Using Business Analyst to Benchmark
Your Way to Success

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Abstract

Benchmarking is an essential and sometimes overlooked skill. It can help us to provide context, set meaningful targets, gain insight into trends, and evaluate performance relative to a business strategy or value proposition. This presentation will describe 8 techniques to improve location analytics for retail applications. The techniques are analogous to 8 scientific tools, which are: 1) The Mass Spectrometer, 2) The Telescope, 3) The Microscope, 4) The Scale, 5) The Black Light, 6) The Funnel, 7) The Petri Dish and 8) The Mirror. Each tool will be translated into an analytics technique using an example from retail projects that used Esri Business Analyst and the Spatial Statistics toolbox. After the data has been created through the analytics process, it can be transformed into a dashboard that provides business value and improves operational decisions.

This presentation expands upon my UC 2015 presentation (4 Lessons in Creating a New Trade Area Methodology for Retail Stores) and it is inspired by the 8 techniques from the “Seven Data Story Types” described by Ben Jones who based his data visualization techniques on Christopher Booker’s The Seven Basic Plots: Why We Tell Stories. The benchmarking techniques are not necessarily new ideas, but innovation and insight are often the result of a process and not an epiphany. The goal of this presentation is to encourage analysts to develop their own analytical process to improve the business decisions for their organization.
Beazknees, March 2015. Web. 15 April 2015. All images used with permission.
CORPS OF ENGINEERS U.S. ARMY

1939

SURVEY MARK

FOR DISTURBING THIS MARK

URGE 6L C

WARRANTY OF SURVEYED POINT

250 FINE OR IMPRISONMENT
8 Scientific Tools – 8 Techniques for Benchmarking

1. The Mass Spectrometer
2. The Telescope
3. The Microscope
4. The Scale
5. The Black Light
6. The Funnel
7. The Petri Dish
8. The Mirror
1) The Mass Spectrometer: Parts of the Whole
The Mass Spectrometer: Parts of the Whole
Where are the best markets for craft beer and pizza?
US Population by Age Groups

- Age 0 - 17
- Age 18 - 34
- Age 35 - 51
- Age 52 - 68
- Age 69+
2015 Millennial Context in the US

- 24% of the US population
- Just slightly more than other groups, except those age 65+
US Median Household Income by Age Group

US Median - $53,000
2015 Millennial Income Context in the US

- 42% of millennials make < $15,000 in annual income.
- % of millennials in higher income categories is low compared to other age groups.
2015 Millennial Income Context in the US

• 53% of millennials make < $50,000 in annual income.
2) The Telescope: Zoom Out
Millennial Density in the US
Percent Millennials by State
How to Calculate a Base Comparison Index

• First, calculate the percentage for your area of interest.
  – Washington D.C.’s population is about 34% millennials.

• Second, calculate the percentage for your base area.
  – The US 2015 Population is about 24% millennials.

• Divide the percentage of your area of interest by the base area and multiple by 100.
  – \((\frac{34.137\%}{23.615\%}) \times 100 = \text{an index of 145}\)
Millennial Index by State

- 85 - 100
- 101 - 110
- 111 - 145
Millennial Percent Index by DMA

- 0 - 100
- 100 - 120
- 120 - 158

Locations with values:
- Lubbock, TX (120)
- Lafayette, IN (158)
- Bryan, TX (129)
- Tallahassee, FL (122, 141)
DMA Millennial Percent: Top 5

- University of Florida
- Florida State University
- Texas A&M University
- Texas Tech University
- Purdue University
Number of Millennials Index: Top 10 DMAs

- Los Angeles: 1307
- San Francisco: 472
- Dallas-Fort Worth: 505
- Houston: 471
- Chicago: 652
- New York: 1395
- Washington DC: 423
- Philadelphia: 525
- Atlanta: 441
- Boston: 448
How to Calculate an Average Comparison Index

• First, calculate the values for each area and then the average of these values
  – The average number of millennials in DMAs is 358,076.390476

• Second, divide 100 by the average value
  – $100 / 358,076.390476 = 0.000279270017961998$

• Multiply each record by the result in the second step.
  – $[\text{Age18\_34\_CY}] * 0.000279270017961998$
  – This ensures that the average will always equal 100, which then serves as the benchmark.
3) The Microscope: Zoom In
Skyline Shopping Center
Refining Site Selection Criteria
43,942 Highway Exits in the US
40% of McDonalds are within 1 Mile of a Highway Exit
7400+ Pizza Hut Locations in the US
30% of Pizza Huts are within 1 Mile of a Highway Exit
Within 1 Mile of Exit?

