poloclub.github.io/#cse6242

CSE6242/CX4242: Data & Visual Analytics

Data Cleaning

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Partly based on materials by Guy Lebanon, Jeffrey Heer, John Stasko, Christos Faloutsos

Data Cleaning

How dirty is real data?

How dirty is real data?

Examples

- Jan 19, 2016
- January 19, 16
- 1/19/16
- 2006-01-19
- 19/1/16

http://blogs.verdantis.com/wp-content/uploads/2015/02/Data-cleansing.jpg

How dirty is real data?

Comes up with **5+ kinds of “data dirtiness”**

60 seconds

How dirty is real data?

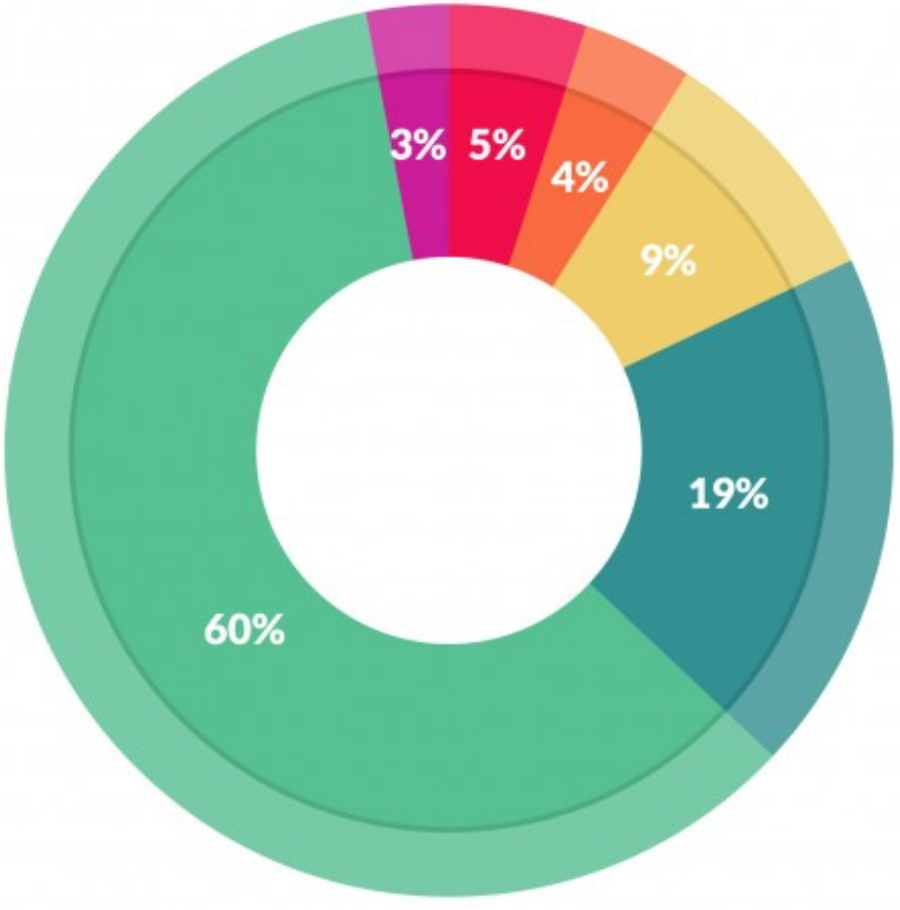
How dirty is real data?

