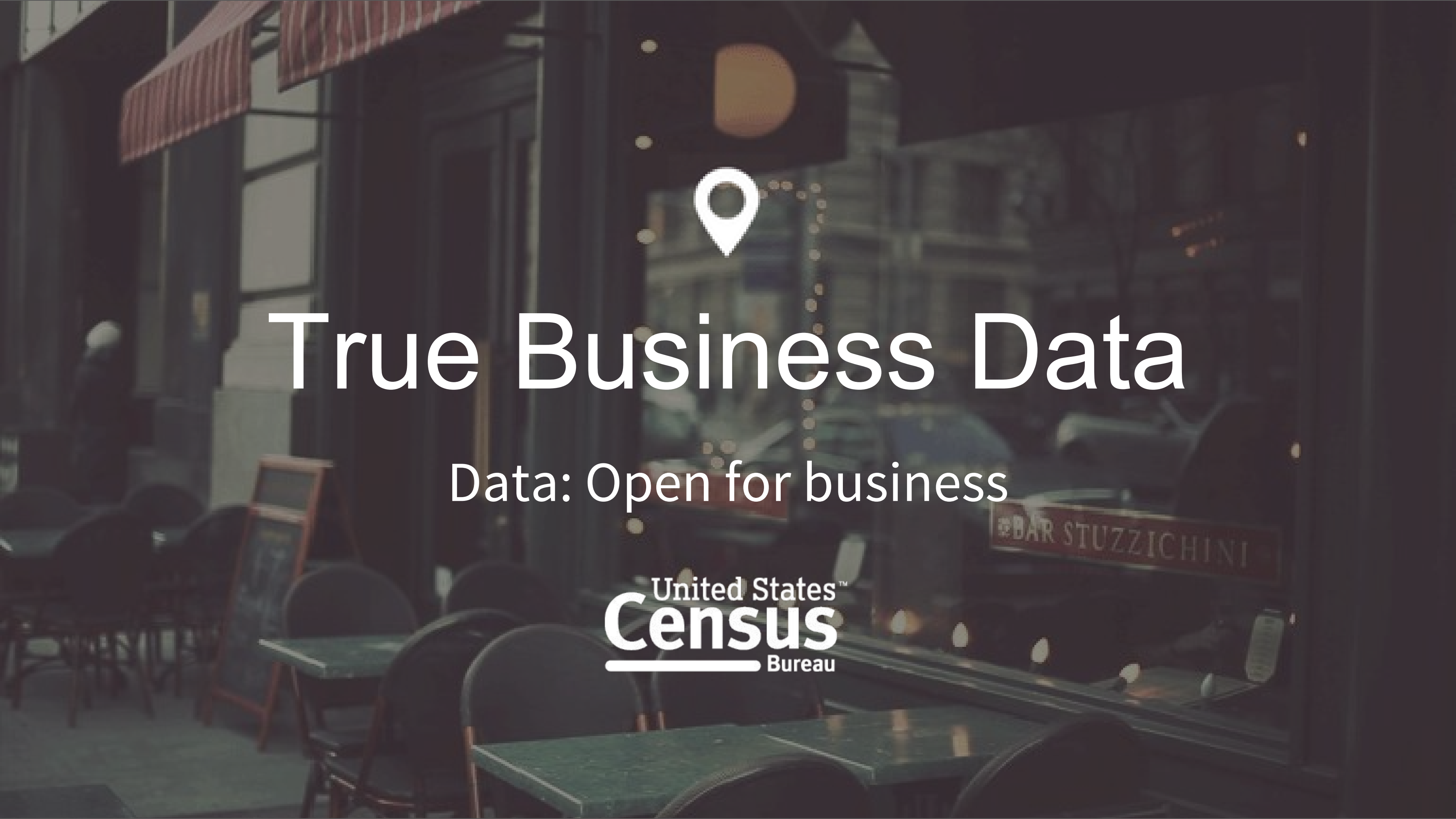


True Business Data

Data: Open for business

United States Census Bureau

The U.S. census bureau has a responsibility to maintain the best possible business data

Census Bureau Mission

“To serve as the **leading source of quality data** about the nation's people and economy”

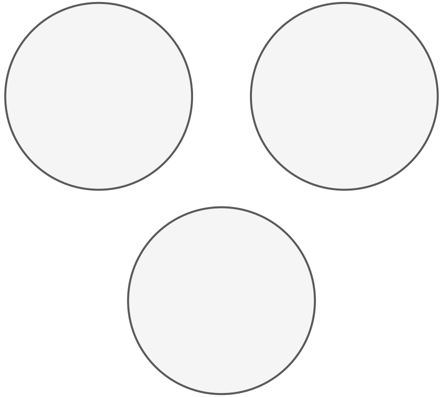
Census Bureau Goal

Our *goal* is to provide the best **mix of timeliness, relevancy, quality and cost** for the data we collect and services we provide.

http://www.census.gov/about/what.html

U.S. business data in a sorry siloed state

Slow, small, poorly structured and siloed



Current Census data

Public, useful high level metric

Every 5 years, at state level,

Highly aggregated

State-level Govt. data

Open source

Unstructured and inconsistent across state boundaries

Proprietary business data

Entity level, highly structured

Inaccessible behind APIs: Google maps, Yelp, etc.

