Ticketmaster Pricing Optimization for Luke Bryan Concerts

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Background:
ASA DataFest is an annual competition where teams spend a weekend analyzing an unknown, large dataset supplied by a company to provide insights, recommendations and visualizations. In 2016, the data was provided by Ticketmaster, who was interested in exploring the optimization of ticket prices by geographic location. During the event, my DataFest team focused on pricing optimization for the popular country artist Luke Bryan. We used census income data[1] to highlight areas where Ticketmaster should focus initial pricing optimization efforts. After DataFest concluded, I focused on including more pricing and census data in the analysis of Luke Bryan's ticket prices.

Goal:
The goal of my analysis was to compare Luke Bryan's average ticket prices across the country to the average ticket prices of other country and non-country concerts and to provide a grouping of venue cities with similar characteristics to allow for focused pricing optimization efforts.

Data:
I used Ticketmaster's sample Purchase Dataset for my analysis, where each row in the dataset represented a purchase made from Ticketmaster. I filtered this dataset into three subsets; Luke Bryan concerts, other country concerts (excluding Luke Bryan) and other concerts (excluding country concerts). For each subset, my variables of interest were the number of tickets purchased, the transaction amount of this purchase, and the venue location. This subsetting resulted in approximately 13,000, 51,000 and 346,000 observations for the Luke Bryan, country and concerts datasets, respectively and 48 unique venue cities for Luke Bryan concerts. Using the census data, I found the median income and the sum of the population within a 50 mile radius of each Luke Bryan venue city. Finally, I aggregated the country and other concerts datasets into groups that corresponded to performance venues within a 50 mile radius of Luke Bryan's concert venues and used the average values of the variables above from this aggregation.

Clustering:
I performed k-means clustering on the average ticket prices for each venue for all three types of tickets and the census data on median income and the sum of the population within a 50 mile radius of each of Luke Bryan's venue cities. I used both Bayesian Information Criteria (BIC) and silhouette analysis to determine that the optimal number of clusters was $k = 4$ clusters. A map of the cluster results by geography (Figure 1) and a summary of the relevant clustering values for each cluster (Table 1) are provided below.

The clustering results show that the size of and the median income in a venue city tend to be more important than geographic location in determining ticket prices for

