Dynamic Route Recommendation Web Service based on Real-time Fuel Price

Project: Urbana Fleet Fuel Management

Team Member: Josh, Terry, Zhaoqin, Jianzhang, Lynn

Team Introduction

- Diverse Background

School Year:

Undergrad(1)
Master(3)
PhD(1)

Major:

Computer Science(1)
Agriculture(1)
Business(1)
Information Sciences(2)

Expertise:

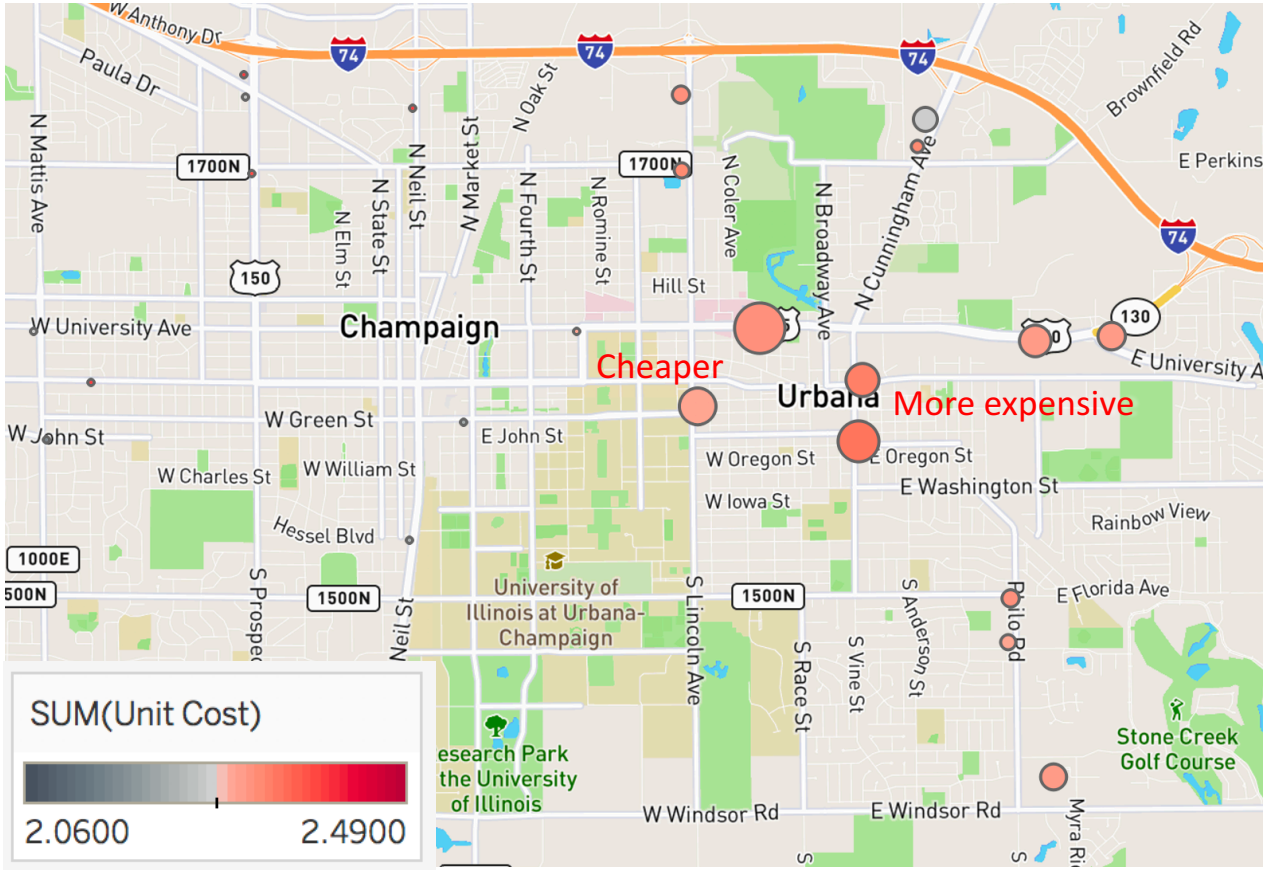
Web Development(1)
Data Analysis(1)
Data Visualization(1)
Software Programming(1)
Machine Learning(1)
Web Scraping(1)
……

What we made?

- A website for recommending fleet driver to find the best gas station choice
- A reusable, interactive dashboards for fleet fuel manager monitoring
- A overall optimization solution for Environmental Sustainability Manager to save more cost & reduce more fuel-use

Why we did this?