Or firewalls e.g. CES Longitudinal business data

Solution: Better business data created from the web

Based on the Common Crawl

The Common Crawl is an open source snapshot of the public web (50Tb) updated ~monthly.

Using big data processing and machine learning techniques we’ve created a tool that enables rich, recent business data to be extracted by Zip Code

Open business data presents a huge opportunity

The bottleneck to a richer understanding of U.S. business ecosystem

This project is a data product and not an interface, or a pipeline, or a classifier

A rich new resource for everyone interested in US business data, and the 6 million active small businesses that drive the US economy.

[1] SBA.gov, 2012 Census summary, NYTimes: government-incentives

Open business data presents a huge opportunity

Users

SIDE WALK LABS

Business

UNITED STATES FEDERAL RESERVE SYSTEM

NYCEDC

Government

Berkeley UNIVERSITY OF CALIFORNIA

Academic

[1] SBA.gov, 2012 Census summary, NYTimes: government-incentives

So what is True Business Data?

An open source set of data that provides listings of businesses and their locations created from the common crawl.

It currently contains:

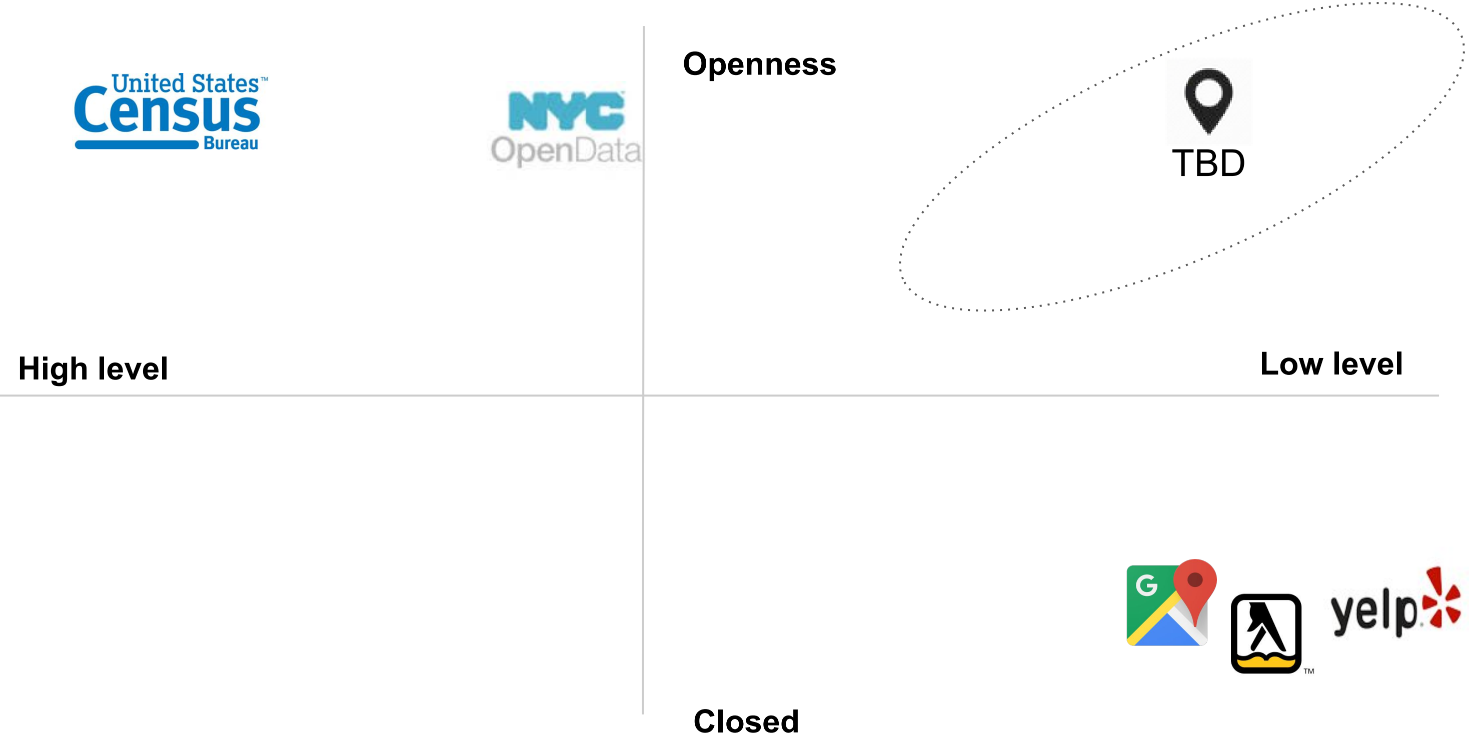
Address(es)

