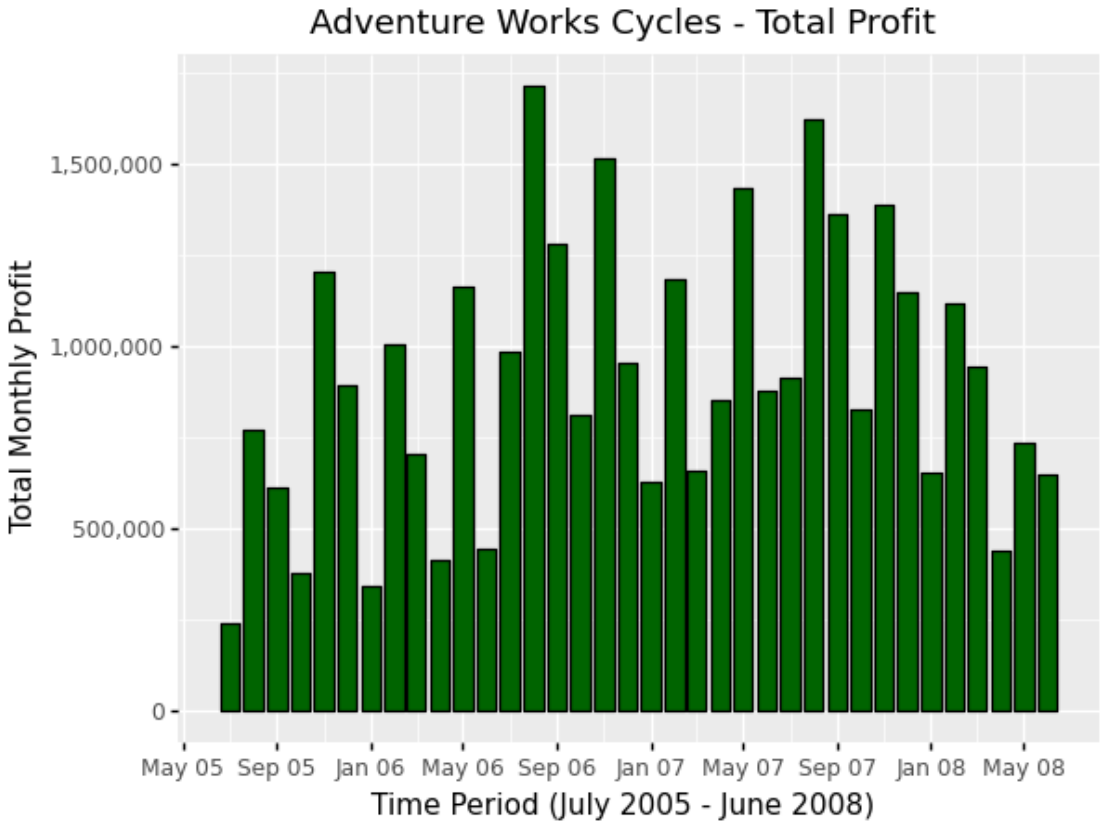
Adventure Work Cycles Data Analysis

April 21, 2021

In this place you can find my Python data analysis (codes, tables, and figures) performed on data of Adventure Works Cycles(a large wholesaler of bicycles in the US and Europe). The main goal of this analysis is to show my potential employer the skills of data analysis that I possess.

Let's start with our first plot showing total profit per month in order to get familiar with problem that we are facing.