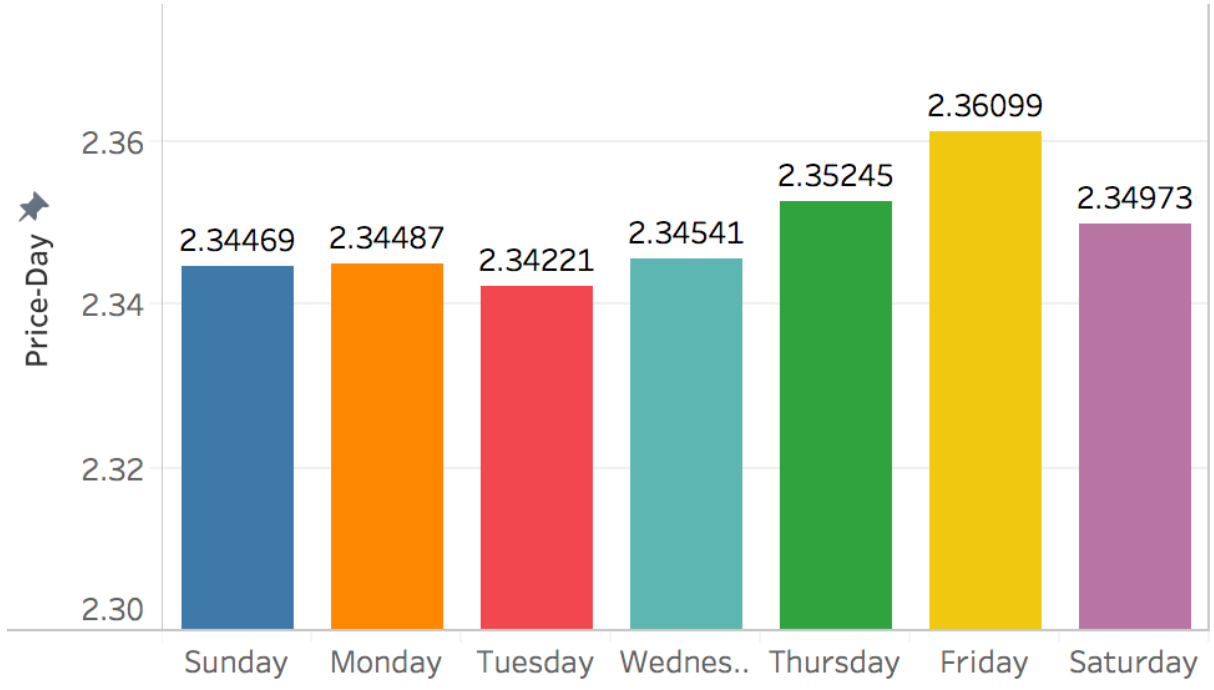
- From historical data, we found the drivers choose the gas station by convenience, but their choice is not the most cost-effective one, which lead to spent more money.

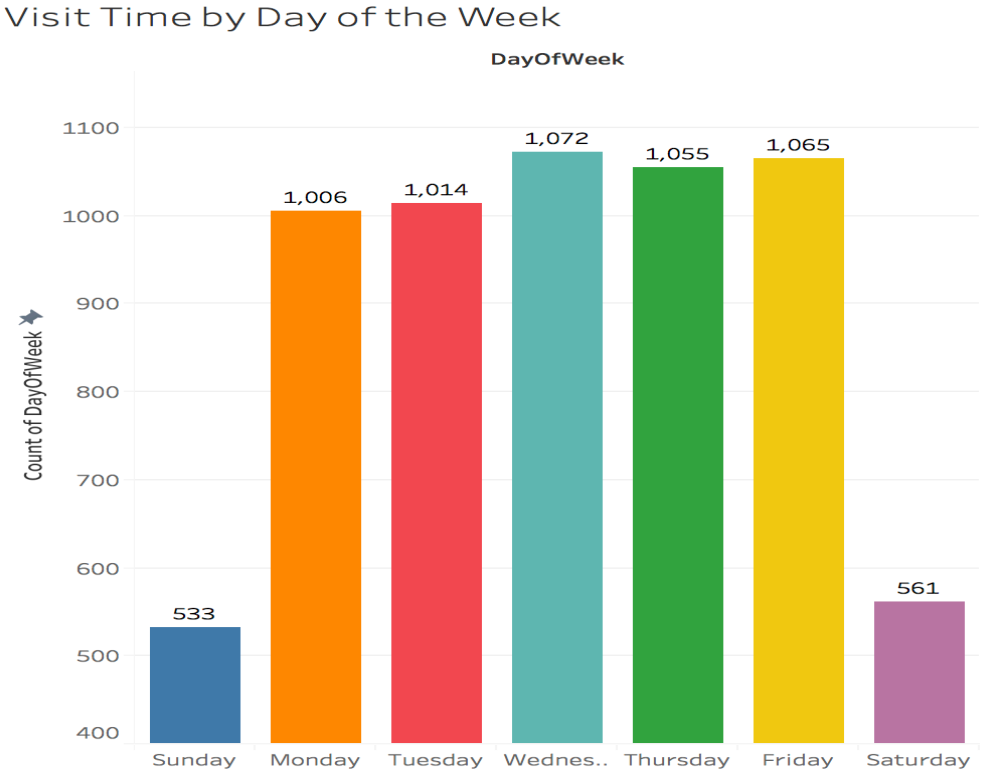


The size of circle represents the visit frequency to the gas station

Why we did this?