- Coding;
- duplicated data
- Encding UTF-8l special characters
- Outliers
- Outdated
- Missing data/features; sparse data
- Different names for the same thing; abbreviation
- Data that needs more context
- Feature misalignment
- Different units, types
- Extra works, spelling errors
- Inconsistent formatting
- False positives (irrelevant data)
- Multiple data sources (potentially disagree)
- Not handling delimiters
- Code mixing (diff language)

Importance of Data Cleaning

“80%” Time Spent on Data Preparation

Cleaning Big Data: Most Time-Consuming, Least Enjoyable Data Science Task, Survey Says [Forbes]
http://www.forbes.com/sites/gilpress/2016/03/23/data-preparation-most-time-consuming-least-enjoyable-data-science-task-survey-says/#73bf5b137f75



What data scientists spend the most time doing

- *Building training sets: 3%*
- *Cleaning and organizing data: 60%*
- *Collecting data sets; 19%*
- *Mining data for patterns: 9%*
- *Refining algorithms: 4%*
- *Other: 5%*

Writing “Clean Code”

- Be careful with **trailing whitespaces**
- Indent code (**spaces vs tabs**) following coding practices in your team/company
  https://google.github.io/styleguide/javaguide.html#s4.2-block-indentation

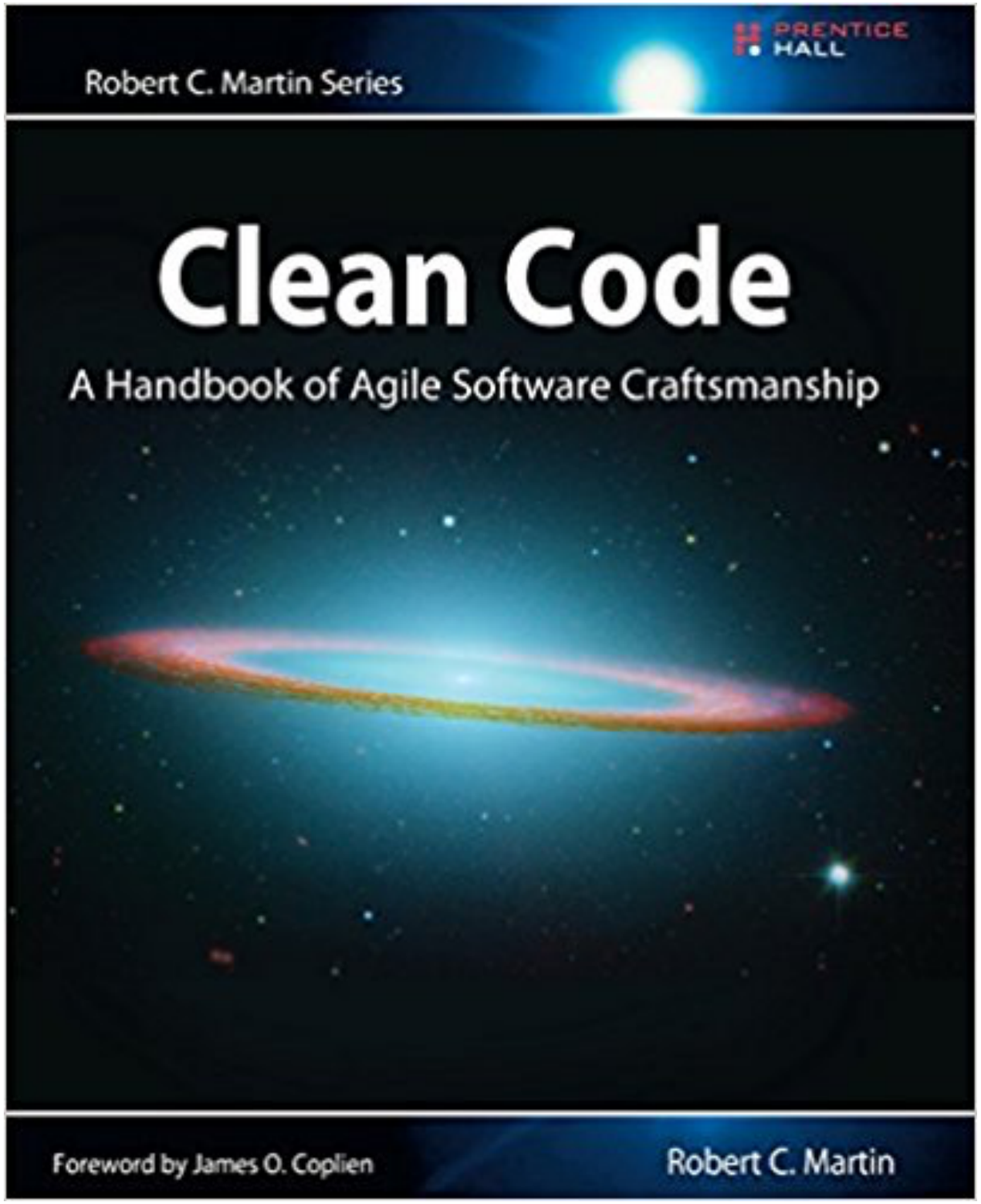
…there’s *no way* I'm going to be with someone who uses spaces over tabs…