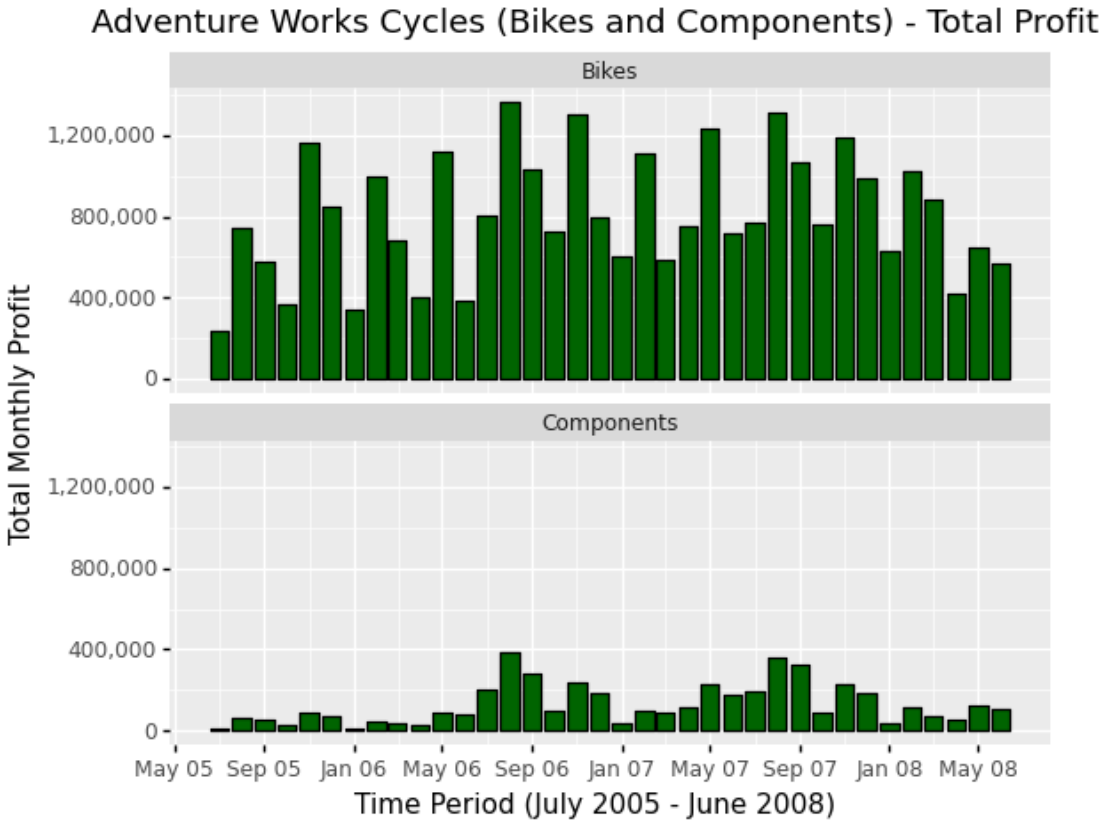
[3]: <ggplot: (8767576096392)>

We will continue our data analysis by investigating the profit with no freight cost among each product categories sorted by percetage rank, so just take a look at the next table.

[9]:

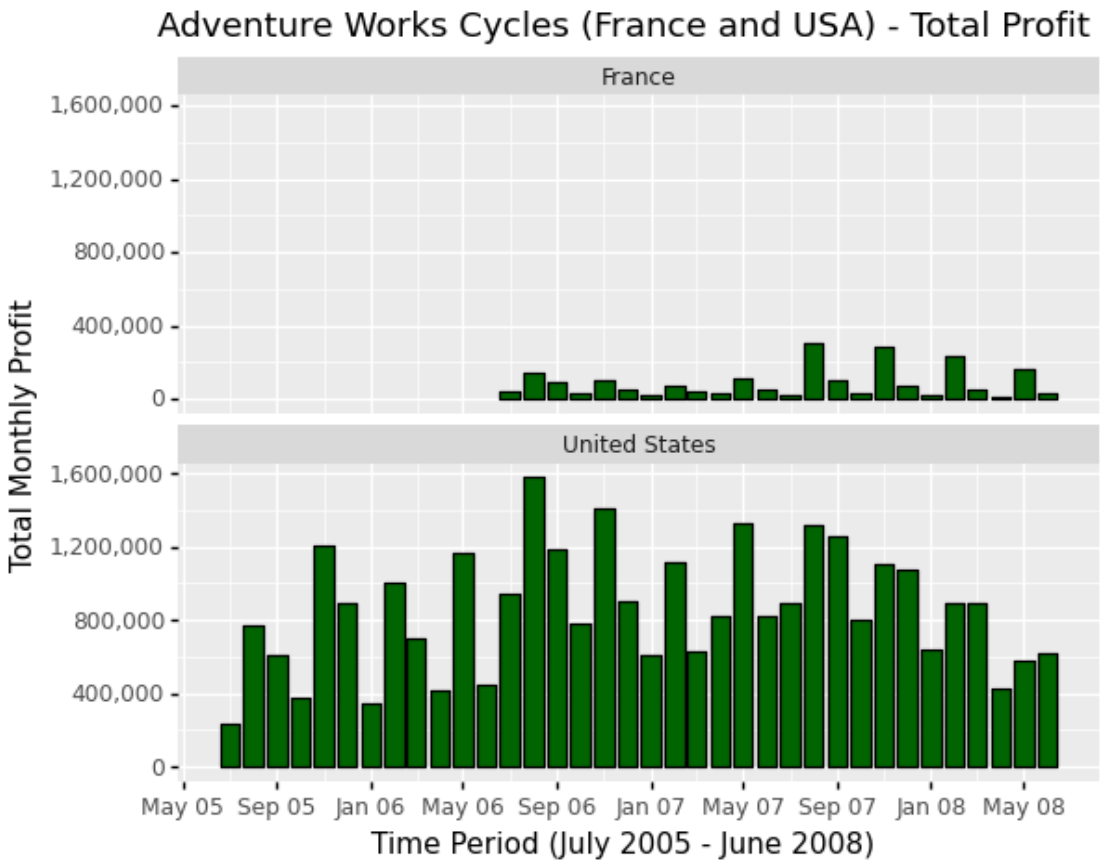
	Product_Category	TotalProfitNoFreight	percent_rank
0	Bikes	3.203100e+07	81.342642
1	Components	6.091057e+06	15.468225
2	Clothing	9.005934e+05	2.287055
3	Accessories	3.552195e+05	0.902079