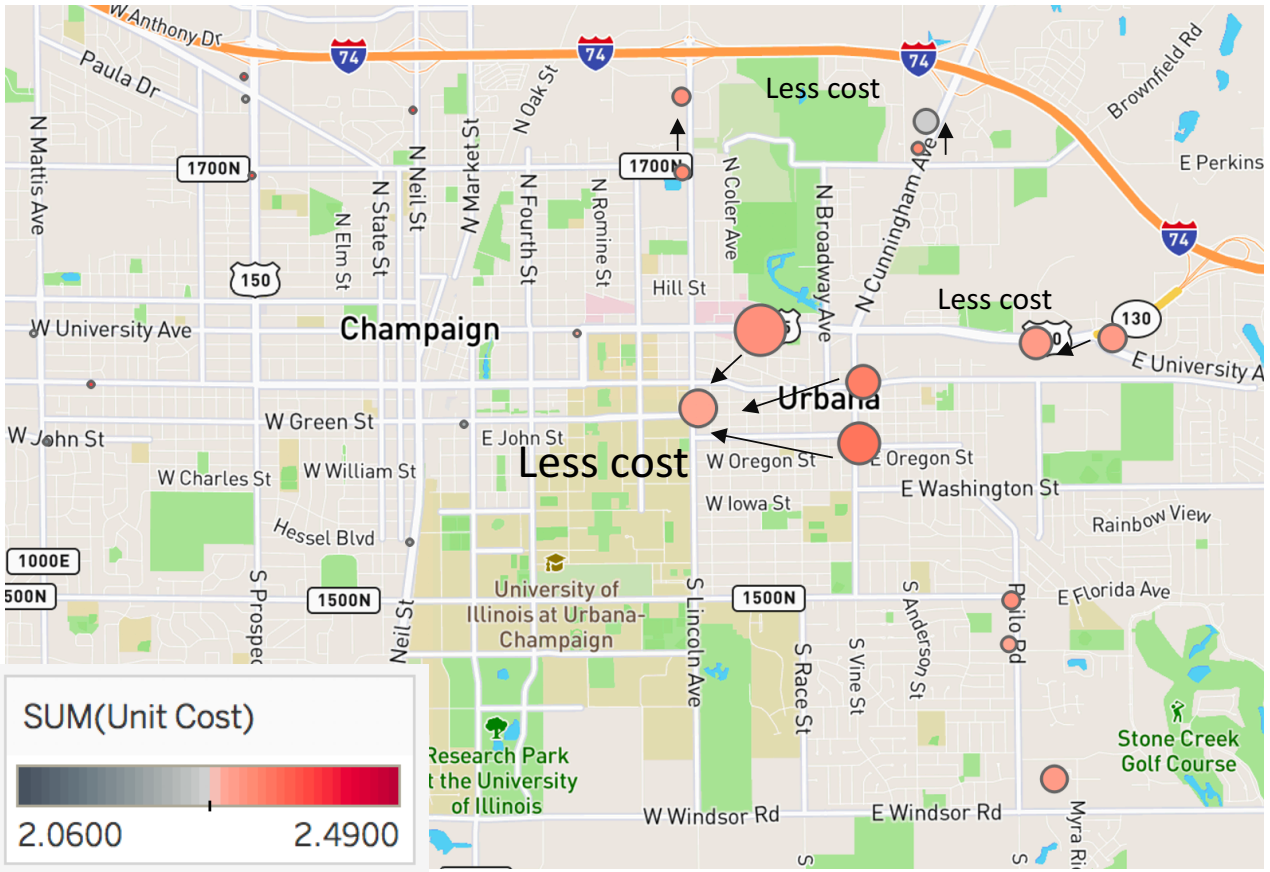
- Meanwhile, the price is fluctuating by the day of week.
- Tuesday is usually the lowest
- Friday is usually the highest
- But our current visit time distribution by day of the week didn't follow this strategy





Here is our solution

- From the map below, follow the arrow sign, we can move our gas station choice to the cheaper one. If we implement this strategy, it will save us around $15000 per year.