Website URL

Date

So what?

Why is it better?



Openness

High level

Low level

Closed

TBD

Why is it better?

	Openness	Timeliness	Granularity	Cost	Scope
TBD	🟩	🟩	🟩	🟩	🟩
United States™ Census Bureau	🟩	🟥	🟥	🟥	🟩
™	🟥	🟩	🟩	🟥	🟩
NYC OpenData	🟩	🟥	🟩	🟩	🟥
G	🟥	🟩	🟩	🟥	🟩

Using True Business Data

“If only I had local business data I could perform a better analysis, and give a better answer to my question!”

(This was us 12 weeks ago)

Use case example

How do governmental agencies track the impact of $80bn of economic business incentives they spend each year?

True Business Data helps keep track of government expenditures by:

- Enabling granular tracking of thousands of business
- Enabling impact assessments of incentives across geographic areas
- Providing up-to date information to decision makers

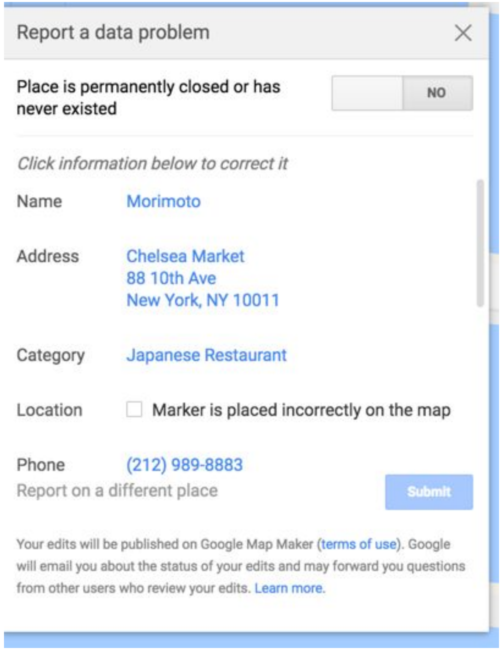
Currently the government relies on tax forms, which are updated yearly.

Use case example

Google's Maps business relies on accuracy above all else to serve 1Bn users monthly.

How does True Business Data drive value for Google?

- A major unsolved problem: have you ever had an issue?
- Enabling validation and identification of new and removed businesses in a much rapid fashion
- Business openings and closing present an ongoing issue to this key metric



Report a data problem ✕

Place is permanently closed or has never existed

Click information below to correct it

Name Morimoto

Address Chelsea Market
88 10th Ave
New York, NY 10011

Category Japanese Restaurant

Location □ Marker is placed incorrectly on the map

Phone (212) 989-8883

Report on a different place

Your edits will be published on Google Map Maker (terms of use). Google will email you about the status of your edits and may forward you questions from other users who review your edits. Learn more.

Currently Google relies on user reported information.

Academic use case

Where do academics get data to enable research on business ecosystems?

True Business Data is the best data set because it:

- Provides reliable snapshots of local economies across the United States
- Is publically released with no licensing fees or limitations
- Enables replication by providing common reference data

> In Silicon Valley there is a sense that you prosper only because you're surrounded by lots of resources that make it possible to succeed - beyond what your own entity controls

Rosabeth Kanter
Harvard Business School

The list goes on….

Real estate valuation

Can the value of real estate be predicted from the local businesses?

Business expansion / creation

Where is the best place to start a new business? Is it dependent on what is in the area?

Supply chain management

What businesses in my area can help your business grow and thrive?

