

STATISTICAL INFERENCES IN BUSINESS

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Module 3 Project
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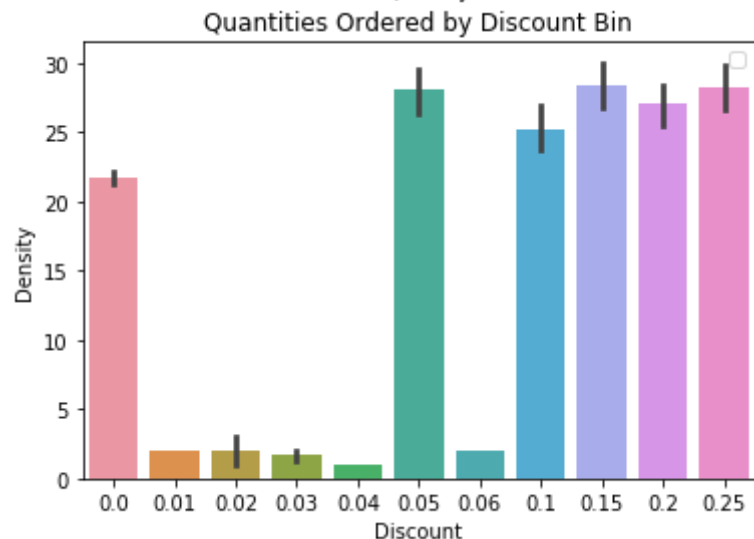
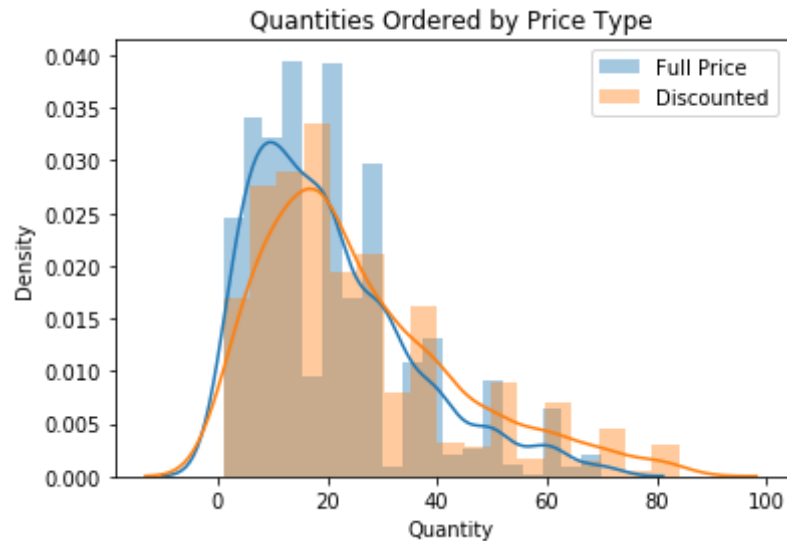
Acknowledgments

EXECUTIVE SUMMARY

- To inform future business strategy, the following questions will be examined with statistical inference:
 - Does a product's discount have a statistically significant effect on the quantity of product ordered?
 - Do customers in different shipping regions have different demands related to shipment time?
 - Do different employees earn more revenue than other employees?
 - Does a shipment's final destination affect its freight cost?
- Statistical inference will allow business strategy to be developed void of any implicit human biases that might form from cursory examinations of data and will offer valuable insight to the Northwind business