Economic saving by changing from gas station A to B:

$$\text{Saving}_{A\to B} = \text{AOC}_A \times \text{AUP}_B - TC_A$$

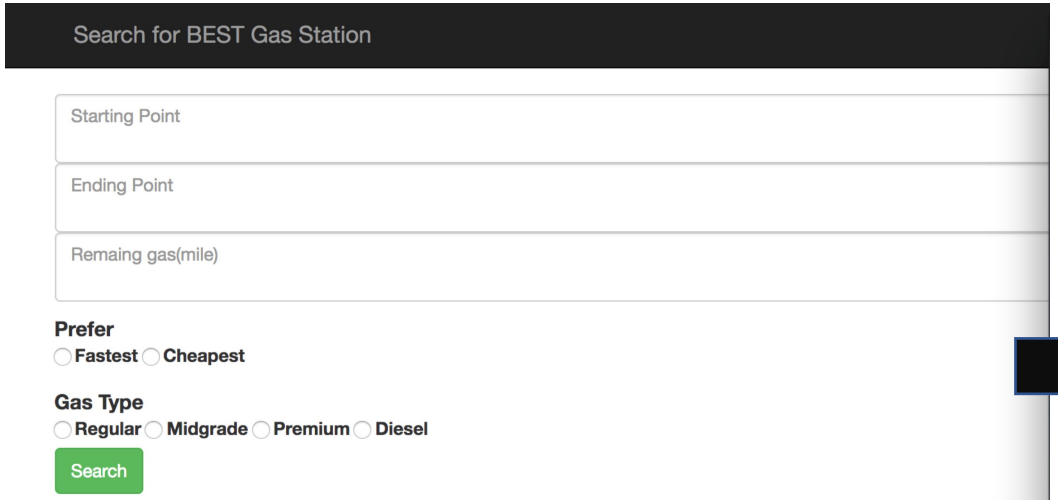
Where AOL: Annual Oil Cost; AUP: Average Unit Price; TC: True Cost

The size of circle represents the visit frequency to the gas station

Dynamic recommendation web service

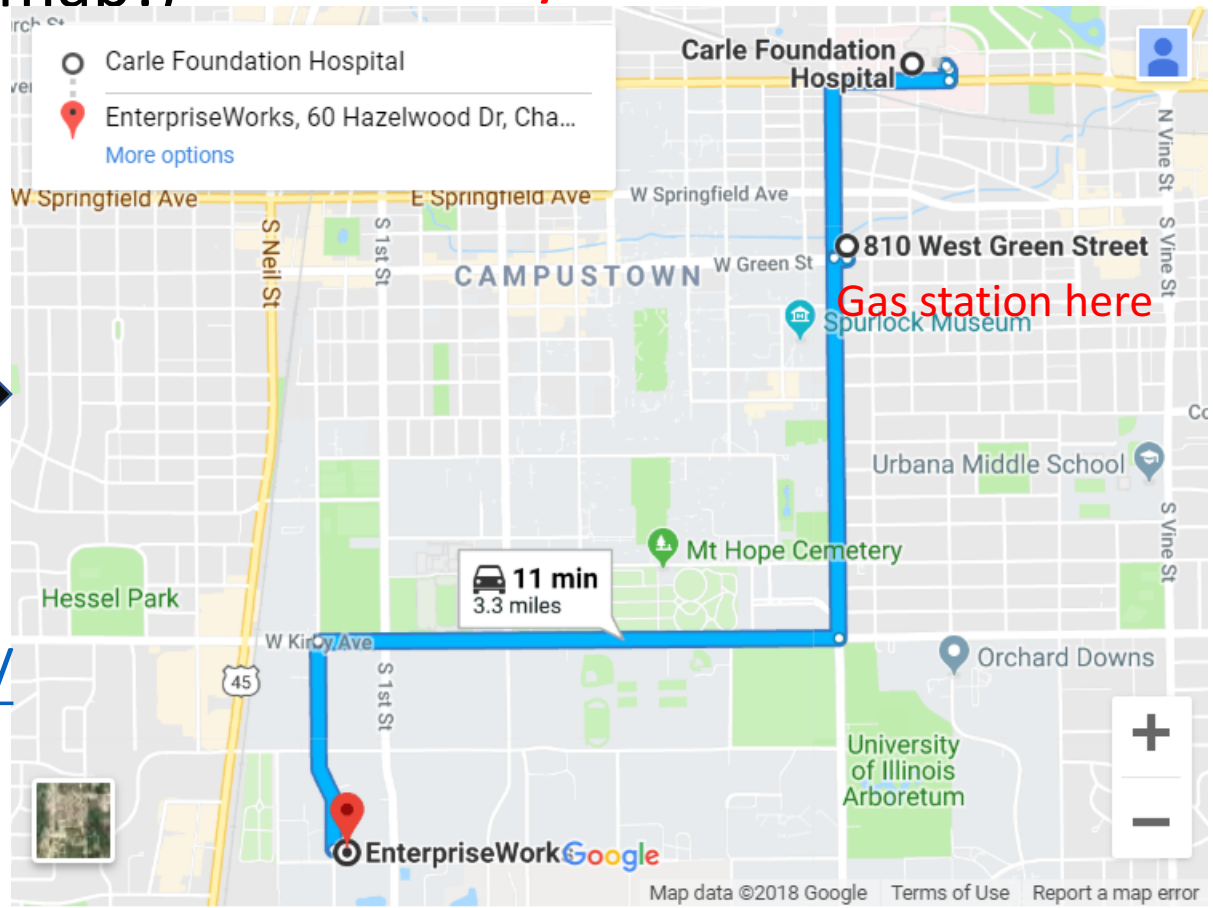
- Daily fuel price source: gasbuddy

Input (like google map, but more than a map!)



