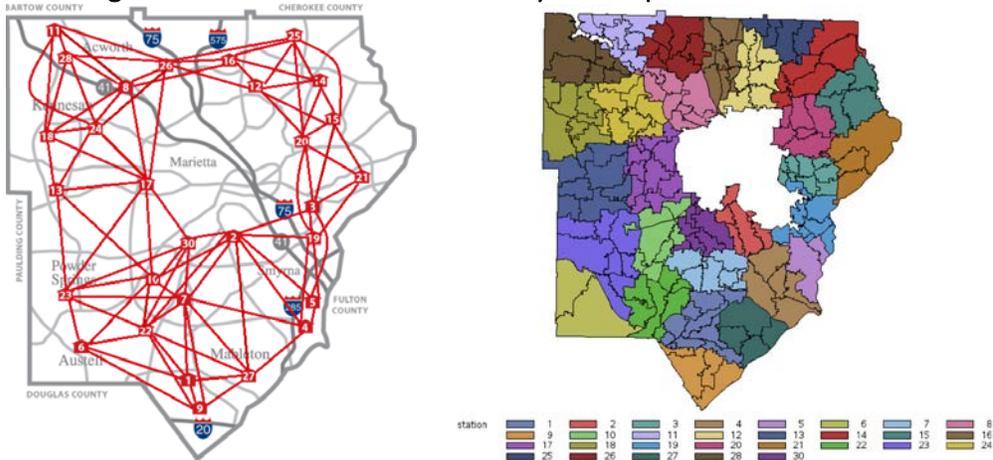


## Data Science Research Series

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### Reducing Travel Times for the Cobb County Fire Department



### BACKGROUND

Getting emergency vehicles to an incident is critical in saving lives and property. The Cobb County Fire Department's (CCFD) 8-minute emergency response time doubles the National Fire Protection Association's (NFPA) 4-minute standard, measured at the 90<sup>th</sup> percentile of all emergencies. Cobb County asked the KSU Department of Statistics and Analytical Sciences to analyze their response data to find ways to improve their travel time. This project aims to reduce CCFD's response time by focusing on the travel times of their various emergency vehicles. Currently, there are 29 fire stations and 272 fire zones within Cobb County, with each fire station being responsible for a pre-defined set of fire zones. The goal of the project is to reduce the response time by reallocating some of the existing zones to new stations.

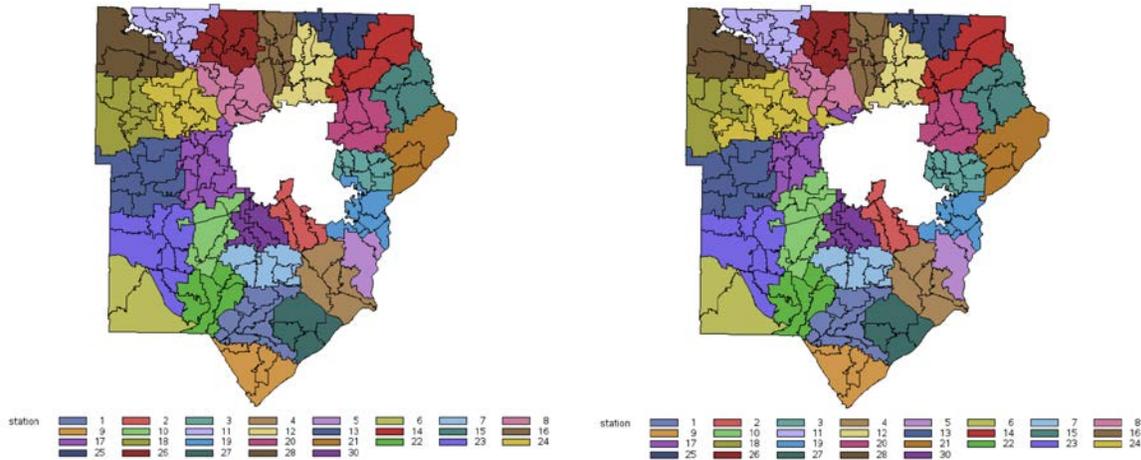
### APPROACH

We investigated whether fire zones and stations can be realigned to reduce travel times by analyzing historical response time data from September 2011 to August 2016. The historical data contained approximately 200,000 incidents over this time frame. To perform this analysis, Google Maps was used to consider the geography, roadways and traffic congestion of Cobb County as it is today. The Google Maps Distance Matrix API was accessed to retrieve the real time traveling times and analyze historical incidents to find cases where a different fire station than the historically used station could lead to faster response times, by comparing current traveling times. For any historical incident, the Google time was first checked for the corresponding station. Then neighboring fire stations

were also checked to see if any other stations could respond faster than the corresponding fire station to the incident. The comparisons of these times were used to drive recommendations on which zones should be reassigned to overall decrease traveling times.

## RESULTS

It is recommended that 12 of the 272 fire zones be reassigned to different fire stations. In these zones, there is a positive reduction in the average response time by reassigning incidents in these zones to a different fire station. The analysis was performed by time of day also, to more accurately report the driving times in the morning, afternoon, evening and nighttime hours. Recommendations are largely the same across the time of day, but some zones have varying time savings at various times of the day. The figures below show the updated Cobb County fire zones map which includes these recommendations. Some zones have been reassigned to different fire stations in these maps.



## CONCLUSIONS

In total, 16% (or roughly 30,000) of all the incidents in the historical data could benefit from having a different station responding to them, which demonstrates that the Cobb County Fire Department is by and large correctly routing their emergency vehicles from their various stations. Our recommendations target roughly a quarter of these 30,000 incidents, indicating that fully reassigning 12 of the currently drawn fire zones to different fire stations can on average save time on each trip to one of the affected zones. By implementing these recommendations, we estimate that the CCFD can on average save 45 seconds per trip in these 12 zones. This is estimated by comparing the real time traffic conditions of using the traditionally assigned station to a new station for incidents in these 12 fire zones. In total, these recommendations affect only roughly 3-4% of all incidents in their historical data, but when dealing with emergency situations this may lead to a significant improvement in overall service to the county. Currently, the CCFD has implemented some of the recommendations we have made and we will be monitoring improvements over the next 6 months.