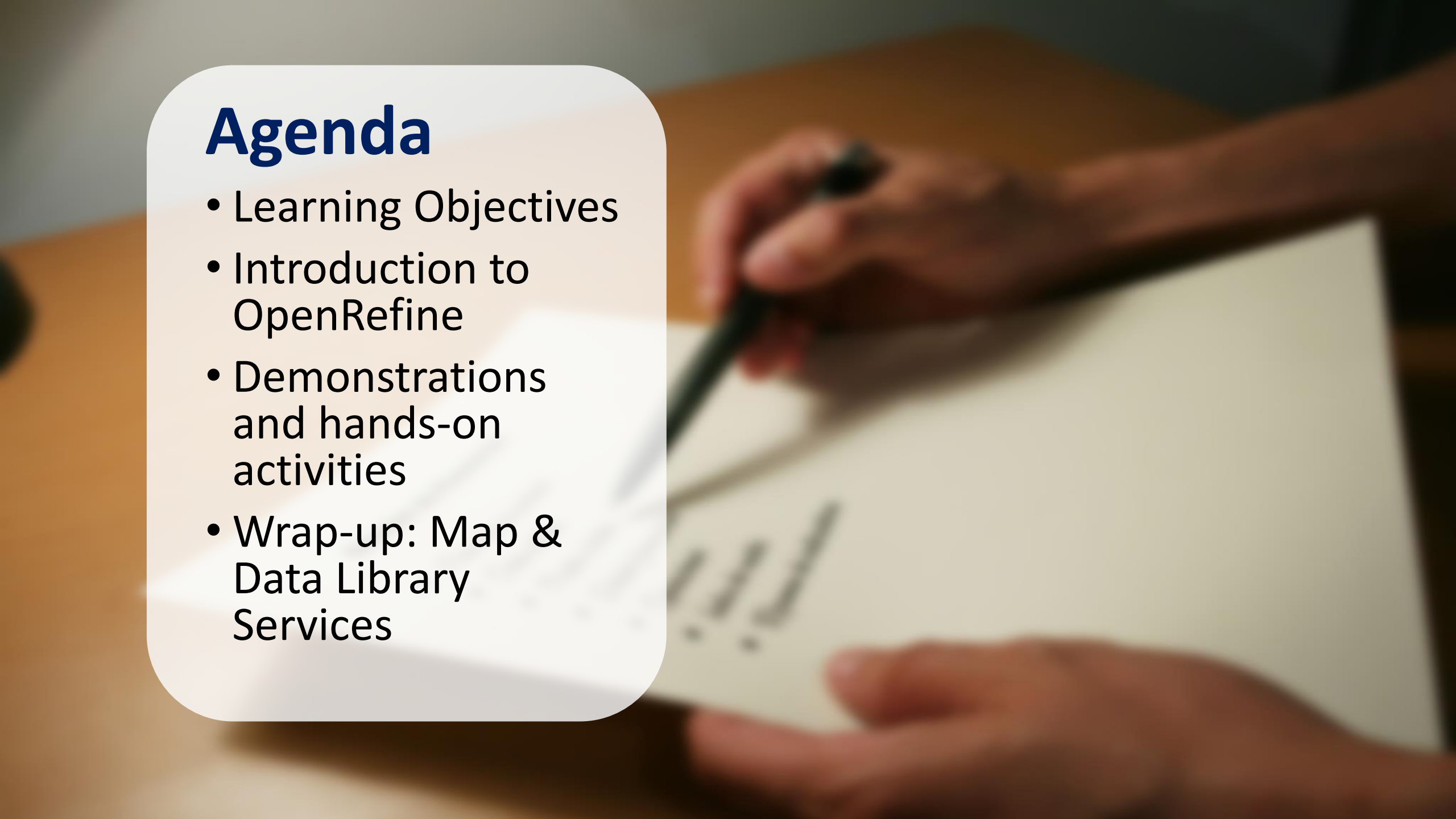
Working with Messy Data in OpenRefine

Kelly Schultz, Data Visualization Librarian



Agenda

- Learning Objectives
- Introduction to OpenRefine
- Demonstrations and hands-on activities
- Wrap-up: Map & Data Library Services

Learning objectives

- Participants will be able to use OpenRefine to:

  - ✓ Manipulate both textual and numeric data
  - ✓ Create new data, transform and reshape datasets, and search and filter data in a variety of ways. GREL expressions and regular expressions will be introduced
  - ✓ Use APIs to bring data into OpenRefine

- Participants will be aware of Map & Data Library services and know where to go for more help

OpenRefine

A free, open source, powerful to
for working with messy data

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Documentation

Community

Post archive

OpenRefine News: Spring 2016

OpenRefine News: December 2015

OpenRefine News: November 2015

Welcome!

OpenRefine (formerly Google Refine) is a powerful tool for working with messy data: cleaning it; transforming it from one format into another; and extending it with web services and external data.