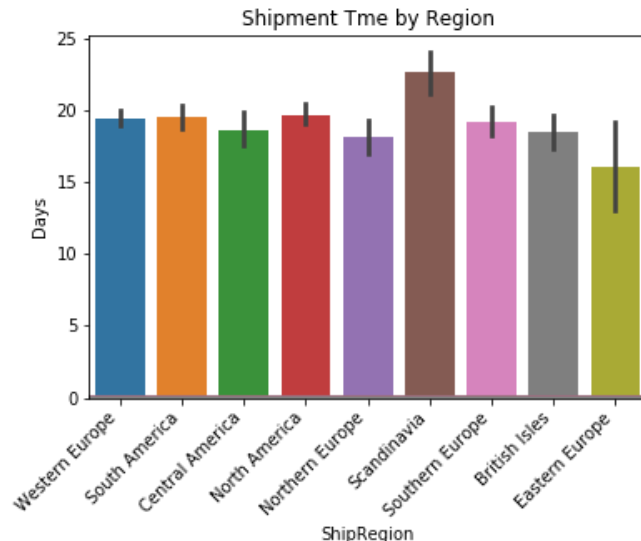
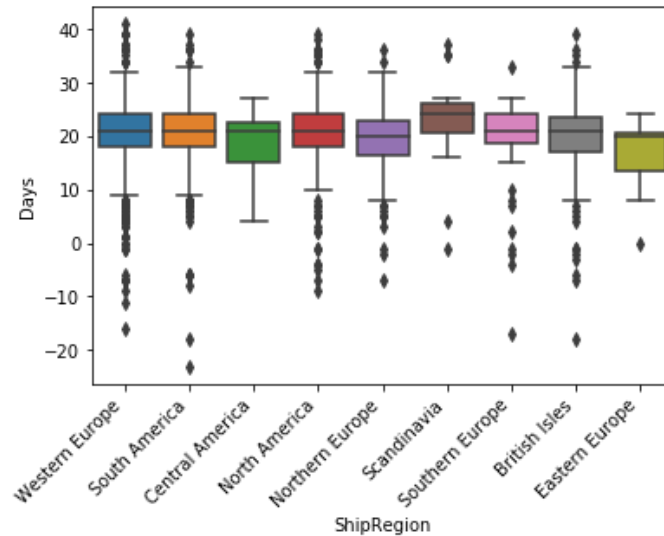
ANALYSIS OF THE CASES

PRODUCT DISCOUNT AND QUANTITY ORDERED



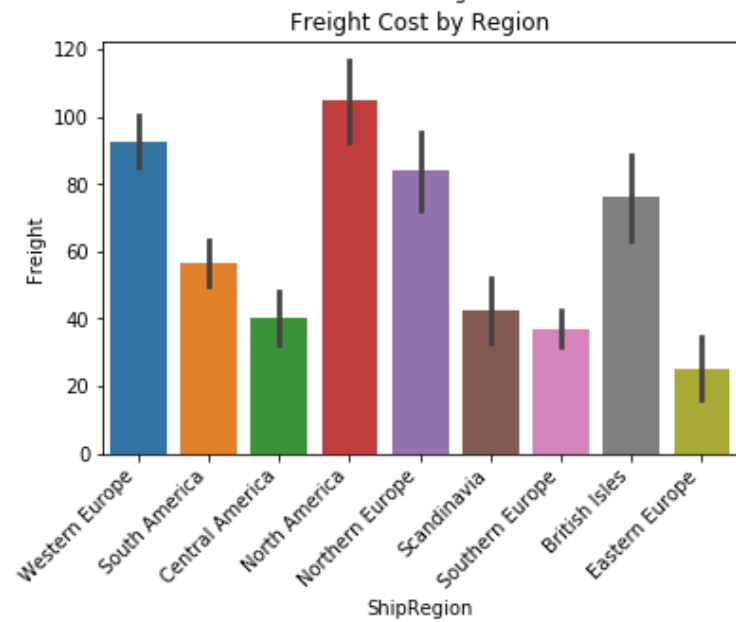
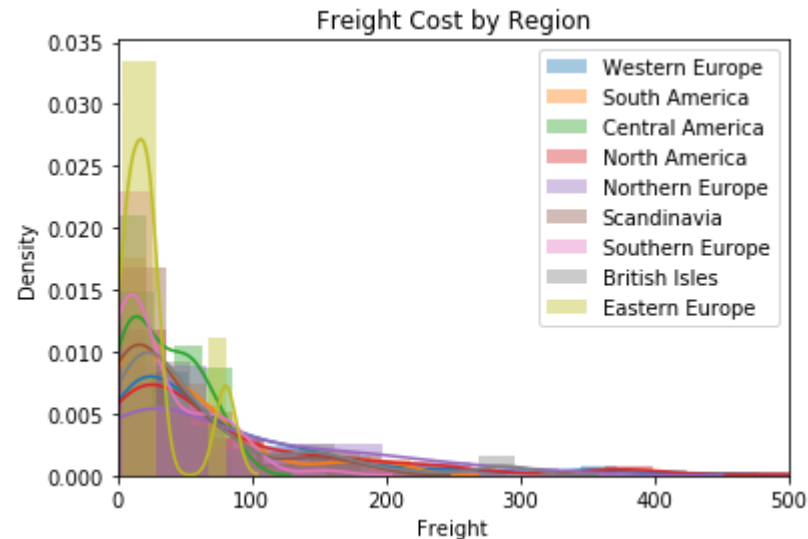
- With a p-value < 0.01 , we were able to reject the null hypothesis that stated a product's discount has no impact on the quantity of product ordered.
- Further analysis highlighted that discounts of 5%, 15%, 20% and 25% resulted in the most gains in quantity of products ordered.
- Based on this analysis, Northwind should reconsider offering discounts other than 5%.
 - There is marginal difference in the 5% discount and those offered at 15%, 20%, and 25%.
 - Offering higher discounts leads to lower revenue and cannot be justified unless for clearing way for new inventory.