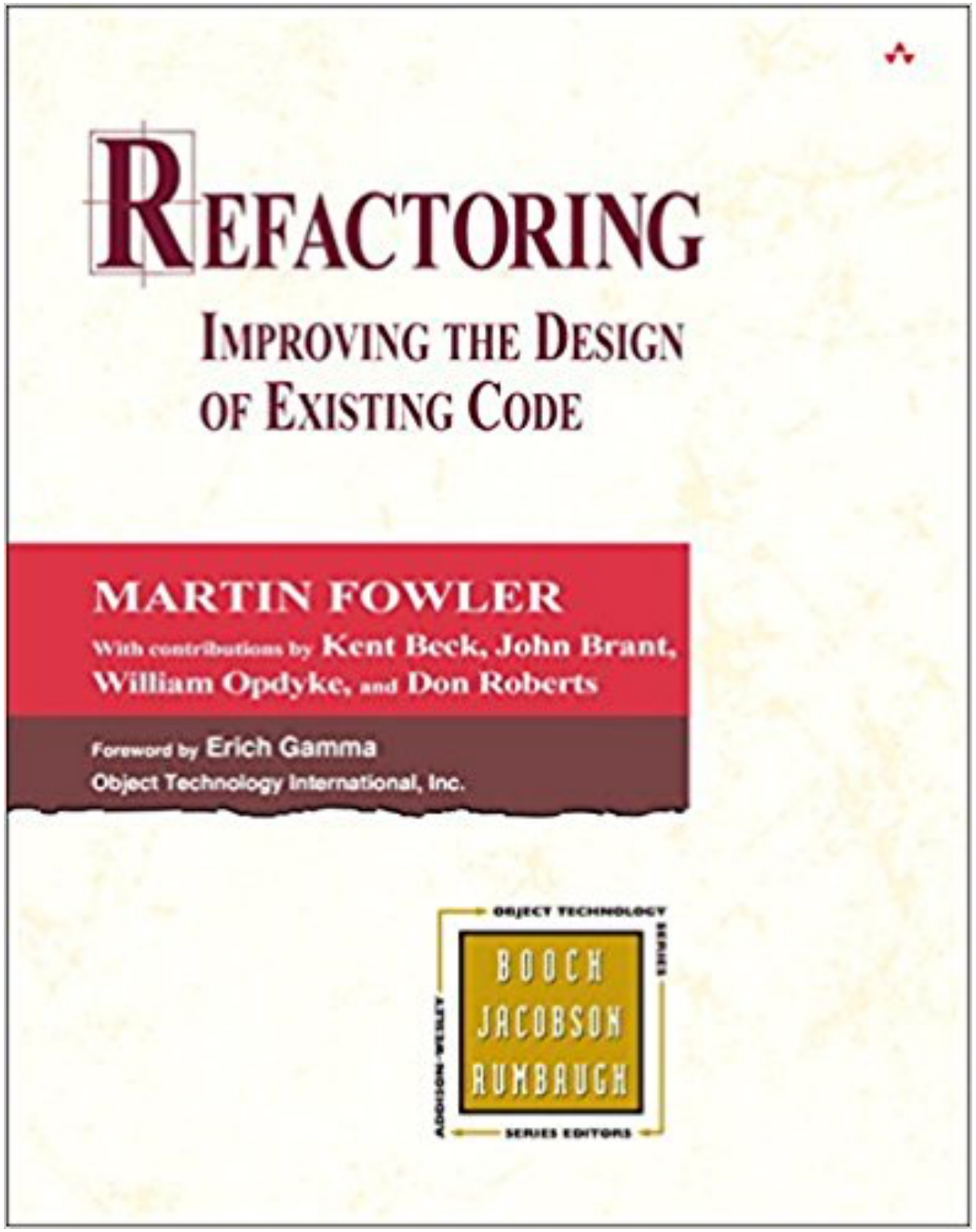
http://www.businessinsider.com/tabs-vs-spaces-from-silicon-valley-2016-5