Website: http://lynnnyn.pythonanywhere.com/

Output: best route map based on your need!



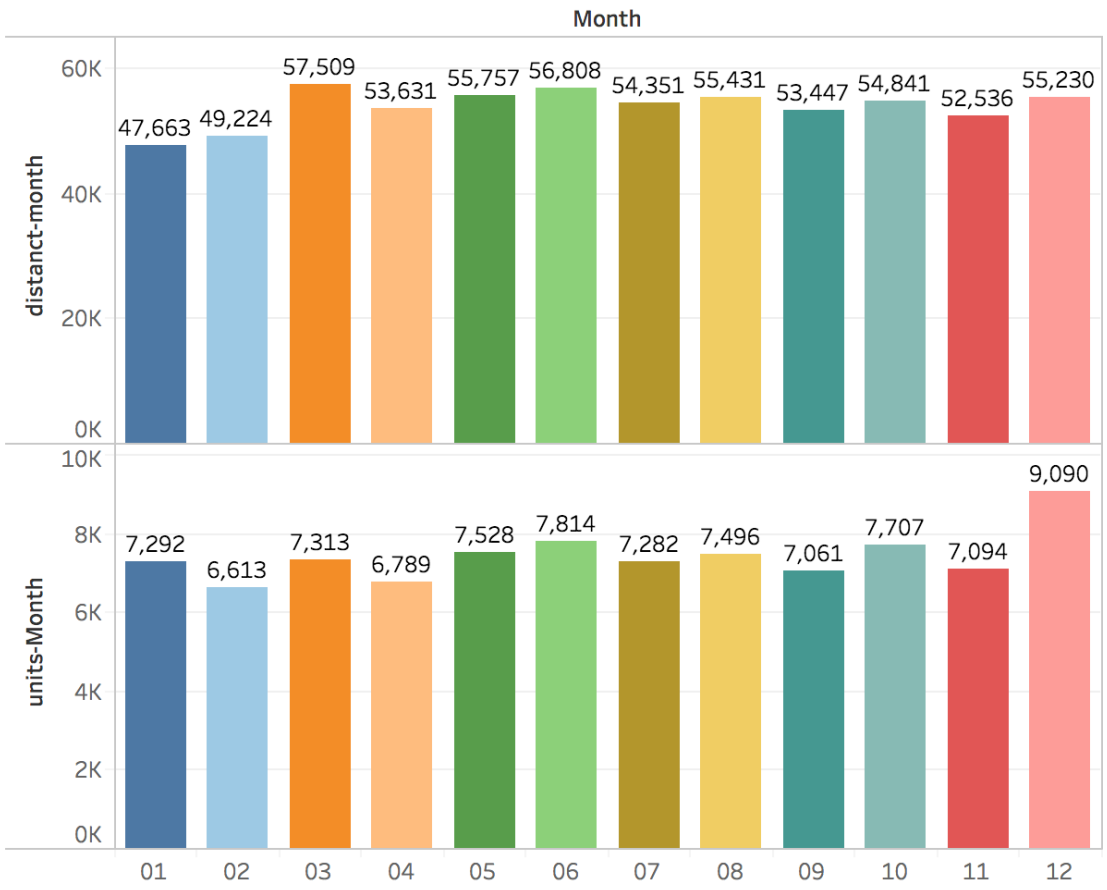
Best route calculation

- Fixed start and end points: get the gas station nearby
- Grab the real-time fuel price from gasbuddy
- Calculate the fuel cost based for each gas station nearby
- Optimize the route by take into the consideration of total distance; reachability of target station with current fuel mileage; fuel cost saving; travel time and drivers need