SHIPMENT REGION AND SHIPMENT TIME



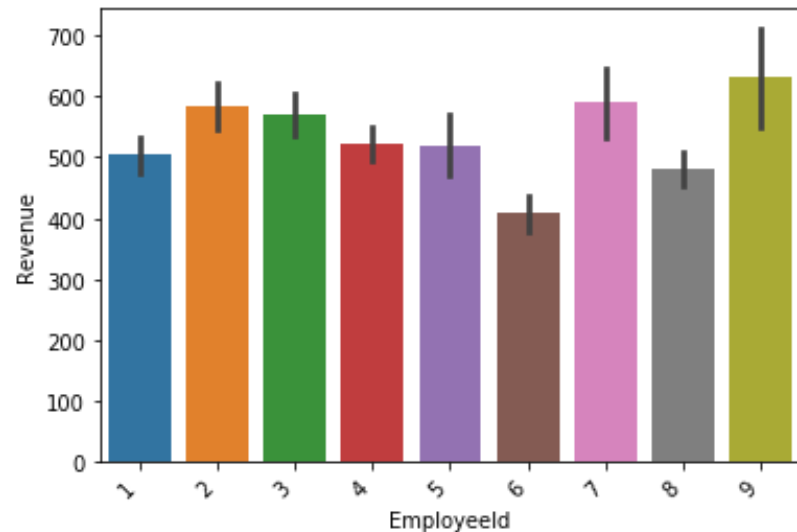
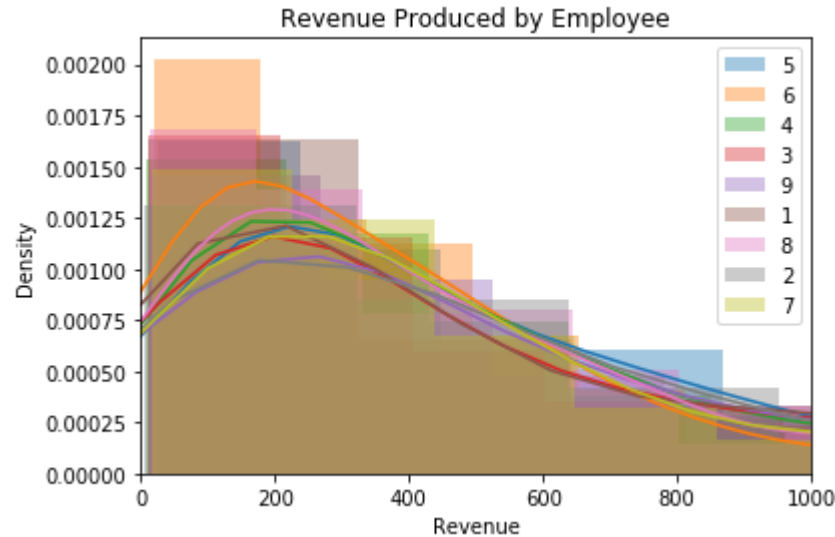
- With a p-value of 0.23, we were not able to reject the null hypothesis that stated a product's shipment region had no affect on the time customers wanted their goods.
- Both graphs highlight that most customers desire their goods within 20 days of placing their order. Eastern European nations appear to be slightly below this measure, but not at a significant level.
- From a strategy perspective, Northwind can aim to minimize shipping costs by entering RFP process with shippers that can offer shipment within 20 days at cheaper rates than current providers