Please note that since October 2nd, 2012, Google is not actively supporting this project, which has now been rebranded to OpenRefine. Project development, documentation and promotion is now fully supported by volunteers. Find out more about the history of OpenRefine and how you can help the community.

2017 OpenRefine User Survey

It's been a while since our last user survey (see the result from the 2014 edition), we would like to know who you are, how you use OpenRefine and what your expectations are. So here it is the 2017 edition of the OpenRefine u survey! Thank you for sharing it with your friends, coworker, and communities!

Take the survey

Using OpenRefine - The Book

Why OpenRefine?

vs

Installing OpenRefine

- OpenRefine is installed locally on your computer, even though it uses a web browser as the user interface
- A copy of your data files are saved locally on your computer

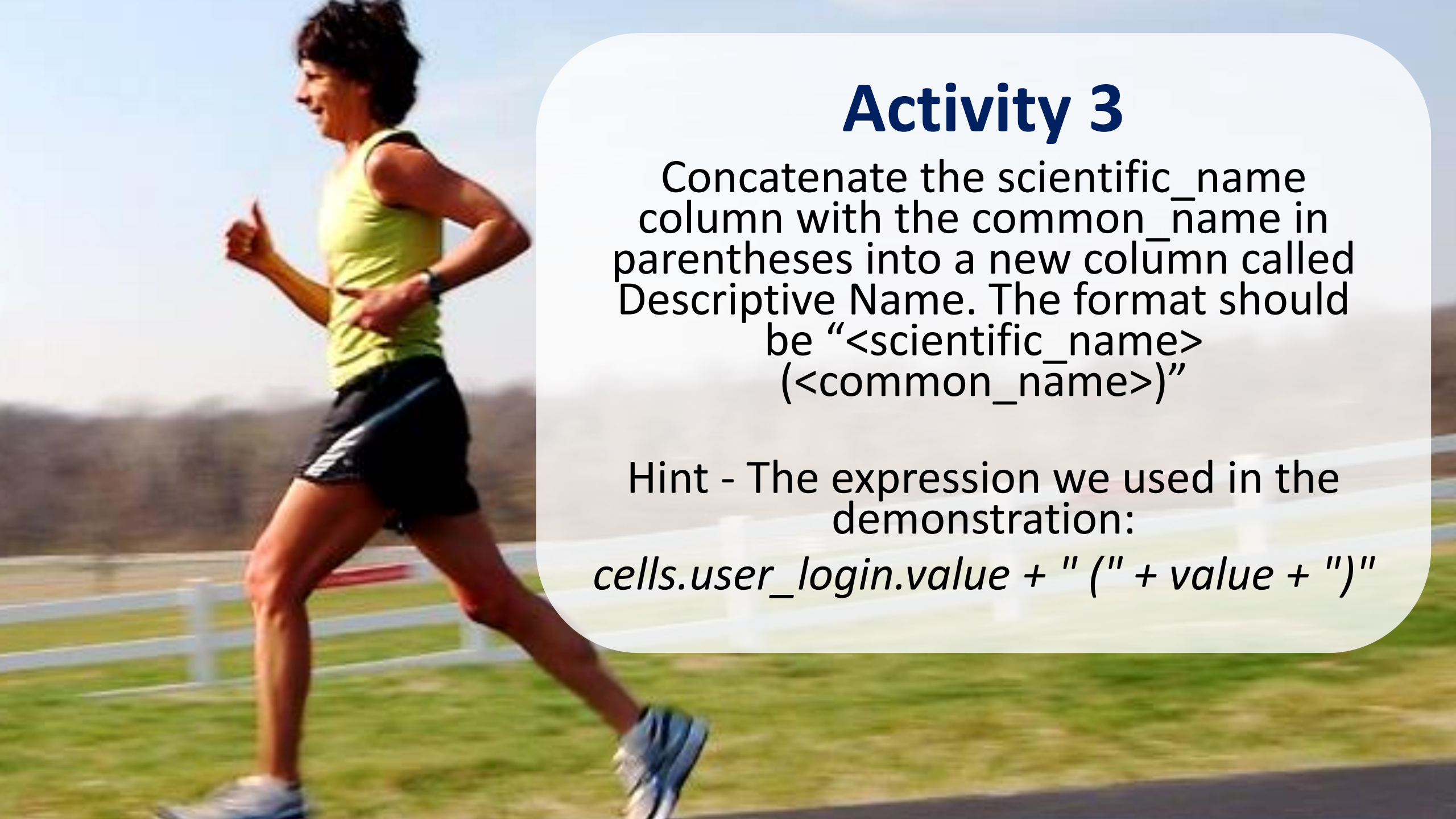
Demonstrations/Hands-on practice

Activity 1

Add another text facet on the household expenditures column. What did the average household in British Columbia spend on pet food in 2016?

Activity 2

Try playing around with the cluster methods and see if you can clean up the species_guess column's values more.