Let's see what is the total profit gained by selling Bikes and Components.



[12]: <ggplot: (8784042582495)>

We see less profit made in last few months by selling products of these categories. Let's see what is going on among regions.



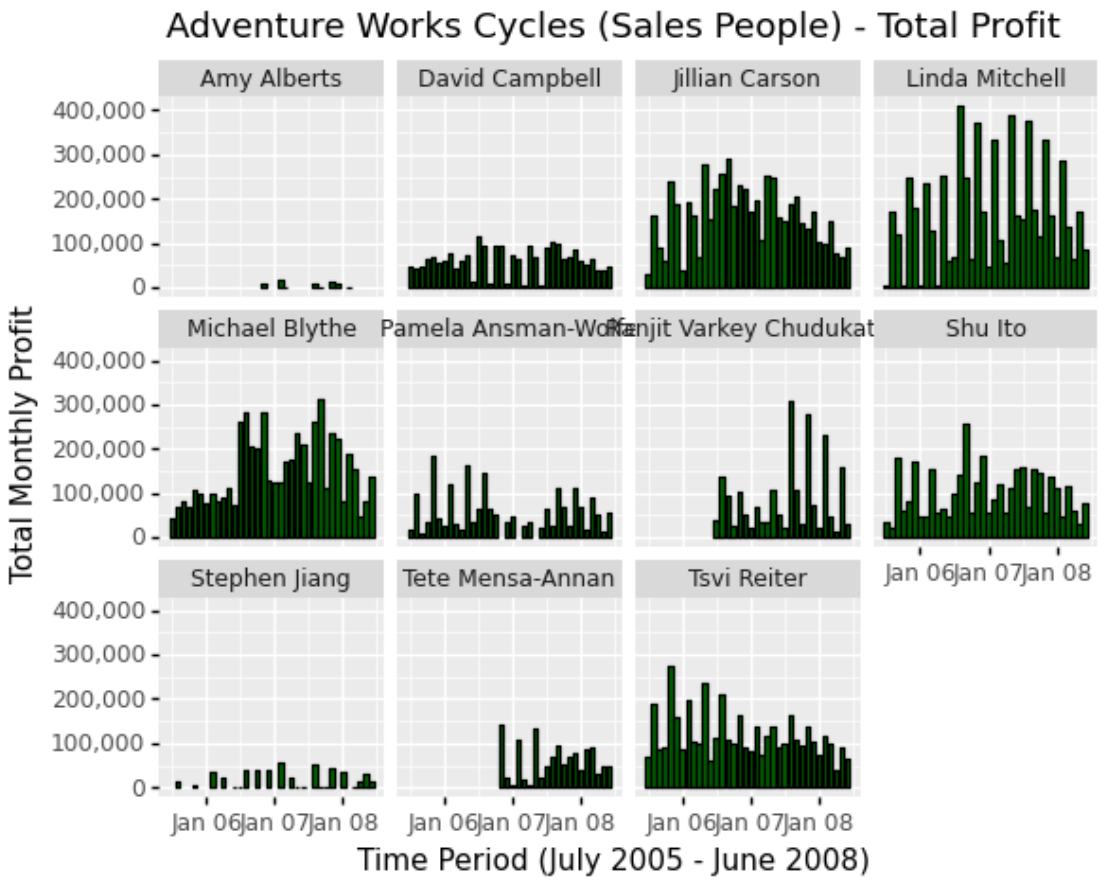
[13]: <ggplot: (8784043420766)>

Most of the profit was made in USA but still we do not see any pattern representing