- Yes
- No
4) The Scale: Show the Differences
Comparing Customer Income Profiles
4200+ Little Caesars Pizza Locations
152 MOD Pizza Locations

Coming Soon MOD Pizza
## Comparison of Major Pizza Chains in California

<table>
<thead>
<tr>
<th>Competitor</th>
<th>Average for 2-Mile Ring Areas</th>
<th>Average of 2015 Total Population</th>
<th>Average of 2015 Average Household Size</th>
<th>Average of 2015 Median Household Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Caesars</td>
<td>69,969</td>
<td>3.06</td>
<td>$54,193</td>
<td></td>
</tr>
<tr>
<td>Shakey's</td>
<td>99,752</td>
<td>3.22</td>
<td>$55,949</td>
<td></td>
</tr>
<tr>
<td>Papa Murphy's</td>
<td>41,075</td>
<td>2.67</td>
<td>$55,983</td>
<td></td>
</tr>
<tr>
<td>Me-n-Ed's</td>
<td>42,911</td>
<td>3.03</td>
<td>$57,393</td>
<td></td>
</tr>
<tr>
<td>Domino's</td>
<td>71,866</td>
<td>2.86</td>
<td>$59,284</td>
<td></td>
</tr>
<tr>
<td>Pizza Hut</td>
<td>84,619</td>
<td>3.09</td>
<td>$59,844</td>
<td></td>
</tr>
<tr>
<td>Papa John's</td>
<td>80,387</td>
<td>2.90</td>
<td>$61,334</td>
<td></td>
</tr>
<tr>
<td>Pizza Guys</td>
<td>62,917</td>
<td>2.97</td>
<td>$61,659</td>
<td></td>
</tr>
<tr>
<td>Blast 825</td>
<td>39,333</td>
<td>2.60</td>
<td>$62,613</td>
<td></td>
</tr>
<tr>
<td>Mountain Mike's</td>
<td>50,663</td>
<td>2.86</td>
<td>$66,915</td>
<td></td>
</tr>
<tr>
<td>Pizza Rev</td>
<td>106,999</td>
<td>2.78</td>
<td>$68,437</td>
<td></td>
</tr>
<tr>
<td>Round Table</td>
<td>55,323</td>
<td>2.76</td>
<td>$68,642</td>
<td></td>
</tr>
<tr>
<td>Blaze</td>
<td>81,632</td>
<td>2.67</td>
<td>$71,434</td>
<td></td>
</tr>
<tr>
<td>Pieology</td>
<td>64,763</td>
<td>2.90</td>
<td>$74,737</td>
<td></td>
</tr>
<tr>
<td>Mod Super Fast</td>
<td>71,542</td>
<td>2.78</td>
<td>$79,452</td>
<td></td>
</tr>
</tbody>
</table>
How many locations are in the top 20% in the Seattle area?
Which new MOD Pizza locations look like the top 20% in terms of median household income?
5) The Black Light: Find the Outliers
5) The Black Light: Find the Outliers
Why is median income the lowest for Flowing Wells ($27,872) and can the site still be profitable?
Daytime population for Flowing Wells (33,225) is in the top 40% of all MOD locations.
6) The Funnel: Combine and Intersect
Hot Spot Grid by Millennial Number
7 Areas that are 40% or more Millennial with 50,000 or more Millennials

- University of Chicago, Northwestern, Chicago, IL
- University of Illinois, Urbana-Champaign
- Purdue University, Lafayette, IN
- University of Indiana, Bloomington
- Texas A&M University, Bryan
- Penn State, State College
- University of Florida, Gainesville
30 Hot Spot Grids that are 24% + and 300,000 + Millennials
Grouping Analysis

- Using Grouping Analysis in the Spatial Statistics Toolbox, we can combine the percent millennials and the total number in the 20 mile grid areas to see how these factors combine.
Group 3 – Highest %, Average Total

- The green group has an average percentage of 40% and an average of 27,931 millennials.

