A Deep Dive into Engagement City, Ohio

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1. Introduction

The city of Engagement, Ohio USA is doing a participatory urban planning exercise to understand the current state of the city. Our team used dataset from *VAST Challenge 2022* to deep dive into economic aspect exploration.

This Shiny app allows users to reveal city Engagement from below different perspectives :
1. Businesses performance analysis
2. Financial health of the residents changing over the period
3. Employer employment patterns

2. Data Preparation

The app makes use of two folders of data for economic analysis, namely attribute and journal, providing information of participants on their financial activities, daily routine, and social network.

Data cleaning, appropriate tables & columns merging, data filtering & chopping are done using R packages within R markdown. To avoid crashing led by data overload, we process data manipulation outside R Shiny then importing it back with *read_rds()*.

The app uses visual analytics techniques to help uses to conduct exploratory. *Shiny, tidyverse, tmap, lubridate, trelliscope, patchwork, sf* packages were used.

3. App Concept

Tool 1: Businesses Performance Analysis
In this section we are requested to find out which businesses appear to be more prosperous, and which is struggling. According to the observation from the dataset, we found that the business mainly falling under catering industry. By using the summary interactive table from our tool, users can filter out the businesses with the top or worst performance based on the analysis on their revenue and number of visitors throughout the given period.

After compared the overall results, we found that the number of visitors and revenue are positively correlated. We selected venue id **1344** and **1342** as the top two businesses with highest revenue and number of visitors during the whole period.


Also, we selected venue id **1349** and **1346** as the two businesses with lowest revenue and number of visitors during the whole period.

After we investigated the details of these business, we have some interesting findings.

Businesses with better performance have better revenue and higher number of visitors during weekends. While businesses with lower revenue and visitors would perform better during weekdays.
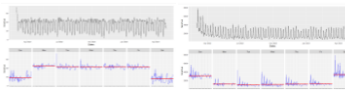

Tool 2: Businesses Performance Analysis
Evaluating the financial health, we looked at the data in mainly three aspects, monthly balance, wage versus cost, and expenditure structure.

Looking at the monthly balance, we can observe that all different categories present a similar trend, especially the remarkable drop in the last 2 months.
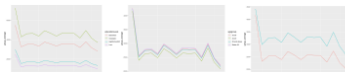
The animated bubble plot reveals the consistent trend with above from Mar 2022 to May 2023. By comparing the distribution of scatters, it is also shown that in the same income level, residents with kids often spend more.
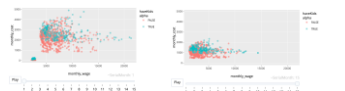
The stacked barchart reveals the expending structure across different attributes. For who with in different education level of agegroup, the structure is relatively similar. However, residents with kids significantly stand out for their high expense of nearly ¼ in education.


Tool 3: Employment Pattern Analysis
This tool is available for employer health exploration. First, viewer could have an overview of Engagement City turnover distribution, according to Turnover Status Distribution tab.

As per research, turnover rate is defined as the percentage of employees who left a company over a certain period. It's often described in relation to employee retention rate. In this condition we applied (Total turnover times of period) / (Total employee number this company ever employed of this particular time) as turnover rate.

According to turnover rate distribution display on city map, we could notice that the number of employer in terms of high-level turnover rate are less than medium and low-level ones. Most company turnover statuses are under low-level, less companies belonging to medium-level. And they locate in northwest and central areas of the city.
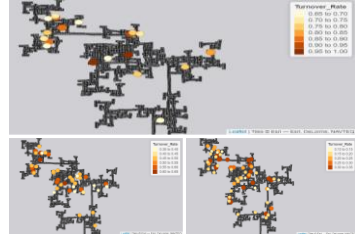
On the other hand, the companies belonging to high turnover level, mainly locate in northwest and only few ones in central area.
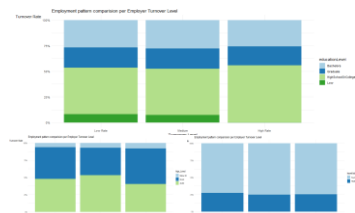
In Employer Factor Ratio tab, users could explore various of employee attributes to come out employment appetites among three turnover levels respectively. We could notice that for having status, there's no significant difference among all levels, only low-level companies get a slightly greater proportion of workers have kids. As for education level, high-level companies hired more high school degree workers and very few low-level degree workers.

4. Conclusion

From the analysis of economic sector in city of Engagement, Ohio USA, we have the following insights:

• The business activities of Engagement, Ohio mainly focused on catering industry, such as pubs and restaurants.

• Businesses with good & bad performance peak at different time. Business earning high profit peaks at weekend, while those with poor performance hit on weekdays.

• Overall, the prosperity of business as well as individual financial health has been shrinking in 15 months period.

• Residents in different categories normally showed similar financial trend and cost structure.

• Most companies with low or medium turnovers. Companies with high turnover level are gathered around the northwest of the city.