the root cause. Maybe the staff is short with sales people, but first let's count the number of sales people and calculate the profit made by them.

[20]:

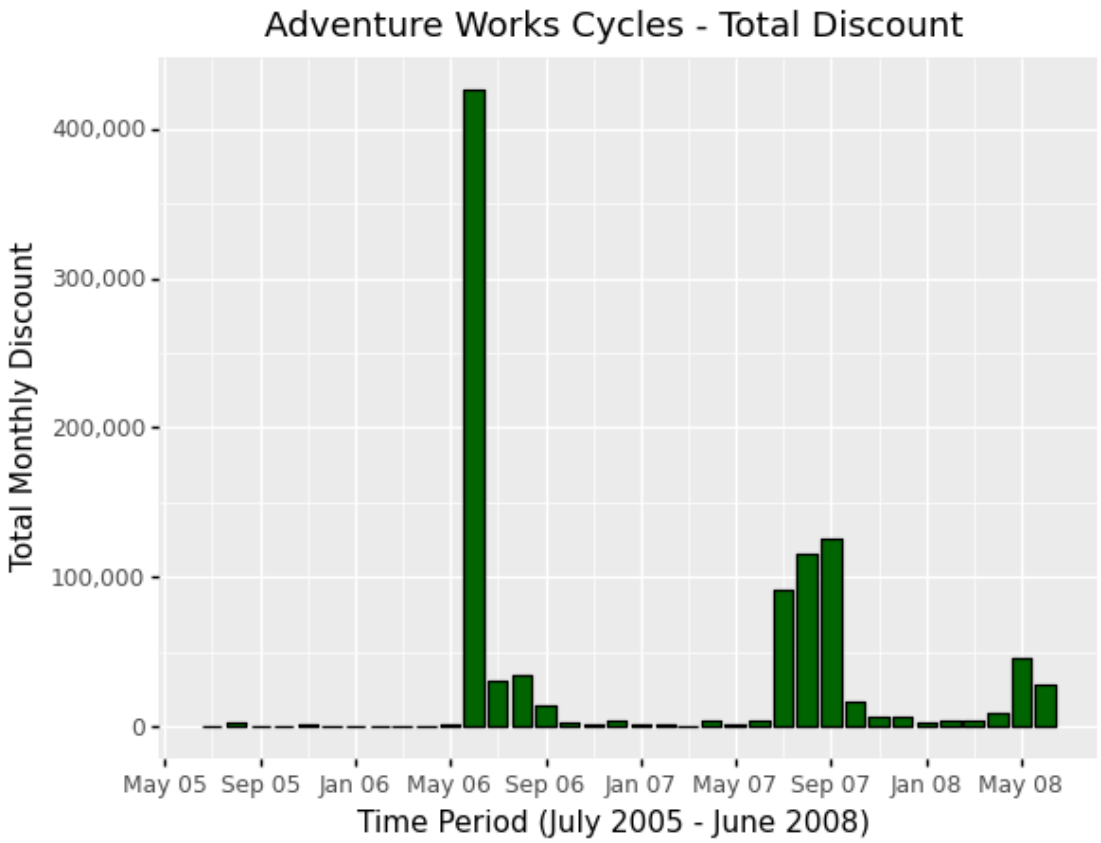
	Sales_Region	Sales_Person	QuantityProfitNoFreight
0	France	1	2.624890e+06
1	United States	10	3.675298e+07

In order to explore if the staff is short with sales people we are creating next plot.



