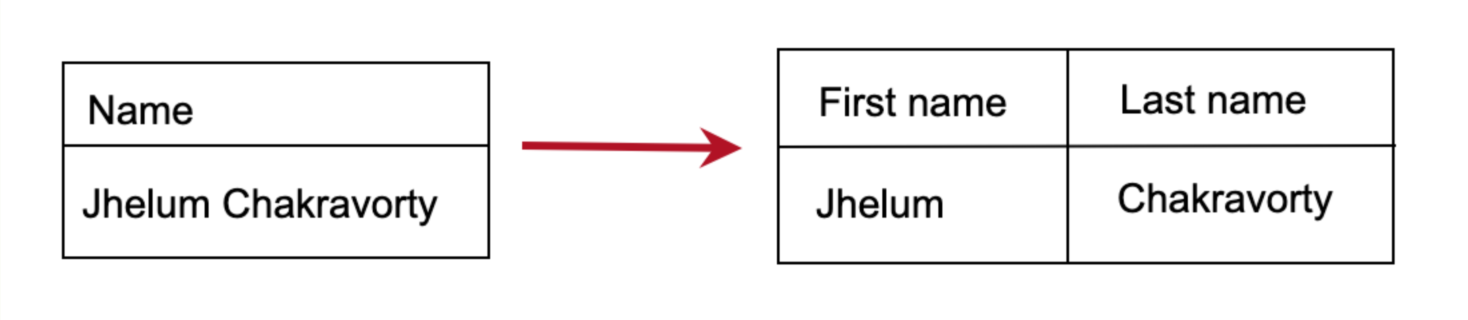

Managing types: Categoricals

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Common Issues

- The levels might not be consolidated

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vegetable
POTATO
carrot
potato

vegetable
potato
carrot
potato

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Common Issues

- You might want to convert into numerical vectors

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Happy?
yes
yes
no
maybe
no

yes	no	maybe
1	0	0
1	0	0
0	1	0
0	0	1
0	1	0

Missing values

- Real-world data can be missing due to various reasons: e.g., observations that were not recorded and data corruption.
- **Handling missing values is important**. Many machine learning algorithms do not support data with missing values.
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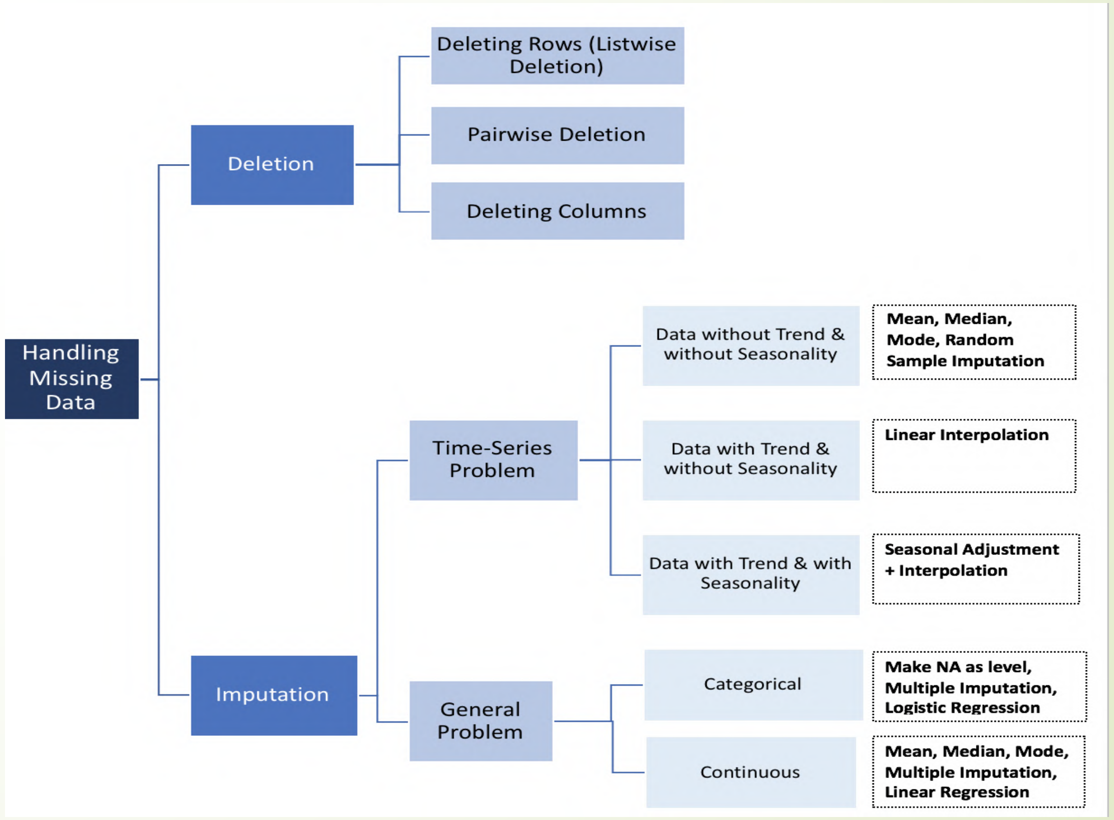