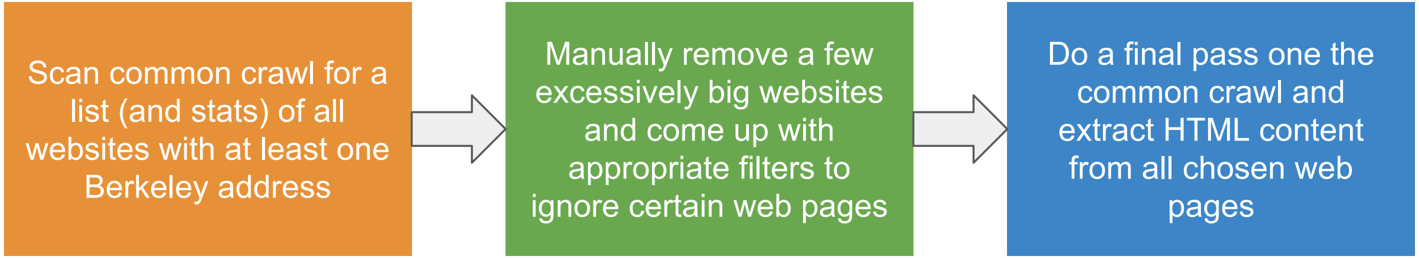
Future capstone projects ;)

Advertising

Who can use your product, and how are you going to reach them?

Project Stages

1. Reduce large dataset to something manageable
    a. Spent time figuring proper approach to tackle data size
    b. For proof of concept, focused on Berkeley businesses
    c. Final output of this stage was a 10 GB dataset, with 9108 websites and 865K web pages, containing:
        i. URL
        ii. Text Content



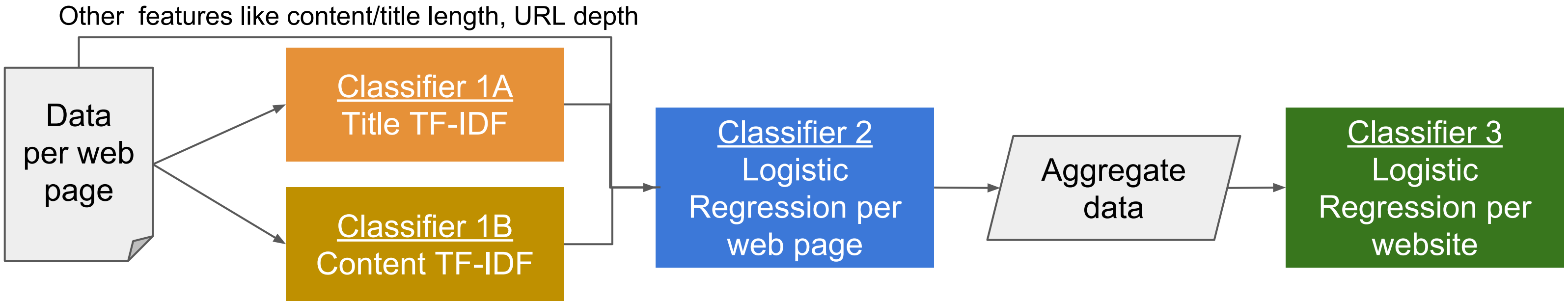
Scan common crawl for a list (and stats) of all websites with at least one Berkeley address

Manually remove a few excessively big websites and come up with appropriate filters to ignore certain web pages

Do a final pass one the common crawl and extract HTML content from all chosen web pages

Project Stages

2. Train classifier to detect business websites
   a. Used the output of the previous stage to iterate and find the best classification model
   b. Started by labeling close to 1K websites
   c. Best model uses logistic regression stacking ensemble
   d. After running classifier on full data, got 3.9K Berkeley businesses


Other features like content/title length, URL depth
Data per web page
Classifier 1A
Title TF-IDF
Classifier 1B
Content TF-IDF
Classifier 2
Logistic Regression per web page
Aggregate data
Classifier 3
Logistic Regression per website

3. Run across multiple snapshots to get monthly business list
   a. Used 25 VMs cluster and spent more than 1K CPU-hours processing data
   b. 3 MapReduce jobs per crawl

Future improvements

Expand True Business data nationwide, provide more snapshots and data access options

Areas for (even) further improvement:

- **Improve accuracy/precision:** add more labeled data.
- **Include new programmatic fields:** additional business metadata like phone number, email, business type.
- **Expand globally:** enable extensibility to cover other countries.
- **Expand methodology:** adapt method to create data for other areas.

Closing Thoughts

- Focused on generating an open source dataset not previously available
- Our intention is to spur other data science projects

“Data is the new oil” – *Clive Humby*

Our Team

- Michael
  - Ideas generator
  - Cloud resources
  - Multi-job Hadoop processing
- Stephen
  - Slides master extraordinaire
  - Web front genius
  - Web Classifier
- Jaime
  - EMR / AWS pipelines
  - Data exploration and munging
  - Web Classifier

BAR STUZZICHINI