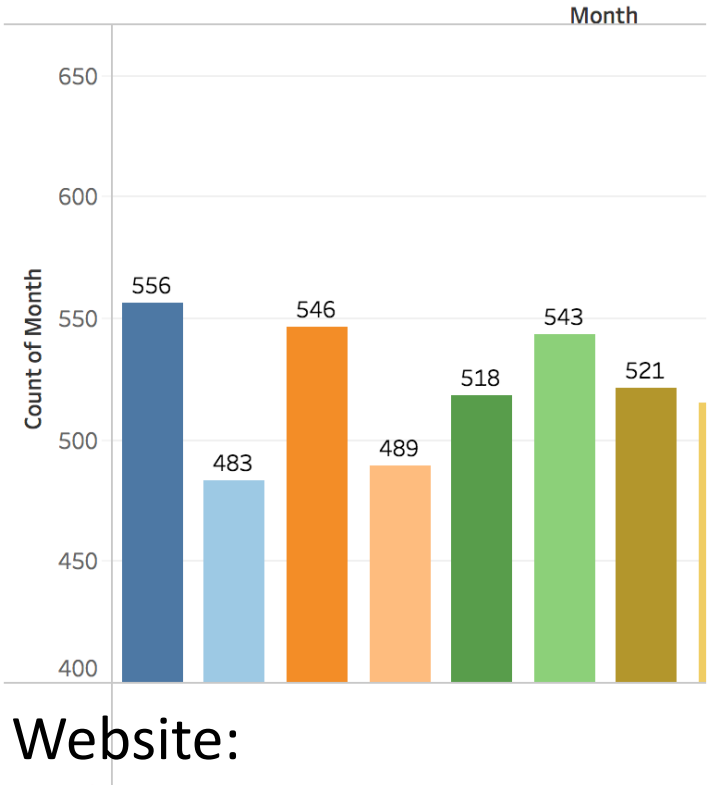
Reusable Interactive Dashboards

Gas Station Analysis | Vehicle Fueling Behavior

Total Distance Driven by Month



Visit time & Avg Price



This will help fuel manager better understand the spend on gas station

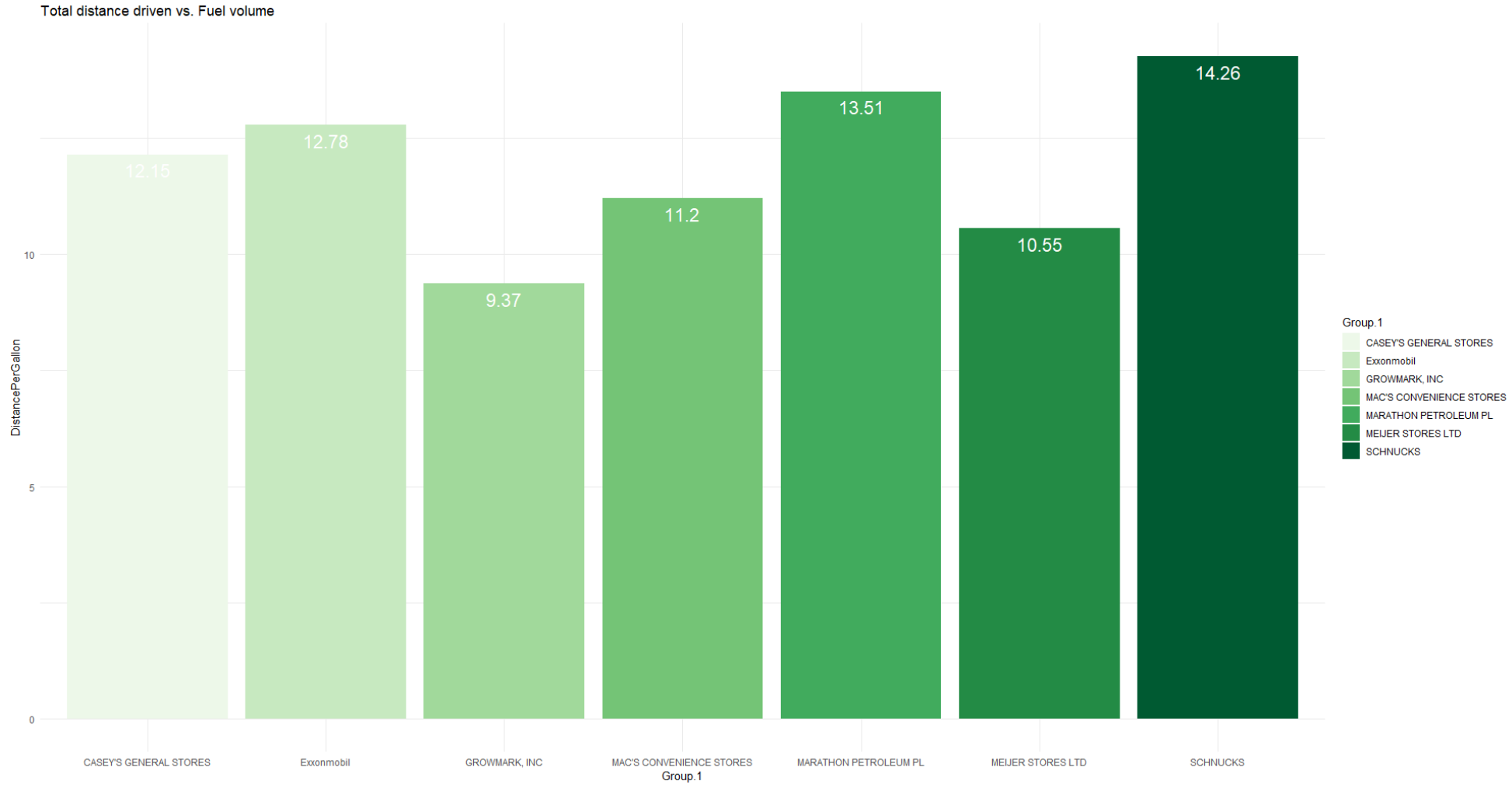
Website: https://public.tableau.com/shared/Y477CXTK5?:display_count=yes