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- Many ways.
  - Imputation and deletion
  - A useful tutorial

Joining, Reorganizing and Tidying

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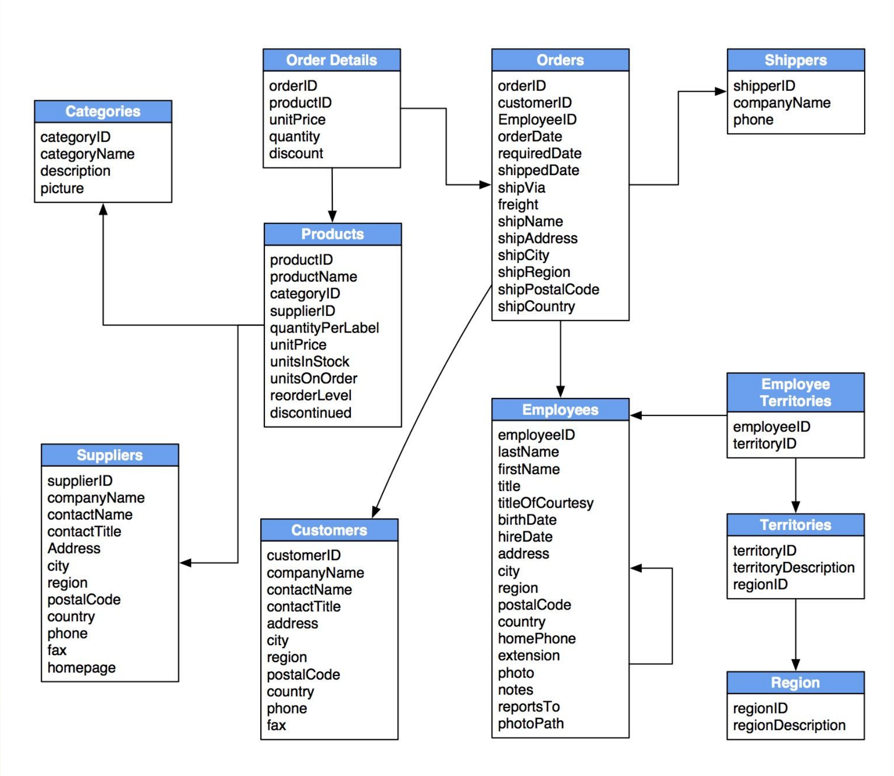

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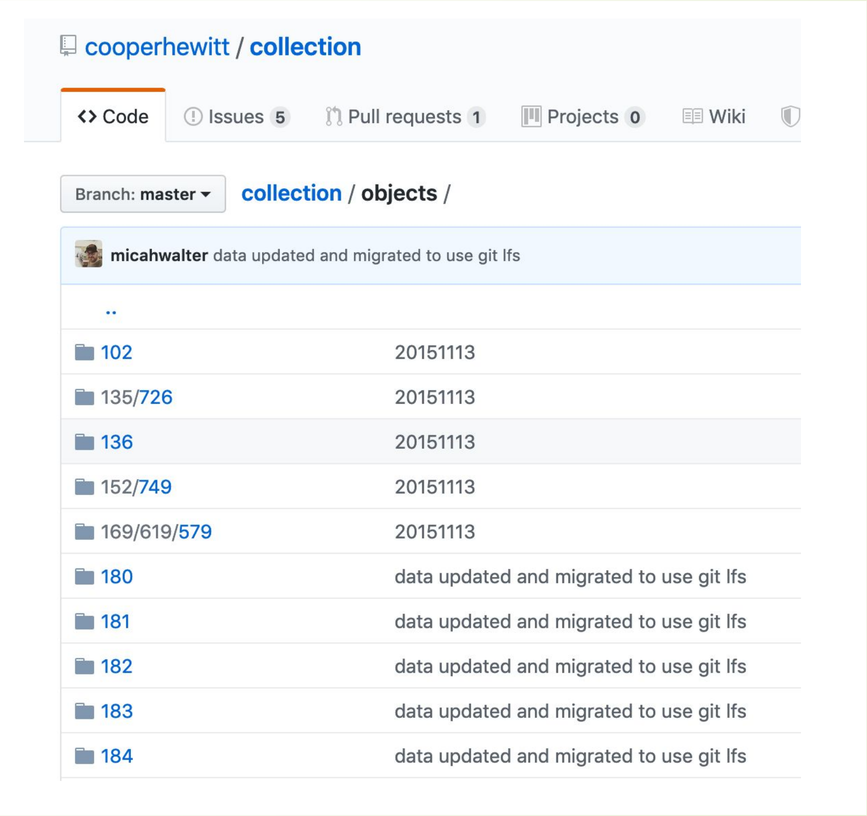

