New York Business Inspection: A Use Case of Food inspection by Muhanned Almutairi

Introduction  
  
In this report, we will explore and analyze a dataset collected about new york business inspections. I have applied most of the stages of the data science methodology that I have studied in this specialization. This project will introduce business inspection predictive analytics reports that can help promote business safety and for example food business as part of the many processes put to prevent food-borne illness. Some of these processes include proper handling of food, proper preparation of food and storage. Food inspection ensures that all these processes are done in such a manner as to promote and achieve food safety. Food inspection involves not only sampling and testing of end products but also assessing food centers to ensure compliance with food safety management systems. This minimizes the occurrence of public health food safety problems. Food inspection dates back to ancient times as part of the history of public health. The Food and Drug Administration (FDA) publishes the FoodCode that sets guidelines and procedures to assist in food control jurisdictions. The Food Code provides a scientifically and legally backed basis for regulating the retail and foodservice industries. These include restaurants, grocery stores, and institutional foodservice providers e.g.nursing homes. In the past, food inspection was done in a reactive manner whereby officers waited for reports of joints with possible non-compliance. However, it has been shown through research that food inspection should be done in a more proactive manner. Currently, some cities in the united states e.g. San Francisco are implementing a technologically driven approach to food inspection to try and predict food establishments that are more likely to be non-compliant to food safety regulation. This is driven in part by the low Inspector to Food place ratio making it difficult to efficiently inspect all the food places.   
For instance,  in San-Francisco, it is estimated that one business inspector needs to efficiently inspect more than500 business establishments given that there are only about 4 dozen inspectors to cover all business establishments. It is in waking of this statistic that the city saw an opportunity to make the process of food inspection more efficient by utilizing data analytics.

# Data

The data I have found is collected from (<https://data.cityofnewyork.us/Health/DOHMH-New-York-City-Restaurant-Inspection-Results/43nn-pn8j>). The Health Department inspects the approximately 27,000 restaurants in New York City to monitor their compliance with food safety regulations. Inspectors observe how food is prepared, served and stored and whether restaurant workers are practicing good hygiene. They check food temperatures, equipment maintenance, and pest control measures.  
Violations found during inspections carry point values, and a restaurant’s score corresponds to a letter grade. The point/grade cut-offs are the same as for mobile food vending letter grading, with fewer points corresponding to a better grade:  
  
"A" grade: 0 to 13 points for sanitary violations  
"B" grade: 14 to 27 points for sanitary violations  
"C" grade: 28 or more points for sanitary violations  
Also, we will use Foursquare which comes with venue data that contains key descriptors of different venues including the category and popularity. This will show categories such as Nursing homes and food establishments along with attributes like name, address, ratings, and reviews from millions of points of interest. This report would be beneficial to public health specialists and every stakeholder working to alleviate public health concerns through preventive measures. The solution is not to introduce food inspection since these professionals are already carrying out food inspections in the relevant jurisdictions but to make the process more efficient.   
In the city of New York, through theDepartment of Public Health systematically collected food inspection data from close to 100,000sanitation inspections. Using this data, together with metadata on weather, related complaints e.g.sanitation, business characteristics, the city’s advanced analytics team helped predict the food establishments that are more likely to violate food safety regulations. The food inspectors can then have a “Critical first” inspection approach where the places that have been predicted to have critical violations are inspected first. Some of the factors that tend to predict critical violations include previous critical violations, high temperatures, nearby sanitation complaints, nearby burglaries, etc.  
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# Methodology

# Results

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# Discussion

There are two types of models, regression and classification, that can be used to predict inspection. Regression models can provide additional information on the amount of improvement, while classification models focus on the probabilities of business might need to inspect earlier. The underlying algorithms are similar between regression and classification models, but different audience might prefer one over the other. Therefore, in this study, I carried out both regression and classification modeling.here below the result of machine learning and its score.

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# Conclusion

To promote health, stakeholders in the healthcare industry need to continuously innovate to make the process more efficient. In food inspection, technology can be used to predict a likely critical violation through the use of data analytics instead of inspecting every joint blindly given the lack of enough manpower for this. The data used to predict critical violation include weather, crime and inspection data. Afterward, places data e.g. Foursquare is used to locate the food establishment for physical inspection.