The Recent "State" of Craft Brewing in the US

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What does industry data tell outsiders about craft beer and brewing?

Craft beer: a 2000s success story

- Significant craft production growth throughout much of the late 2000s-mid 2010s
- <1,500 craft breweries 2005 to almost 6,000 by 2017
- By 2018: 66% of Americans live within 10 miles of a craft brewery
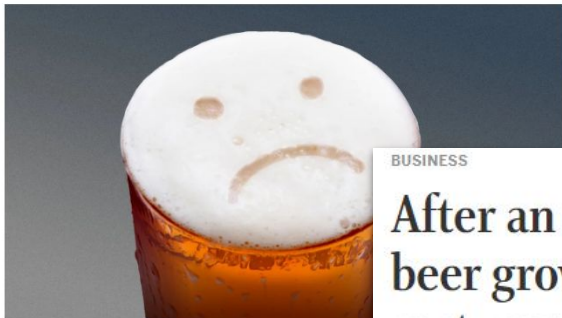
Newsletters   *The Atlantic*

BUSINESS

Craft Beer Is the Strangest, Happiest Economic Story in America

Corporate goliaths are taking over the U.S. economy. Yet small breweries are thriving. Why?

By Derek Thompson

The Atlantic, 2018

Today: investing in a mature market requires careful planning

Craft beer's pandemic slump
John Frank, author of Axios Denver
Axios Illustrations: Sarah Grillo

BEVNET MAGAZINE MARCH-APRIL 2023
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Craft Beer Overview: A 'Culling' of Craft is Coming
Zoe Licata | Apr. 7, 2023 at 12:11 pm

BUSINESS
After an explosive decade, craft beer growth slows as industry matures
With 10,000 people gathered for this week's Craft Brewers Conference in Minneapolis, leaders say the industry is maturing and smaller breweries must keep pace with consumers.
By Brooks Johnson Star Tribune | MAY 3, 2022 — 3:03PM
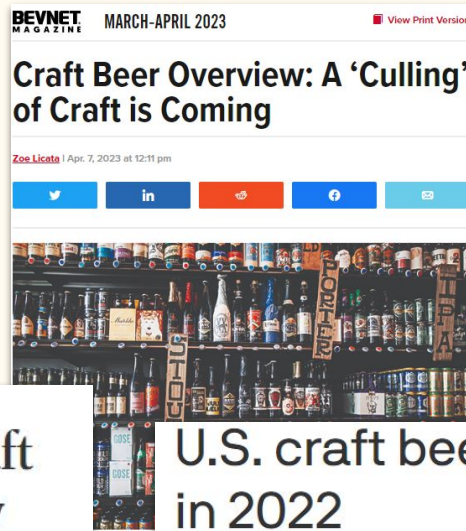
U.S. craft beer market fell flat in 2022
John Frank, author of Axios Denver

Goal: develop an interactive dashboard for quick examination of craft beer statistics by state

- Allow users to access a continually updated set of craft brewing industry statistics to help make informed decisions about craft brewing investments (business plans, other financial investments)
- Display the data using interactive maps for digestibility and visual appeal
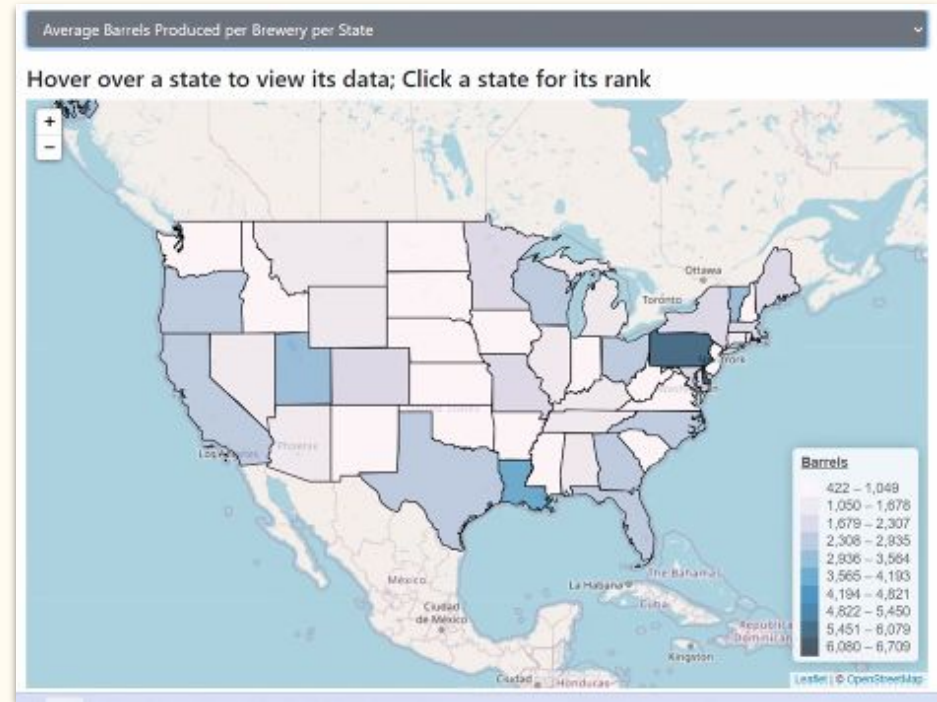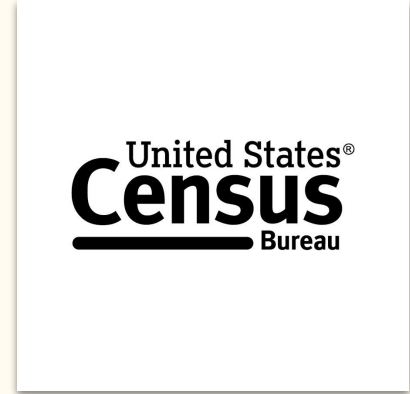
Database