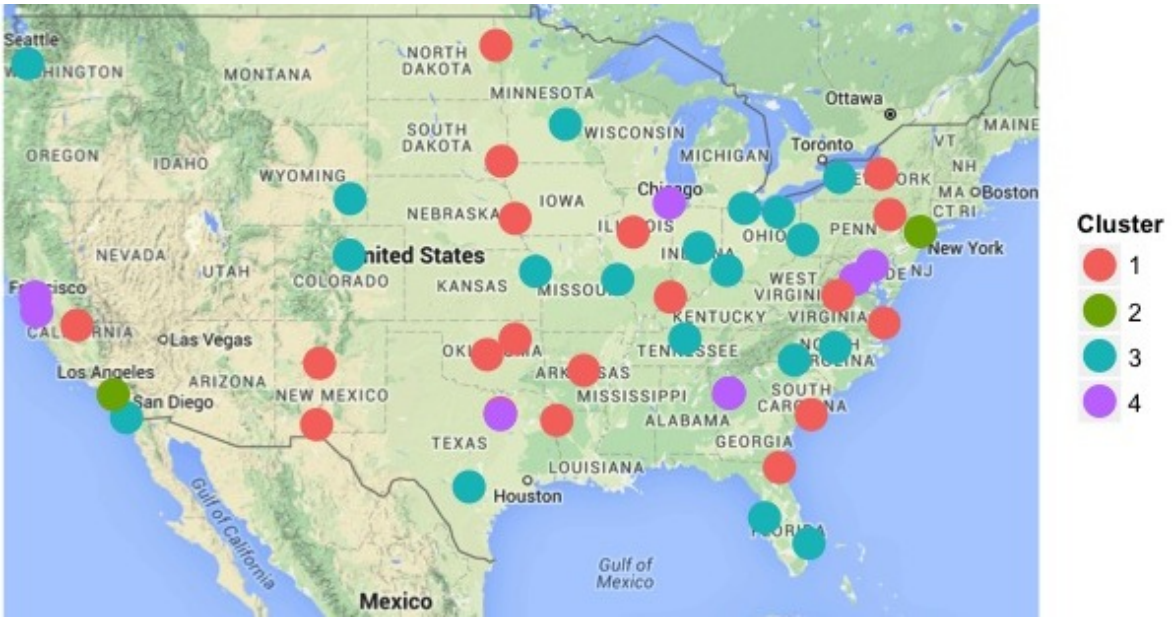

Figure 1: K means clustering results for Luke Bryan concert venue cities using average ticket prices for Luke Bryan, country and other concerts and the median income and population within a 50 mile radius of the venue city.

Luke Bryan concerts. Cluster 1 tends to be mid-size cities, such as Albuquerque, Charleston, Jacksonville, Omaha and Syracuse, that have the lowest median income and area population of the four clusters. However, these cities have the highest average ticket prices for Luke Bryan, country and other concert events. Since these average prices are already the highest among the clusters, and these venue cities are the least wealthy and populated relative to the other clusters, there is probably not much pricing optimization in terms of raising ticket prices to be done in these areas.

Cluster 2 consists of New York City and Irvine, CA (just outside of Los Angeles). This cluster consists of very populated and wealthy areas (highest median income and area population of the 4 clusters). However, for these areas, Luke Bryan average ticket prices are the lowest among the four clusters. Due to the large number of people in these areas and the high median income, New York and Southern CA would be good areas for Ticketmaster to explore raising prices for Luke Bryan concert tickets, as they are currently priced the lowest among the three clusters and tend to be priced lower than other concert tickets by about $10.

Cluster 3 includes cities such as Charlotte, Cleveland, Denver, Minneapolis and Nashville that are fairly similar in size to Cluster 1. Cluster 4 consists of larger cities such as Atlanta, Chicago and Dallas. In both of these clusters, Luke Bryan average ticket prices are already about $12 more than other country ticket prices. Cluster 3 Luke Bryan tickets prices are nearly the same as ticket prices for other concerts, while in Cluster 4, Luke Bryan tickets are about $9 less than the average ticket price for other concerts.

	Average Ticket Prices			Average Demographic Information	
Cluster	Luke Bryan	Country	Other Concerts	Income	Population (in millions)
1	67.74	60.98	70.45	46,037.20	0.919
2	58.89	56.83	67.55	74,853.17	16.147
3	60.02	48.85	60.73	53,801.27	2.704
4	60.11	48.59	69.63	69,823.11	6.702

Table 1: Summary of average ticket prices and demographic information for each cluster. For the average demographic information, Income is the average median income within a 50 mile radius of each venue city, while Population is average total population in a 50 mile radius of each venue city

Conclusions:
Overall, in nearly all venue cities and on average in every cluster, the average price for Luke Bryan tickets is already more than the average price for other country concerts. However, especially in large, wealthy cities, Luke Bryan average ticket prices are less than the average ticket prices for other, non-country concerts. As a result, Ticketmaster should focus their pricing optimization efforts for Luke Bryan tickets relative to other concerts, rather than relative to country concerts. Luke Bryan has consistently sold out venues and set venue records [2] across the country, including in New York City [3], so it seems likely that his popularity in many areas of the country is strong enough that tickets to his concerts, particularly in large cities such as New York, Atlanta and Chicago (Clusters 2 and 4), could be priced on par with tickets to other, non-country concerts, leading to a potential increase in ticket price of $9-$10 per ticket for Ticketmaster.

[1] University of Michigan. *Population Studies Center*. Zip Code Characteristics: Mean and Median Household Income. Accessed April 18, 2016. http://www.psc.isr.umich.edu/dis/census/Features/tract2zip/.
[2] Taste of Country. Accessed April 18, 2016. http://tasteofcountry.com/luke-bryan-ohio-shows-venue-records/.
[3] Axs. Accessed April 18, 2016. http://www.axs.com/news/luke-bryan-sells-out\-madison-square-garden-in-just-five-minutes-adds-2-16778.