SHIPMENT REGION AND FREIGHT COST



- With a p-value of > 0.01 , we are able to reject the null hypothesis that stated a product's freight cost will remain the same regardless of shipment region.
- From a business strategy standpoint, shipments between the following regions varied the most:
 - North America & South America
 - North America & Southern Europe
 - Northern Europe & Southern Europe
 - South America & Western Europe
 - Southern Europe & Western Europe
- It is possible that distance between regions such as South America & Western Europe can impact freight costs. However, Northwind might want to look into other shippers to transport its goods between North America & South American and between the various European regions

REVENUE GENERATED PER EMPLOYEE



- With a p-value of 0.01, we are able to reject the null hypothesis that all employees have the same level of revenue production.
- Of particular interest to examine are employees 6 and 9.
 - Employee 6 is underperforming compared to their peers.
 - Employee 9 is overperforming compared to their peers.
- As a business, Northwind can explore standard practices such as training for all employees so that they can have the same basis to achieve sales as employee 9.
 - Likewise Northwind can control against some of the negative aspects of employee 6 so that no other employee have low sales such as them.

REQUESTS FOR FURTHER ANALYSIS

AREAS FOR FURTHER STUDY

Product Discount & Quantity Ordered	Shipment Time & Shipment Region	Shipment Region & Freight Cost	Employee Revenue Production
<ul style="list-style-type: none">• We can examine what full-price products are purchased in conjunction with discounted products for marketing purposes.• We can also examine when in a product's life cycle might it make sense to offer a higher discount should company need to reduce storage costs.• We can also see which times of year are best for offering products	<ul style="list-style-type: none">• Further analysis can be provided around the cause of so many outliers in North American region. Better defining consumer in this region can bolster future revenue• Closer comparison of profiles of Scandinavian and Eastern European clients could help company leverage infrastructure to meet demands of Eastern European clients while taking advantage of n	<ul style="list-style-type: none">• Further analysis around units sold per region versus distance traveled to fulfilment will help determine if some freight costs can be mitigated.• Cost containment for regions with high volume maybe easier to achieve versus costs related to longer distances.	<ul style="list-style-type: none">• Further analysis of employee 9's profile can help determine how heightened sales can be achieved across the firm.• Review of who employee 9 reports to and other top performers can highlight systems that need to be replicated.• Predictive model can be created to help determine likelihood of sales based on training, years of experience and other factors for individual employees

ACKNOWLEDGEMENTS

THANK YOU

- This analysis could not have been completed without the powerful learning community present at Flatiron. While I cannot attend most events live, watching the videos and sharing in everyone's learning pains brings both comfort and inspiration to continue trudging forward. In particular, Dr. Irving's passion for the subject matter and ability to relate to the student perspective make his instruction value-add, insightful, and a fun experience.
- I also am grateful to the Flatiron method that has taught me how to be a continuous learner. From consulting Stack Overflow to library documentation, this project was a learning experience that saw me grow from being skeptical of performing ANOVA test to desiring to undertake some Chi-Square exams in the near future with confidence.