Trailing whitespace is evil — leads to “false differences”.
Don't commit evil into your repo.

https://stackoverflow.com/questions/300489/why-is-it-bad-to-commit-lines-with-trailing-whitespace-into-source-control

Both available **free** for GT students on https://www.oreilly.com/





Data Cleaners

Watch videos

- Data Wrangler (research started at Stanford)
- Open Refine (previously **Google Refine**)

in Alabama	Alabama
in Alaska	Alaska
in Arizona	Arizona
in Arkansas	Arkansas

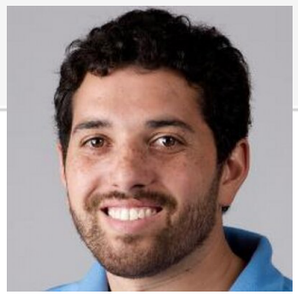
Write down

- Examples of **data dirtiness**
- Tool's **features** demo-ed (or that you like)

Will collectively summarize similarities and differences afterwards

Open Refine: http://openrefine.org video#1
Data Wrangler: http://vis.stanford.edu/wrangler/

DataWrangler alpha




Wrangler is an interactive tool for data cleaning and transformation.
Spend less time formatting and more time analyzing your data.

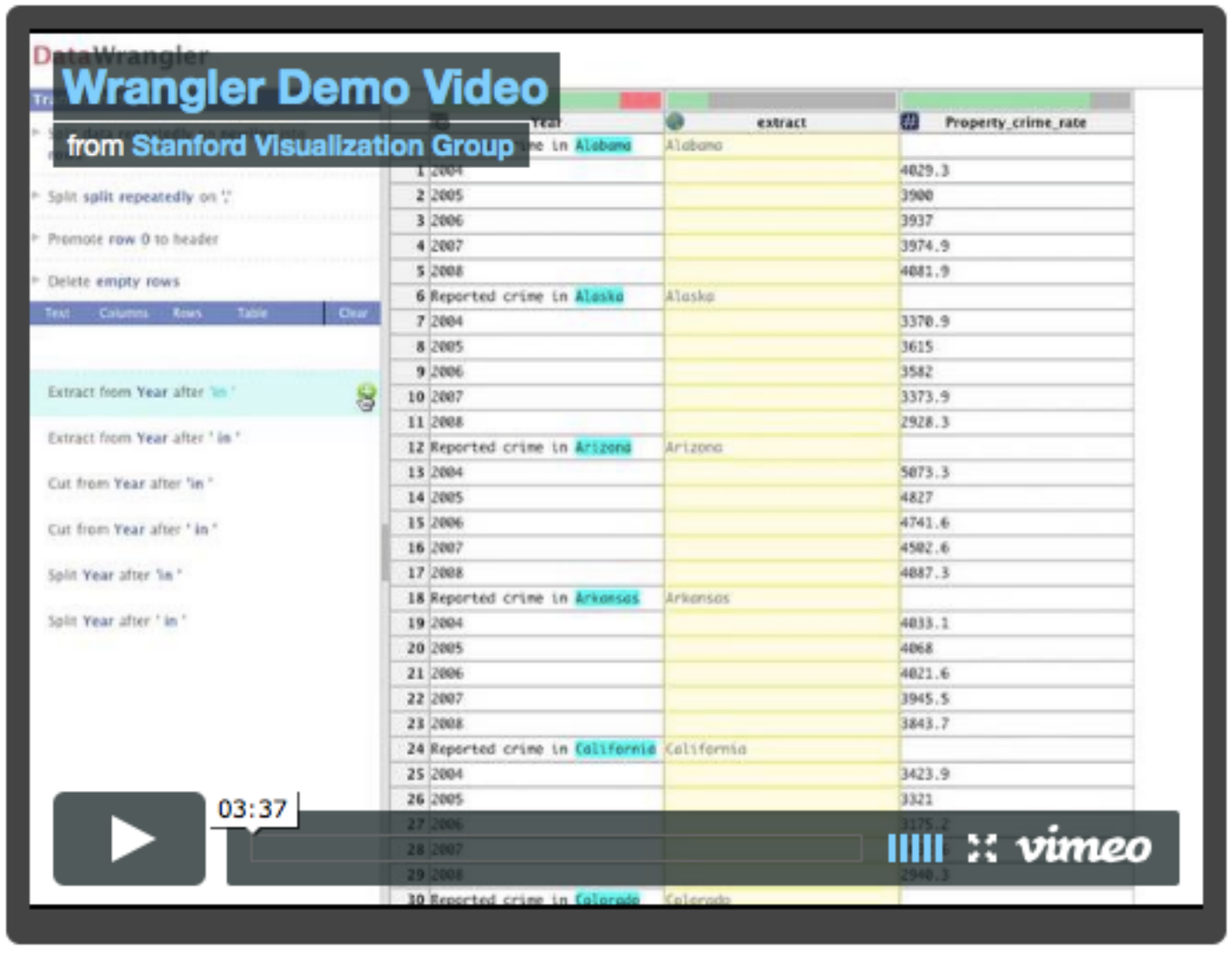
UPDATE: The Wrangler research project is complete, and the software is no longer actively supported. The team behind Wrangler has moved on to work on a commercial venture, Trifacta.