Our Recommend Next Step

- Implement the website for fleet driver to find the best gas station choice
- Discover the potential partnership(bundle promotion, discount) with gas station brand who offers the most cost-effective fuel.

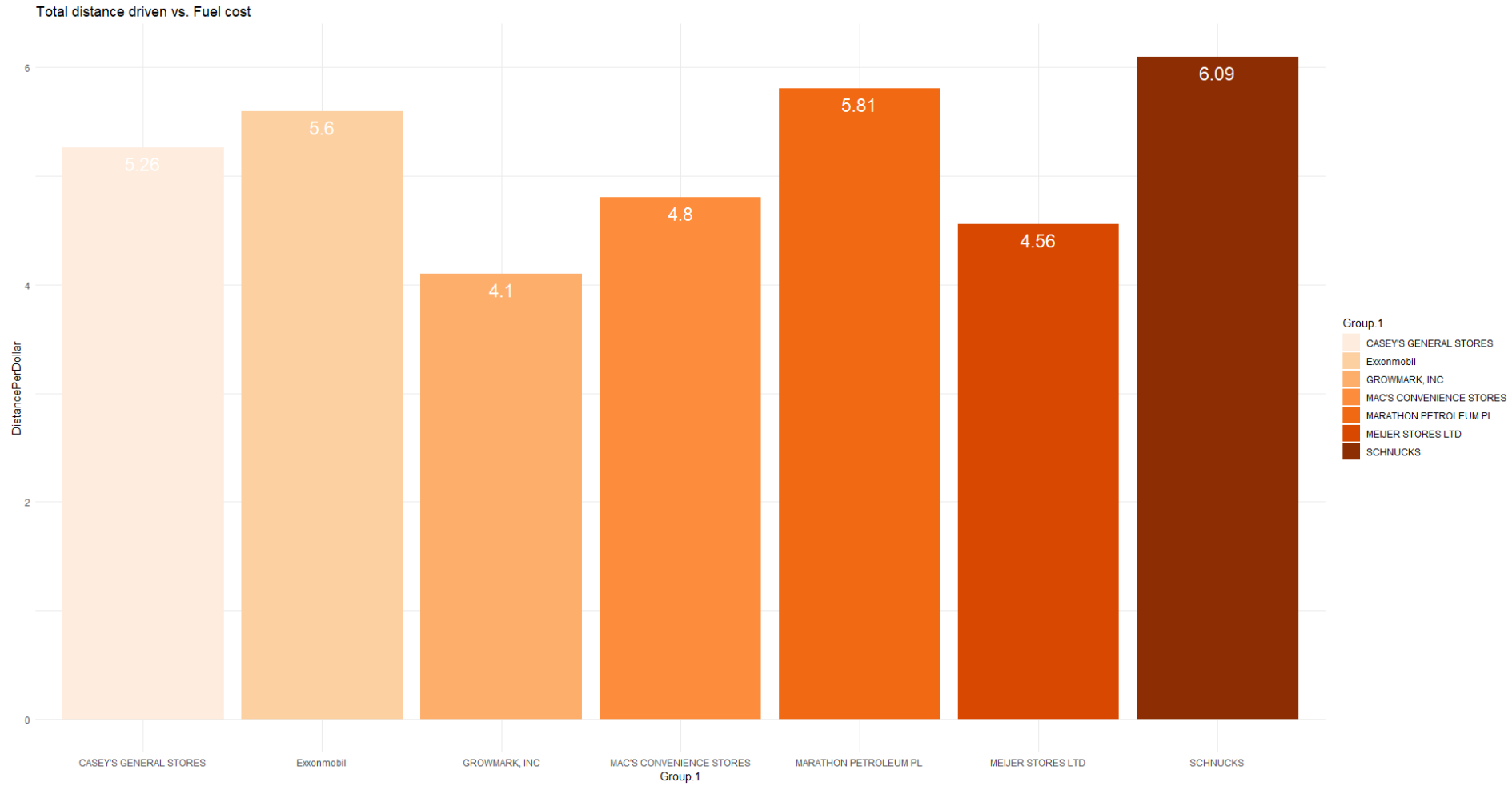
We also found some interesting insights

- Fuel efficiency by brand, we found Schnucks is the best, while Growmark is the lowest.