Approach

- Straightforward ETL system
- Find craft brewing industry data sources and process (extract and transform)
- Create database of relevant craft brewing industry statistics (quarterly beer production, annual production, brewery numbers, brewery categories, etc. - load)
- Develop a data pipeline for seamless interaction of the frontend and backend (analyze)
- Develop a frontend for displaying data with simple, digestible, map-based visualizations (display)
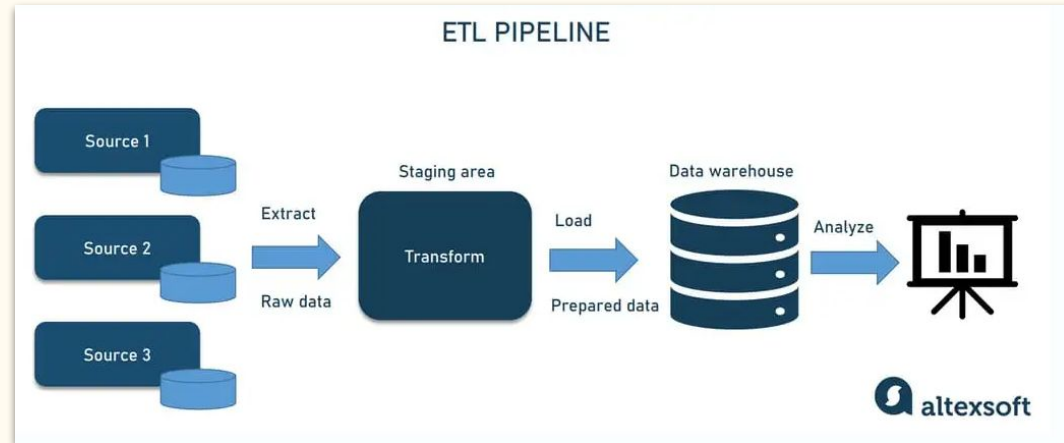
Data Sources

- Three key sources
  - Brewers Association - MS Excel files of industry relevant data
  - US Treasury Alcohol and Tobacco Tax and Trade Bureau - MS Excel files of quarterly state production data
  - US Census Bureau Data - API for census data (decennial census, population estimates, etc.) with JSON format return

# SQL Database - Transform and Load

- Create ERD for craft brewing statistics SQL database and code DB schema
- Create Python scripts to pull population data from the US Census Bureau using USCB APIs
- Create Python script to format quarterly TTB production reports for adding to the SQL database
- Add data to SQL database tables using established schema
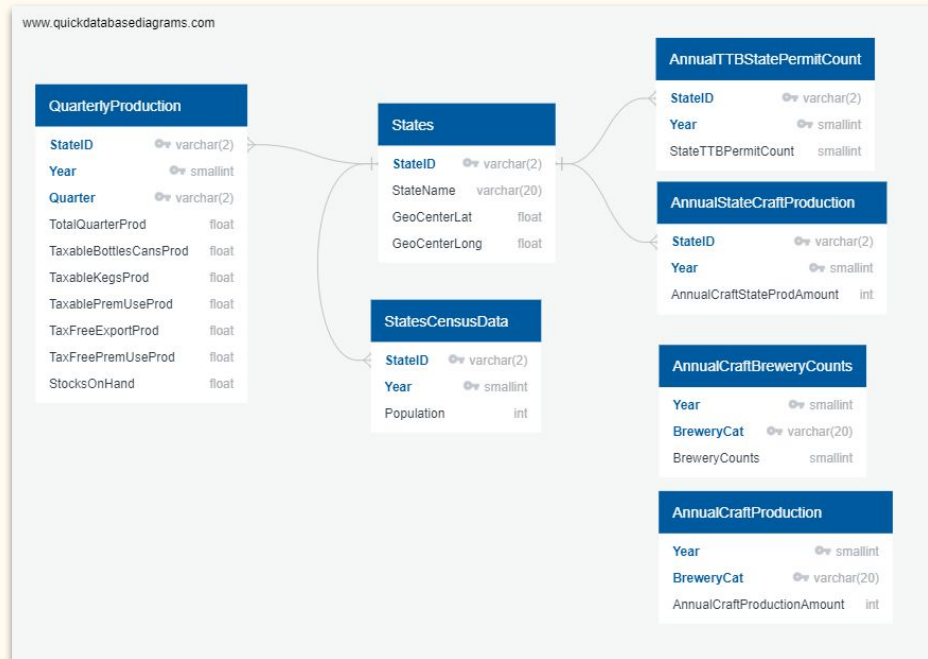
Pipeline