Activity 3

Concatenate the scientific_name column with the common_name in parentheses into a new column called Descriptive Name. The format should be “<scientific_name> (<common_name>)”

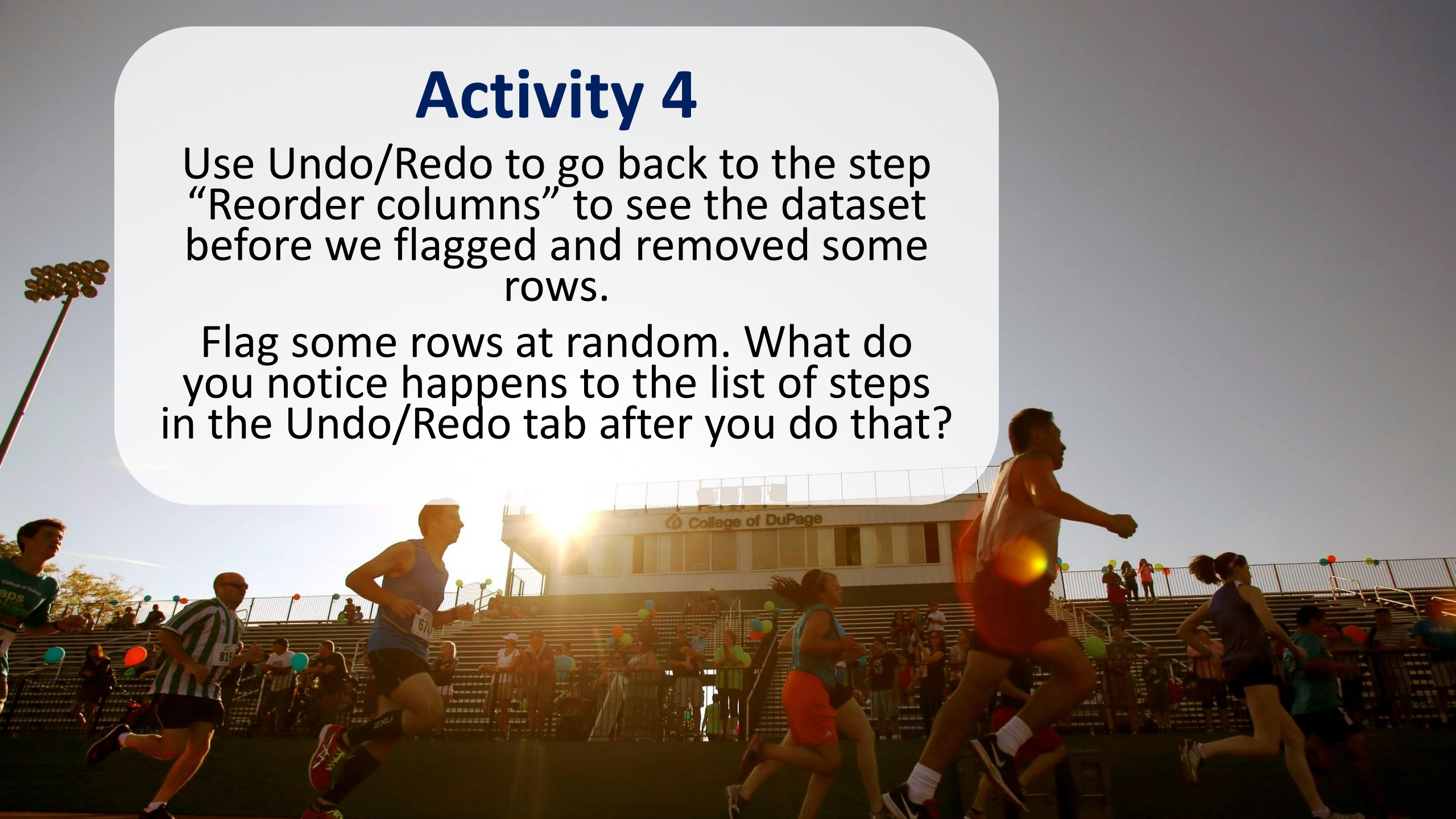
Hint - The expression we used in the demonstration:

cells.user_login.value + " (" + value + ")"

Activity 4

Use Undo/Redo to go back to the step “Reorder columns” to see the dataset before we flagged and removed some rows.

Flag some rows at random. What do you notice happens to the list of steps in the Undo/Redo tab after you do that?



Break

What is a “regular expression”?