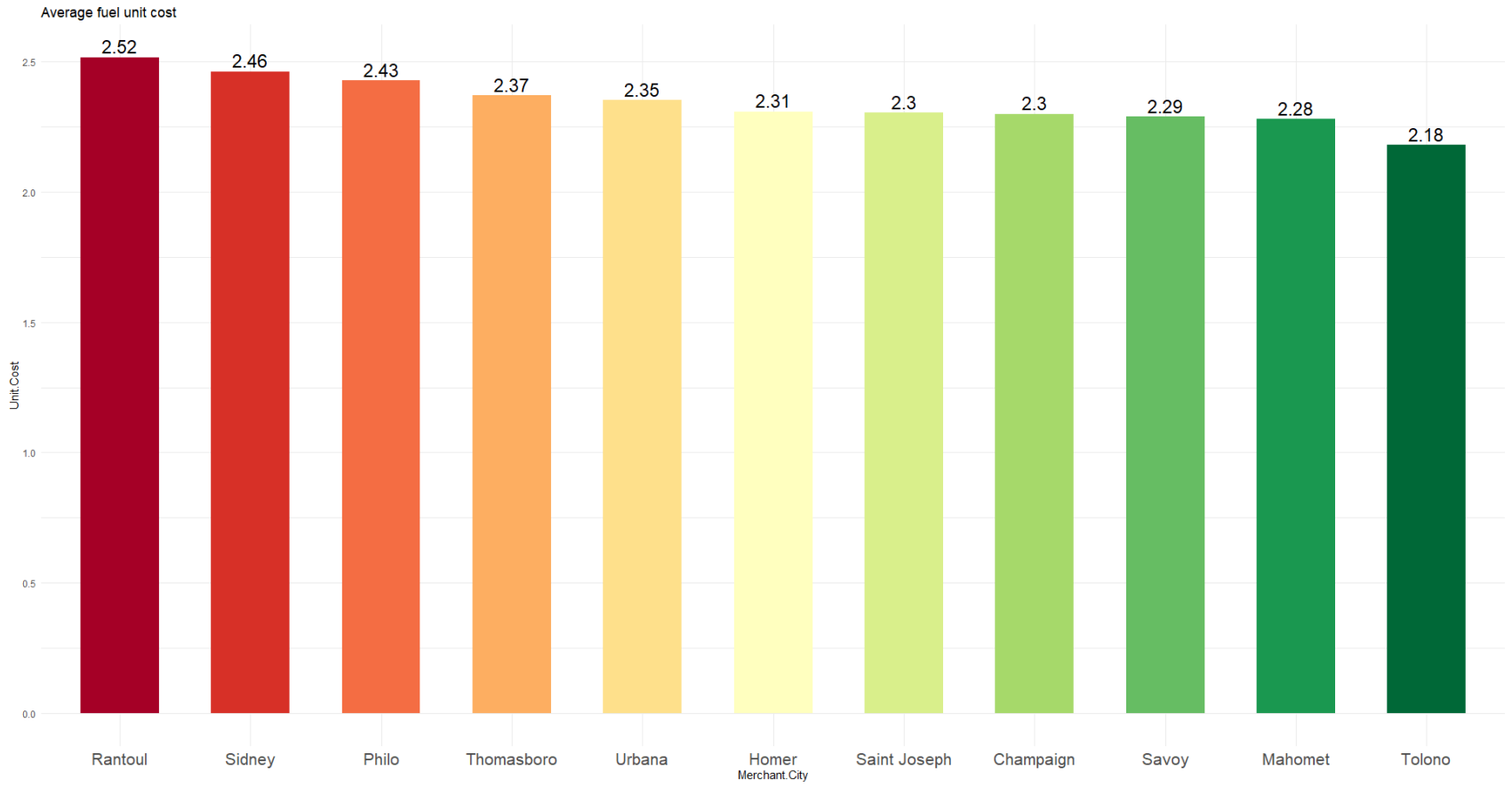
We also found some interesting insights

- Distance per dollar by brand, we also found Schnucks is the best, while Growmark is the lowest.



We also found some interesting insights

- Avg fuel unit cost by city in Champaign county. Although our most driving area is around Urbana-Champaign, but the recommendation is if we are outside of Urbana-Champaign, we can make use the fact that gas station price in some cities like **Rantoul, Sidney, Philo** are cheaper than Urbana-Champaign.



We also found some interesting insights

- Total spend by department in 2017. Although we didn't know the meaning of PW, PD (probably related to police), we can clearly see that PW & PD spent the most amount of gas spent last year.