Data Pipeline Goals

- Act as the glue to bind everything together
  - Work with back end to develop the database
  - Work with front end to identify data needs
  - Stand on both sides of the bridge
- All about data usability
  - What data is needed?
  - What form does it need to take?
  - What can be calculated from the data?
- Understanding of what the data means
  - Verify data quality
  - Recognize data "losses"
  - Verify valid and invalid transformations

AWS 3 Tier Architecture

Presentation Tier → Application Tier → Database Tier
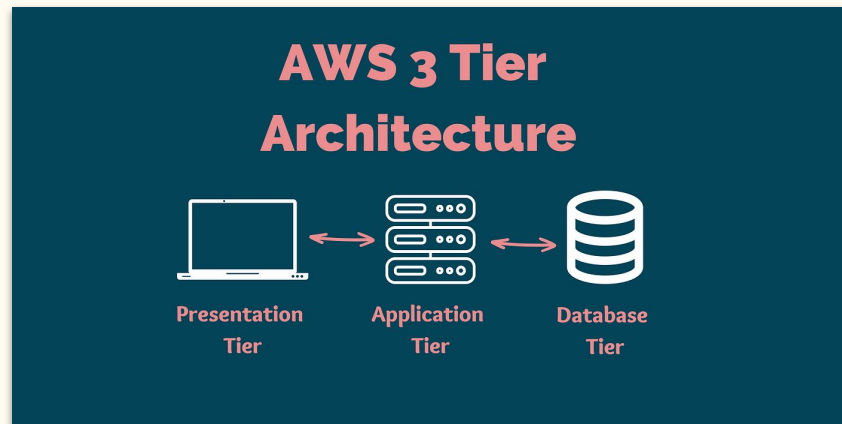
Data Pipeline Process

1. Extract data from the database
   a. Used SQL Alchemy to run queries via Python
2. Load into a Pandas DataFrame
   a. Filling null values as needed. Typically included negative numbers to show gaps
3. Identify needed and unneeded data
   a. Heatmaps were generated with averages of multiple years of data
   b. Time series required a single value for time, rather than a pair of quarter and year
      i. (2017, Q2) vs (2017.25)
4. Export data in a useable format
   a. Heatmap required geographic data and a geoJSON format
   b. Time series needed values to be grouped by state

Before

	statename	Year	AnnualCraftStateProdAmount	StateTTBPermitCount	Population
0	Alabama	2017	62738	52	4874747
1	Alaska	2017	204302	45	739795
2	Arizona	2017	147728	130	7016270
3	Arkansas	2017	42294	44	3004279
4	California	2017	3285525	1106	39536653

	StateID	Year	Quarter	TotalQuarterProd	StocksOnHand
0	AK	2017	Q1	43715.79	14848.42
1	AK	2017	Q2	54774.67	13249.36
2	AK	2017	Q3	56571.29	12874.29
3	AK	2017	Q4	38779.60	8532.77
4	AK	2018	Q1	49548.90	14306.25