- A sequence of characters that define a search pattern
- Used to search for 'matches' within text (strings)
- Can also be called:
  - Regex
  - Regexp
  - Pattern
  - Rational expression

SAVE & SHARE

save regex ctrl+s

FLAVOR

- pcre (php) ✔
- javascript
- python
- golang

TOOLS

- code generator
- regex debugger

REGULAR EXPRESSION

no match

/ insert your regular expression here / g

TEST STRING

SWITCH TO UNIT TESTS

insert your test string here

Learning to write them

- To practice, we'll use a web-based tool to see results in real time

regex101.com

- Later, we'll use them in OpenRefine to do something useful

EXPLANATION

An explanation of yo

MATCH INFORMATIO

Detailed match info

QUICK REFERENCE

Search reference

- all tokens
- common toke
- general tokens
- anchors

Notebook 1

Site	Date	Measurement
Baker	2009-11-17	1223.0
Baker	2010-06-24	1122.7
Baker	2009-05-24	2819.0
Baker	2010-08-25	2971.6
Baker	2011-01-05	1410.0
Baker	2010-09-04	4671.6

Notebook 2

Site/Date/Measurement

Davison/May 23, 2010/1724.7

Pertwee/May 24, 2010/2103.8

Davison/June 19, 2010/1731.9

Davison/July 6, 2010/2010.7

Pertwee/Aug 4 2010/1731.3

Davison/Apr 22, 201/2122.2

Pertwee/Sept 3, 2010/3981.0

Sample data

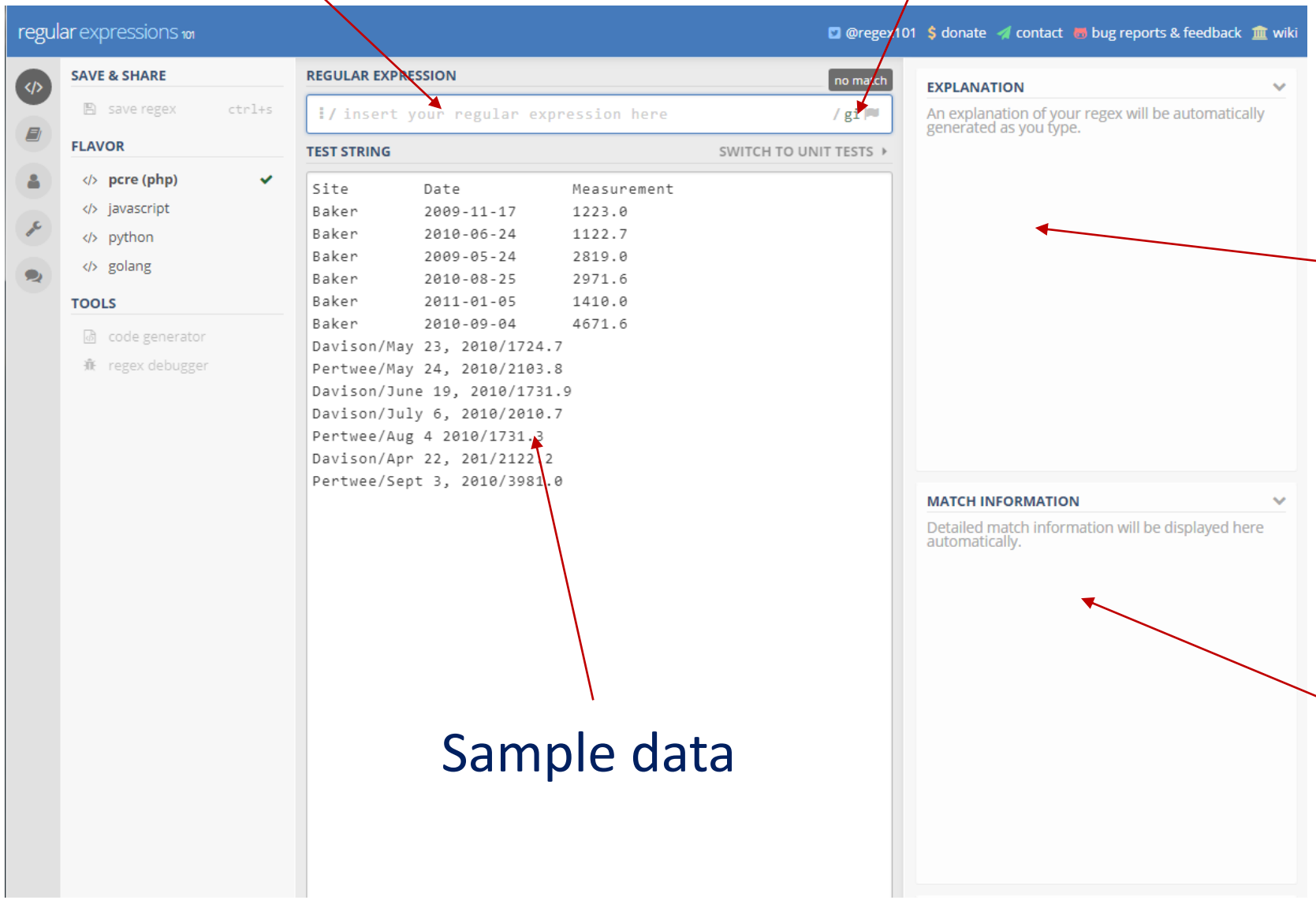
Note: The sample data is adapted from the Software Carpentry lesson: http://v4.software-carpentry.org/regexp/patterns.html