TRIFACTA

Why wrangle?

- Too much time is spent manipulating data just to get analysis and visualization tools to read it. Wrangler is designed to accelerate this process: spend less time fighting with your data and more time learning from it.
- Wrangler allows interactive transformation of messy, real-world data into the data tables analysis tools expect. Export data for use in Excel, R, Tableau, Protovis, ...
- Want to learn more about Wrangler's design? Take a look at our research paper.
- Wrangler is still a work-in-progress. Please share your feedback and feature requests!

TRY IT NOW



OpenRefine

OpenRefine is a powerful free, open source tool for working with messy data: cleaning it; transforming it from one format into another; and extending it with web services and external data.

Download

Main features

Faceting

Drill through large datasets using facets and apply operations on filtered views of your dataset.

Clustering

Fix inconsistencies by merging similar values thanks to powerful heuristics.

Reconciliation

Match your dataset to external databases via reconciliation services.

Infinite undo/redo

Rewind to any previous state of your dataset and replay your operation history on a new version of it.

Privacy

Your data is cleaned on your machine, not in some dubious data laundering cloud.

Wikibase

Contribute to Wikidata, the free knowledge base anyone can edit, and other Wikibase instances.

What can Open Refine and Wrangler do?

-

O = Open Refine
W = Data wrangler

What can Open Refine and Wrangler do?

- [O] cluster
- [O] show data distribution
- [O] outlier detection
- [W>O] usability, seems more simple in a good way
- [W] suggestions
- [W] visualize proportion of missing data
- [O,W] History
- [W] relational ops, unfold, pivot, transform
- [O,W] select & edit multiple rows
- [W] export script as javascript
- [O>W] scale to larger data?
- [O] data privacy
-

O = Open Refine
W = Data wrangler

!

The videos only show
some of the tools' features.
Try them out.

Open Refine: https://github.com/OpenRefine/OpenRefine/wiki/Screencasts
Data Wrangler: http://vis.stanford.edu/wrangler/