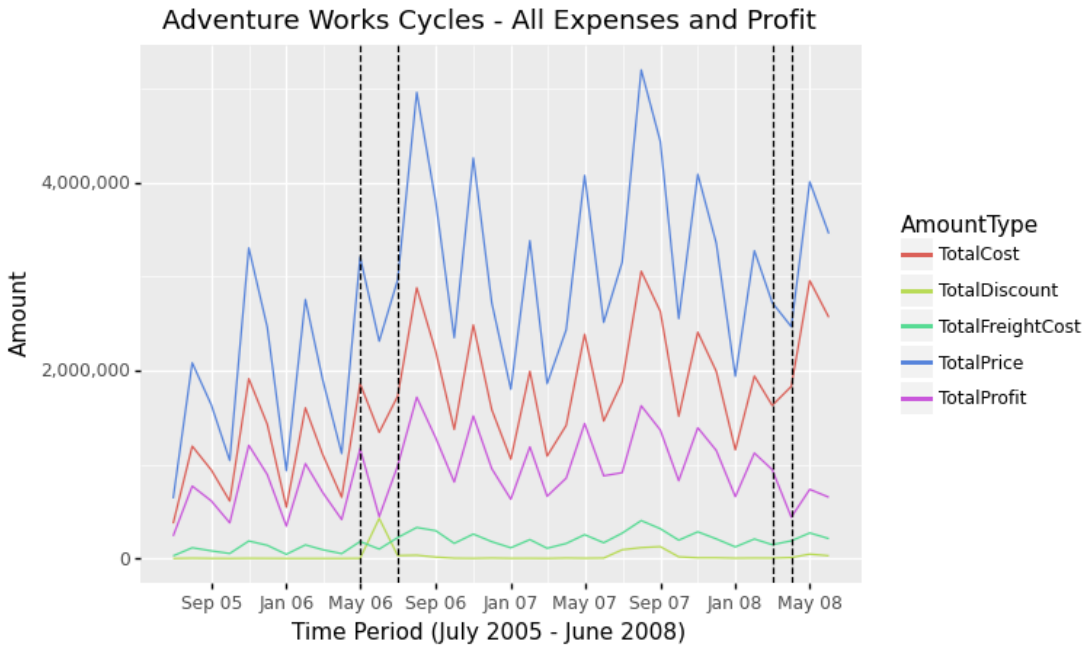
[21]: <ggplot: (8784044077361)>

We don't see any huge drop that will indicate that the low profit case is caused by the staff missing enough employees, so let's see if this is caused by discount.



[34]: <ggplot: (8784043889074)>

We see the amount of money we potentially lost, but the cause of profit reduction in last few months is not due to discount definitely. Now we can see investigate the trend of all expenses and profit per each month.