Accessing the sample data

- Open text file "sample_data.txt"
- Copy the contents
- Paste it into regex101.com, in the "TEST STRING" box

Type your regular expression here

Add mode modifiers here

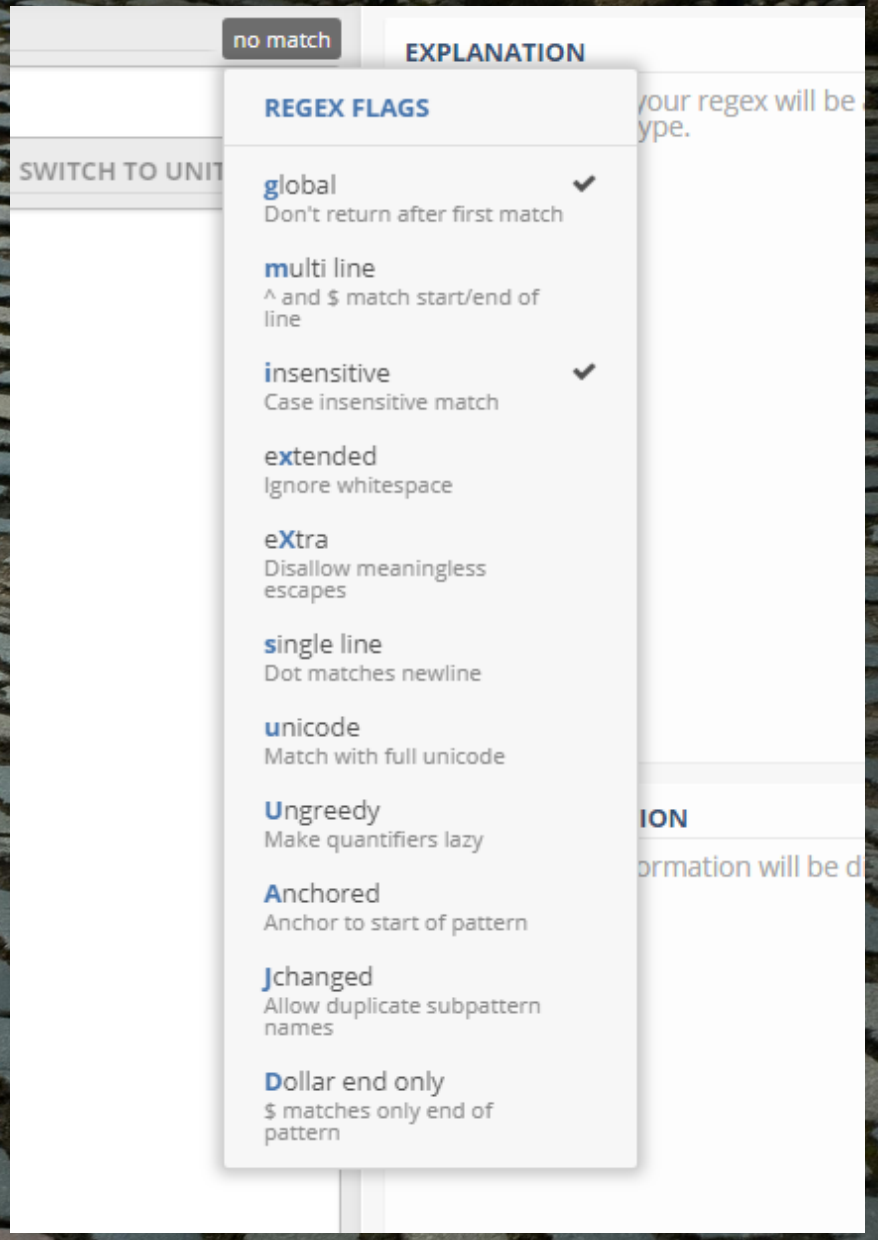


Information about your expression

Sample data

Matches made by your expression

Mode modifiers



Metacharacters & operators

There are certain characters that have special meaning in regular expressions, these are `\` , `|` , `(` `)` `.` `[` `]` `*` `+` `?` `{` `}` `^` `$` .

These are used in combination with text characters to construct regular expressions.

Operator	Description
\	Escape character - use when you need to include a metacharacter as a literal in a regular expression e.g. `\.txt`
|	OR (alternation) e.g. `wom[a|e]n`
( )	Group e.g. `(....)-(..)-(..)` for a date
.	Match any single character e.g. `wom.n`
[abc]	Match any of a, b, or c. e.g. `[btr]ent`
[a-c]	Match any character between a and c. e.g. `[a-z]ent`
*	The preceding item will be matched zero or more times e.g. `teen[a-z]*`
+	The preceding item will be matched one or more times `organi.+`
?	The preceding item is optional and will be matched once at most, e.g. `colo?r` Used to make a quantifier 'lazy', e.g. `.+?`
{N}	The preceding item is matched exactly N times `[0-9]{4}`
{N,}	The preceding item is matched N or more times `[0-9]{4,}`
{N,M}	The preceding item is matched at least N times, but not more than M times `[0-9]{4,6}`
^	Anchor: matches only at the start of the string e.g. `^b` When used within a character set, negates the set, i.e. matches all characters *not* in the set - e.g. `[^abc]`
$	Anchor: matches only at the end of the string e.g. `b$`
\b	Anchor: matches at "word boundary" (zero length position), i.e. transition from word to non-word characters. This allows you to perform "whole word only" searchers e.g. `\bword\b`
\w	Shorthand character class: "word". Marches all the ASCII characters [A-Za-z0-9_]
\s	Shorthand character class: "whitespace". Matches non-word characters including space, tab, line break or form feed.