Group 3: Count = 84, Std. Distance = 23995.3854, SSD = 127.1698

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_AGE18_34</td>
<td>0.4043</td>
<td>0.0565</td>
<td>0.3439</td>
<td>0.6389</td>
<td>0.5105</td>
</tr>
<tr>
<td>AGE18_34_CY</td>
<td>27931.6786</td>
<td>23995.3854</td>
<td>1974.0000</td>
<td>137389.0000</td>
<td>0.0777</td>
</tr>
</tbody>
</table>

The orange group has an average percentage of 25% and an average of 586,128 millennials.

Group 4: Count = 21, Std. Distance = 311737.9932, SSD = 534.0620

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_AGE18_34</td>
<td>0.2568</td>
<td>0.0194</td>
<td>0.2313</td>
<td>0.3106</td>
<td>0.1373</td>
</tr>
<tr>
<td>AGE18_34_CY</td>
<td>586128.0476</td>
<td>311737.9932</td>
<td>376373.0000</td>
<td>1743002.0000</td>
<td>0.7843</td>
</tr>
</tbody>
</table>
The brown group has an average percentage of 24.5% and an average of 162,655 millennials.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_AGE18_34</td>
<td>0.2446</td>
<td>0.0295</td>
<td>0.1859</td>
<td>0.4112</td>
<td>0.3899</td>
</tr>
<tr>
<td>AGE18_34_CY</td>
<td>162654.7500</td>
<td>66575.6965</td>
<td>88434.0000</td>
<td>366730.0000</td>
<td>0.1597</td>
</tr>
</tbody>
</table>
Grouping Analysis for Millennial Hot Spots
Grouping Analysis for Older Millennials

- The purple, red, and green groups all have a higher than average percent and total older millennials.

<table>
<thead>
<tr>
<th></th>
<th># of Older Millennial</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>12,112</td>
<td>12.1%</td>
</tr>
<tr>
<td>Purple</td>
<td>1,104,853</td>
<td>17.0%</td>
</tr>
<tr>
<td>Red</td>
<td>289,840</td>
<td>16.0%</td>
</tr>
<tr>
<td>Green</td>
<td>89,052</td>
<td>14.2%</td>
</tr>
<tr>
<td>Blue</td>
<td>11,631</td>
<td>15.9%</td>
</tr>
<tr>
<td>Orange</td>
<td>7,163</td>
<td>12.4%</td>
</tr>
<tr>
<td>Brown</td>
<td>2,966</td>
<td>10.0%</td>
</tr>
</tbody>
</table>
Grouping Analysis for Older Millennials

115 of the 152 MOD Pizza are in these areas
Older Millennial Hot Spots with No MOD
118 Opportunity Areas
7) The Petri Dish: Change Over Time
Historical US Brewery Count

https://www.brewersassociation.org/statistics/number-of-breweries/
Bart Watson, Used with permission.
Historical US Brewery Count

1873 - 38.5 Million US Population

1881 Transcontinental Railroad completed, Kansas enacts prohibition

1886 - Coca-Cola

1913 Ford develops modern assembly line

1920-1933 - 18th Amendment (Prohibition)

1951 - Color TV

2015 - 320 Million US Population

https://www.brewersassociation.org/statistics/number-of-breweries/
Bart Watson, Used with permission.
# U.S. Brewery Count