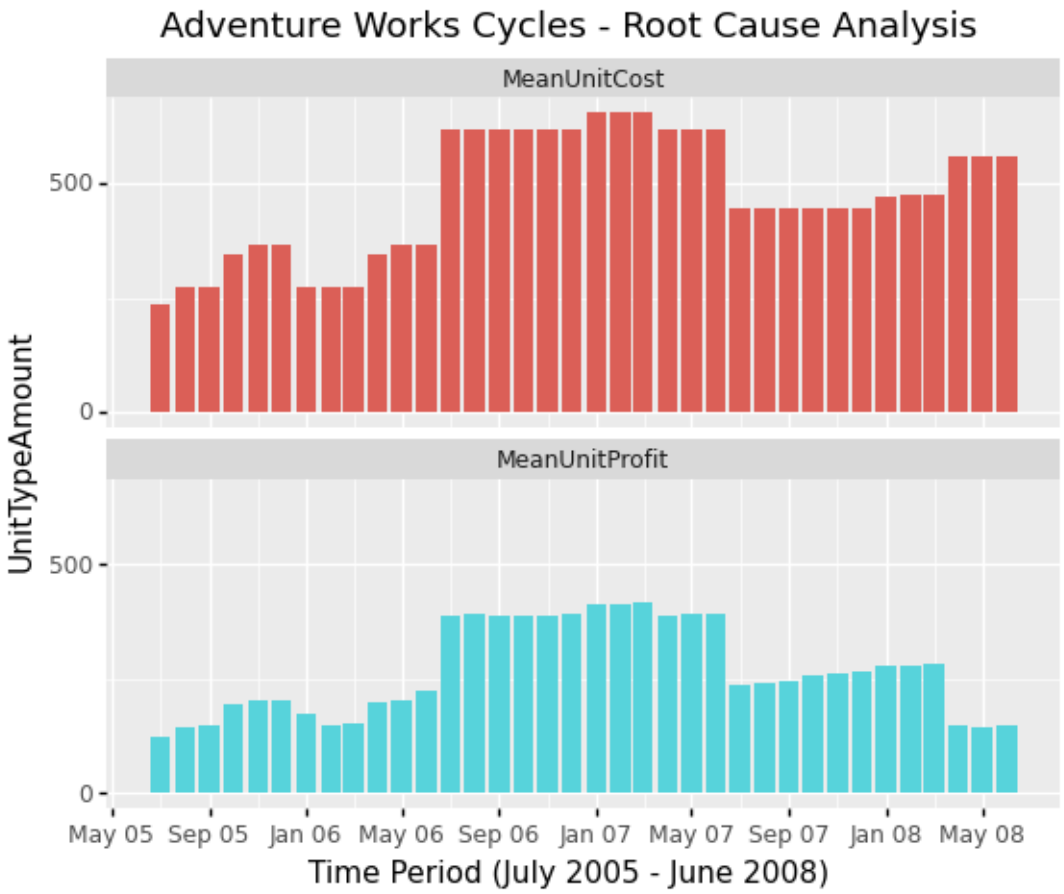


[35]: <ggplot: (8784037505253)>

We see what the problem is! The increase in costs affected the decline in profits!!! We also see that the decline in profit was impacted by discount in June 2006, but right now we are intersted in exploring what happened in last few months. We are creating CostDecrease data frame that will help us detect cases, but we also have to check if all the prices remained unchanged and any of the unit costs have not decreased during the time.

[36]:
```
Empty DataFrame
Columns: [Product_Category, Product_Name, FirstCost, LastCost, FirstPrice,
LastPrice]
Index: []
```

Yes, we see no rows, which means we only have cost increasing moment. We are creating a subset that will only include products with these cases. We want to see the trend by calculating mean cost and profit of all products that were sold during the certain months.



[27]: <ggplot: (8784042585739)>

Finally, this research shows what we suspected. In last few month the increase in costs affected the decline in profits. Let's just check what amount of profit we potentially lost by not setting new prices.

[37]:

OrderDate	TotalCostIncrease
2008-04-01	366006.618025
2008-05-01	591074.145875
2008-06-01	513034.713375

At the end we just should provide our management the list of when the unit cost of specific products increased.

[31]:

	Product_Category	Product_Name	FirstCost	LastCost	\
0	Bikes	Road-250 Black, 44	1554.9479	1943.684875	
1	Bikes	Road-250 Black, 48	1554.9479	1943.684875	
2	Bikes	Road-250 Black, 52	1554.9479	1943.684875	
3	Bikes	Road-250 Black, 58	1554.9479	1943.684875	

```
4              Bikes       Road-250 Red, 58  1554.9479  1943.684875
..               …                     …        …          …
143         Clothing        Racing Socks, L     3.3623     4.202875
144         Clothing        Racing Socks, M     3.3623     4.202875
145      Accessories  Bike Wash - Dissolver     2.9733     3.716625
146      Accessories  Water Bottle - 30 oz.     1.8663     2.332875
147      Accessories    Patch Kit/8 Patches     0.8565     1.070625

     FirstPrice  LastPrice CostIncreasedAt
0       2443.35    2443.35      2008-04-01
1       2443.35    2443.35      2008-04-01
2       2443.35    2443.35      2008-04-01
3       2443.35    2443.35      2008-04-01
4       2443.35    2443.35      2008-04-01
..          …          …             …
143        8.99       8.99      2008-04-01
144        8.99       8.99      2008-04-01
145        7.95       7.95      2008-04-01
146        4.99       4.99      2008-04-01
147        2.29       2.29      2008-04-01

[148 rows x 7 columns]
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