Metacharacters & operators

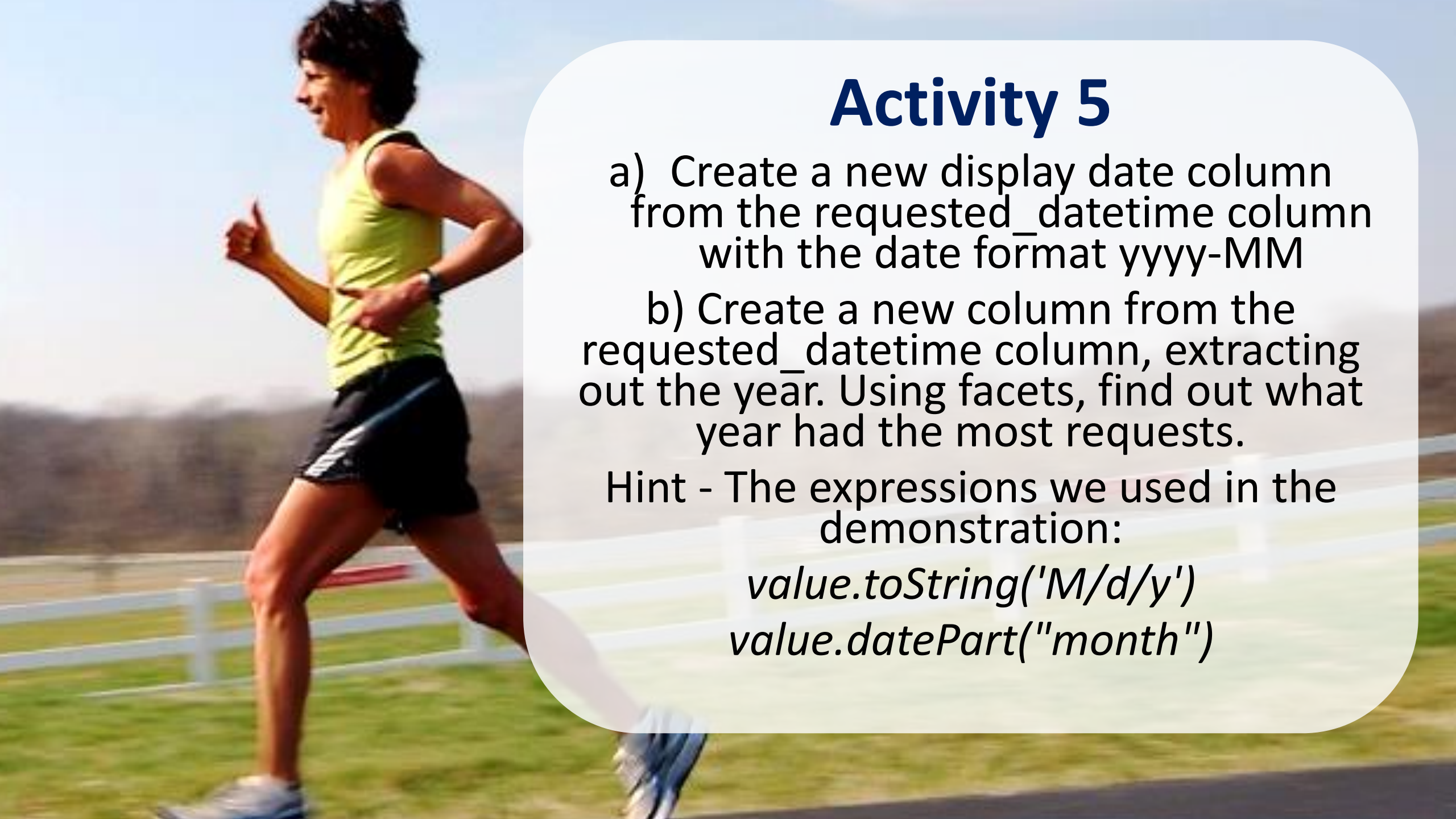
APIs (Application Programming Interface)

- Web APIs – construct a URL and specify the parameters you want to make a data request
- Example: ***https://secure.toronto.ca/webwizard/ws/requests.json?service_code=CSROSC-14&jurisdiction_id=toronto.ca***

```
[
    {
        "id": 2,
        "name": "An ice sculpture",
        "price": 12.50,
        "tags": ["cold", "ice"],
        "dimensions": {
            "length": 7.0,
            "width": 12.0,
            "height": 9.5
        },
        "warehouseLocation": {
            "latitude": -78.75,
            "longitude": 20.4
        }
    },
```


JSON

- Made up of key/value pairs
- Uses curly brackets and colons to structure the data and create the nested format
- Example:
  “price”: 12.50



Activity 5

a) Create a new display date column from the requested_datetime column with the date format yyyy-MM

b) Create a new column from the requested_datetime column, extracting out the year. Using facets, find out what year had the most requests.