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>'14 to '15 % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRAFT</td>
<td>2,401</td>
<td>2,863</td>
<td>3,676</td>
<td>4,225</td>
<td>+ 18.1</td>
</tr>
<tr>
<td>Regional Craft Breweries</td>
<td>97</td>
<td>119</td>
<td>135</td>
<td>178</td>
<td>+ 31.9</td>
</tr>
<tr>
<td>Microbreweries</td>
<td>1,149</td>
<td>1,464</td>
<td>2,041</td>
<td>2,397</td>
<td>+ 21.6</td>
</tr>
<tr>
<td>Brewpubs</td>
<td>1,155</td>
<td>1,280</td>
<td>1,500</td>
<td>1,650</td>
<td>+ 12.2</td>
</tr>
<tr>
<td>LARGE NON-CRAFT</td>
<td>23</td>
<td>23</td>
<td>26</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>OTHER NON-CRAFT</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Total U.S. Breweries</strong></td>
<td>2,456</td>
<td>2,917</td>
<td>3,722</td>
<td>4,269</td>
<td>+ 17.9</td>
</tr>
</tbody>
</table>

[https://www.brewersassociation.org/statistics/number-of-breweries/](https://www.brewersassociation.org/statistics/number-of-breweries/)

Bart Watson, Used with Permission.
8) The Mirror: The Personal Perspective, Seeing the Invisible
Seeing the Invisible: Schlieren Flow Visualization

Adam Cole/NPR YouTube. Used with permission.
Seeing the Sound of a Clap

Adam Cole/NPR YouTube. Used with permission.
Should a craft beer and pizza place open in my neighborhood?
Grouping Analysis for Older Millennials

Pittsburgh
Millennial Density in Pittsburgh
Laptops and Lattes Density in Pittsburgh
Urban Chic Density in Pittsburgh
Metro Renters Density in Pittsburgh
8 Scientific Tools – 8 Techniques for Benchmarking

1. The Mass Spectrometer (Parts of the Whole)
2. The Telescope (Zoom Out, Aggregation)
3. The Microscope (Zoom In, Individual, Specific)
4. The Scale (Show the Difference, Rank)
5. The Black Light (Understand the Outliers)
6. The Funnel (Combine & Intersect)
7. The Petri Dish (Change Over Time)
8. The Mirror (The Personal Perspective, Seeing the Invisible)
Benchmarking: Starts with a PROCESS; leads to an epiphany.
References


- Author’s photo. (Slide 7)

- Ben Jones. Tapestry 2015 Short Stories - Ben Jones: "Seven Data Story Types". [https://www.youtube.com/watch?v=sEZj-eUfbNo](https://www.youtube.com/watch?v=sEZj-eUfbNo) Published on Mar 13, 2015. (Slide 8)


- Florian Klauer. [https://images.unsplash.com/27/type-set.jpg?ixlib=rb-0.3.5&q=80&fm=jpg&crop=entropy&s=0c0d7694be5d16aec2f65c99f075b432](https://images.unsplash.com/27/type-set.jpg?ixlib=rb-0.3.5&q=80&fm=jpg&crop=entropy&s=0c0d7694be5d16aec2f65c99f075b432) Free photos. (Slide 11-12)

- Alex Franzelin. [https://unsplash.com/photos/7HVGbM4Jill](https://unsplash.com/photos/7HVGbM4Jill) Free photos. (Slide 19)

- Greg Rakozy. [https://images.unsplash.com/photo-1452611545118-2b35b308caf5?ixlib=rb-0.3.5&q=80&fm=jpg&crop=entropy&s=f7d930472b1c3a2e6d13098cbe5c4006](https://images.unsplash.com/photo-1452611545118-2b35b308caf5?ixlib=rb-0.3.5&q=80&fm=jpg&crop=entropy&s=f7d930472b1c3a2e6d13098cbe5c4006) Free photos. (Slide 20)

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• Author’s photo. (Slide 53-54)

• Andres Arango/Demand Media. Mark Heidelberger. “How to Make Things Glow in the Dark.” http://www.ehow.com/how_4843493_things-glow-dark.html (Slide 53-54 - Photos are the authors, not from the website.)

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• Moomsabuy. http://www.freedigitalphotos.net/images/Science_g174-Mold_Colonies_In_Petri_Dish_p83272.html Published on May 16, 2012 (Slide 69)

• Bart Watson. https://www.brewersassociation.org/statistics/number-of-breweries/ Used with permission. (Slide 70-72)

• André Branco. https://unsplash.com/photos/OYcO1xSyrQ0 Free photos. (Slide 73)

FOR MORE INFORMATION

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