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```
,width,height,channels,im_size,ctime,mtime,img_files,img_folders,img_subfolders
0,1300,1300,1,3383838,1515131214.7275624,1511274026.0,AOI_2_Vegas_Roads_Test_Public,PAN,PAN_AOI_2_Vegas_img1510.tif
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7,1300,1300,1,3383838,1515131223.0555677,1511274031.0,AOI_2_Vegas_Roads_Test_Public,PAN,PAN_AOI_2_Vegas_img127.tif
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```

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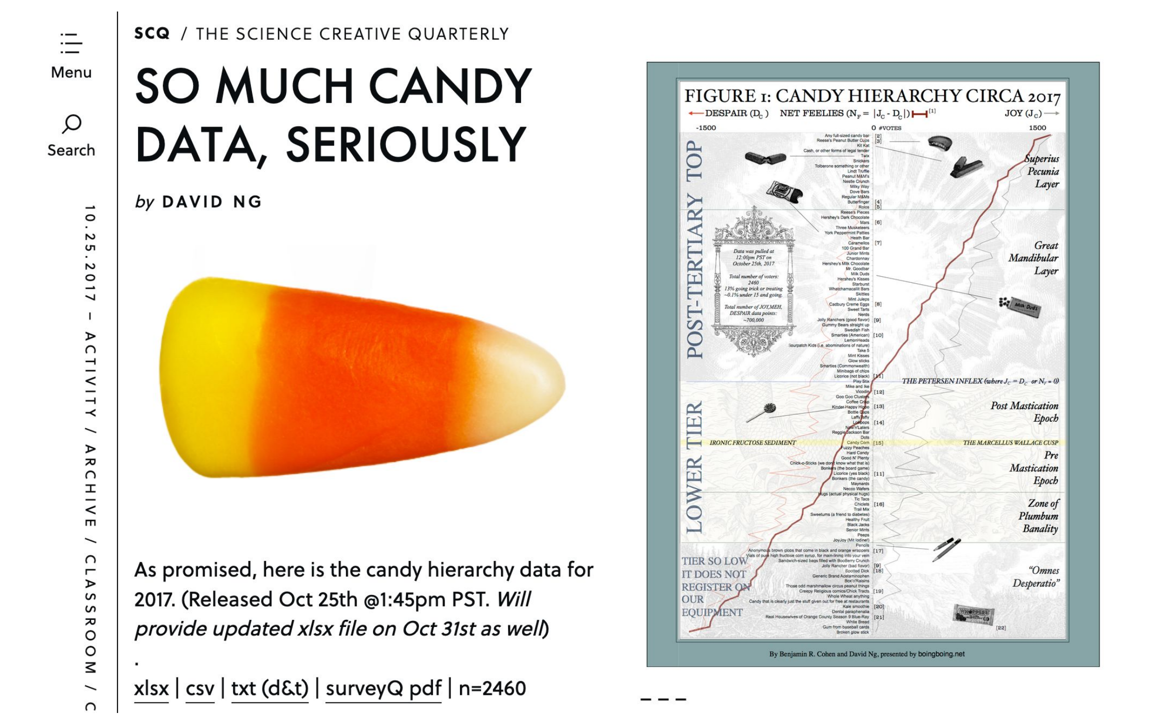

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- Embrace complexity and move forward