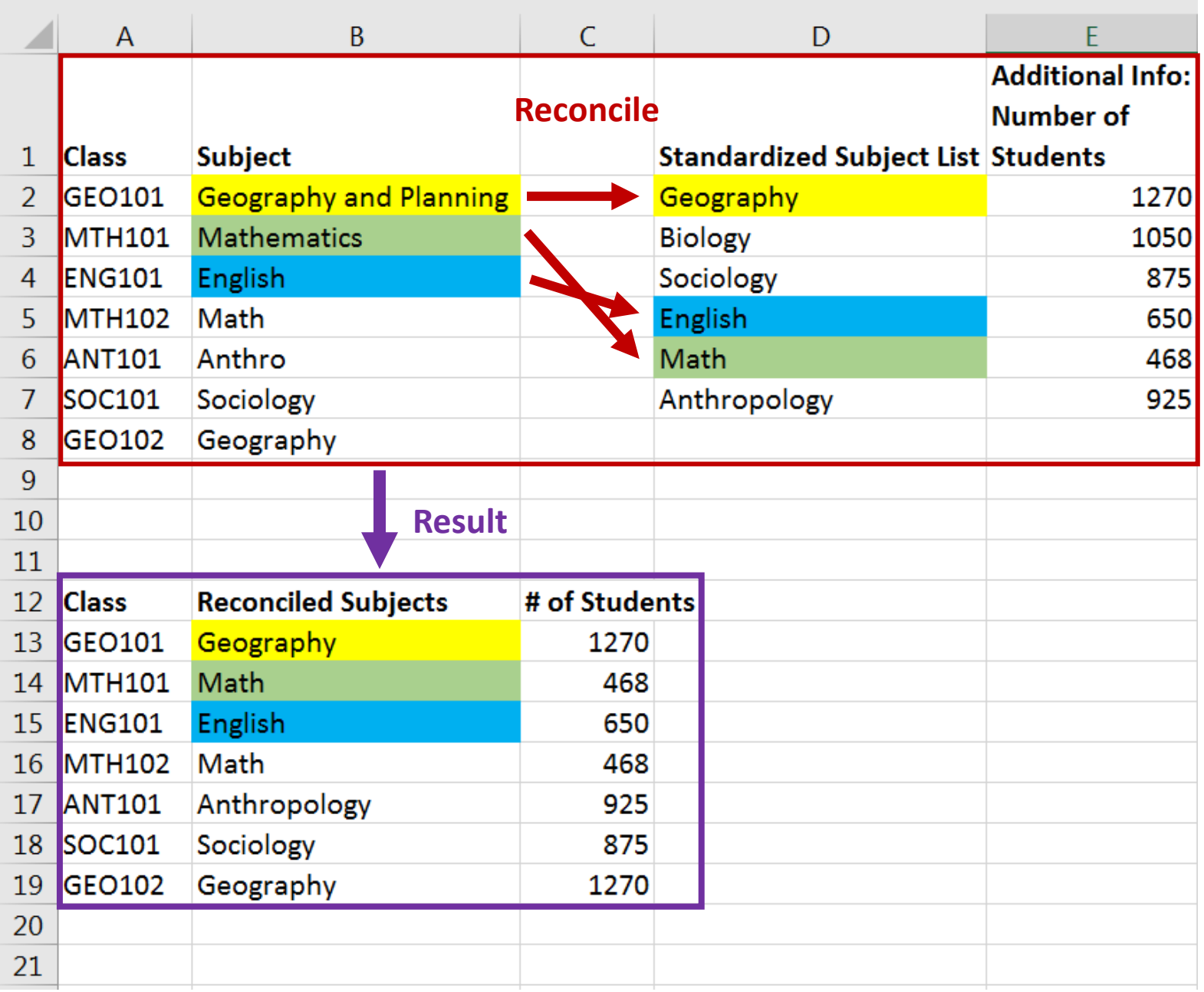
Hint - The expressions we used in the demonstration:

value.toString('M/d/y')

value.datePart("month")

OpenRefine Reconciliation Services

- Look up values in a reconciliation database to find potential matches
- Use matched information to standardize dataset terms and add additional data