After

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {
        "State": "Alabama",
        "Production": 82482.0,
        "Breweries": 67,
        "Breweries Per Capita": 1.5787467696072395e-05
      }
```

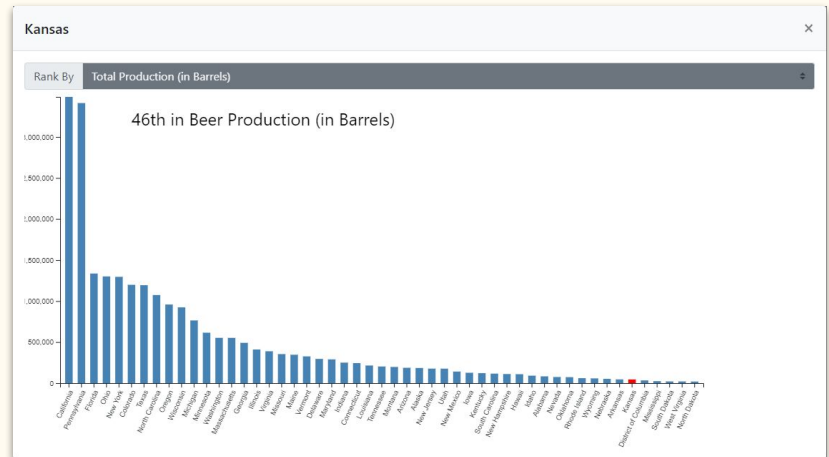|	StateID	data
0	AK	[{'TotalQuarterProd': 43715.79, 'StocksOnHand'...
1	AL	[{'TotalQuarterProd': 12509.21, 'StocksOnHand'...
2	AR	[{'TotalQuarterProd': 6891.71, 'StocksOnHand':...
3	AZ	[{'TotalQuarterProd': 52463.72, 'StocksOnHand'...
4	CA	[{'TotalQuarterProd': 5444732.26, 'StocksOnHan...

Visualization

For the front-end of our dashboard we used a couple of different tools that were available to us.

- We used D3.js (Data-Driven Documents) which is a JavaScript library for producing dynamic, interactive data visualizations in web browsers using HTML, SVG, and CSS.
- We used Leaflet which is an open-source JavaScript library used for creating interactive, mobile-friendly maps that can be easily embedded in web pages.
- We used Bootstrap which is a popular front-end framework for developing responsive and mobile-first websites using HTML, CSS, and JavaScript.
- We used OpenStreetMap which is a collaborative project to create a free editable map of the world, constructed by volunteers using data from surveys, GPS devices, aerial imagery, and other free sources.
- We used Chart.js which is a popular and versatile JavaScript library that enables developers to create interactive, responsive, and customizable charts and graphs for web applications.

The main focus on the interactive dashboard is to be visual clean looking for the user, but also giving them useful information about craft beers. We used three different color schemes to create a heat-map style look that helps the user quickly identify the states that have the most of each data-set.

The specific information for each state is displayed as you hover over it, you can also see its ranking compared to the other states if you click on one.

Montana

Total Beer Production: 197,193 Barrels
0.79% Total U.S. Production

Total Breweries: 122
Average Barrels per Brewery: 1,616

1 Barrel = 31 Gallons

Kansas

Rank By   Total Production (in Barrels)

46th in Beer Production (in Barrels)

For the convenience of the user we offer a bar graph that allows the user to select up to five states and compare them to each other. The two criteria that the user that choose from are:

-Total Barrels Produced per Quarter

-Barrels of Stock on Hand per Quarter

The bright color contrast of the bar-lines with a light gray background gives the user a clear visual of the data they desire.
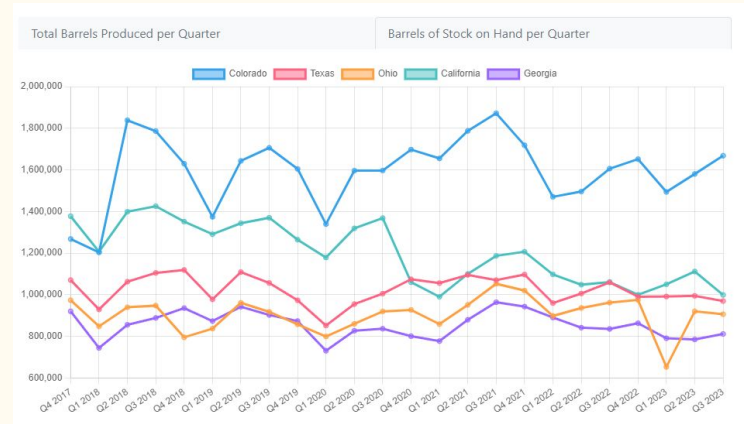
Citations

- U.S. Census Bureau, "Population Estimates API", accessed January 2024, https://api.census.gov/data/2017-2021/pep/population/
- U.S. Census Bureau, "Decennial Census API", accessed January 2024, https://api.census.gov/data/2020/dec/ddhca/
- Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia, and Puerto Rico: April 1, 2020 to July 1, 2023 (NST-EST2023-POP), accessed January 2024, https://www.census.gov/data/tables/time-series/demo/popest/2020s-national-total.html
- Brewers Association Industry Datasets, accessed January 2024, https://www.brewersassociation.org/statistics-and-data/industry-data-sets/