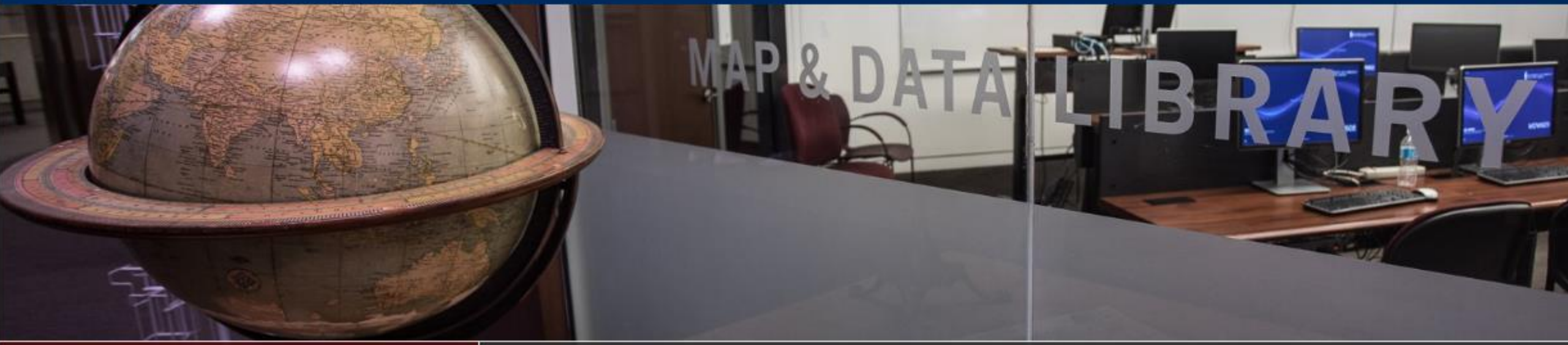
	A	B	C	D	E
1	Class	Subject		Standardized Subject List	Additional Info: Number of Students
2	GEO101	Geography and Planning		Geography	1270
3	MTH101	Mathematics		Biology	1050
4	ENG101	English		Sociology	875
5	MTH102	Math		English	650
6	ANT101	Anthro		Math	468
7	SOC101	Sociology		Anthropology	925
8	GEO102	Geography			
9					
10					
11					
12	Class	Reconciled Subjects	# of Students		
13	GEO101	Geography	1270		
14	MTH101	Math	468		
15	ENG101	English	650		
16	MTH102	Math	468		
17	ANT101	Anthropology	925		
18	SOC101	Sociology	875		
19	GEO102	Geography	1270		
20					
21					

Closing OpenRefine

- Switch to the command window open and press the **Ctrl key** and **C** together
- Wait until there's a message that says the shutdown is complete

UNIVERSITY OF TORONTO
MAP & DATA LIBRARY

Research Learn Techno



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Helpful resources

- OpenRefine documentation wiki: https://github.com/OpenRefine/OpenRefine/wiki/Documentation-For-Users
- OpenRefine Tutorial from John Little (Duke University): https://libjohn.github.io/openrefine/index.html
- Software Carpentry OpenRefine Workshop for Librarians: https://librarycarpentry.github.io/lc-open-refine/
- Cleaning Data with OpenRefine from the Programming Historian: https://programminghistorian.org/lessons/cleaning-data-with-openrefine
- Fetching and Parsing Data from the Web with OpenRefine from the Programming Historian: https://programminghistorian.org/lessons/fetch-and-parse-data-with-openrefine
- Regex Cheat Sheet: http://www.rexegg.com/regex-quickstart.html

Activity (for GPS Credit)

Email me (kelly.schultz@utoronto.ca) the spreadsheet and reflection paragraph within 1 week

Cleaned Dataset

1. Go through the activity handouts called: AugmentingActivity1_PreparingtheData.pdf and AugmentingActivity2_Reconciliation.pdf
2. Export the resulting cleaned dataset as an Excel file

Reflection – One Paragraph

1. What you thought were the most important things you learned today
2. Why are they important
3. How you will apply this knowledge in the future

Wrap-Up


1) Key lesson?
2) Anything unclear?
3) Useful workshop?
Why/Why not?

Data sources

- Statistics Canada CANSIM Table 203-0021 - Survey of household spending (SHS), household spending, Canada, regions and provinces, annual (dollars): http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2030021&tabMode=dataTable&p1=1&p2=-1&srchLan=-1&pattern=household+spending
- Wolfpack Citizen Science Challenge Spring 2017 - North Carolina State iNaturalist Observations: https://data.world/wcsc/spring-2017-challenge/workspace/file?datasetid=north-carolina-state-inaturalist-observations&filename=observations-18840.csv (Must complete a free registration with data.world to access the data)
- The sample data is adapted from the Software Carpentry lesson: http://v4.software-carpentry.org/regexp/patterns.html
- 311 - Open311 API Calls for Service Requests: https://www.toronto.ca/city-government/data-research-maps/open-data/open-data-catalogue/#e2634d40-0dbf-4d91-12fa-83f039307e93
- Project Gutenberg (http://www.gutenberg.org/) top 32 English books, accessed via this API: https://github.com/garethbjohnson/gutendex

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