EMS CALL PREVENTION

SYNOPSIS Using text and data mining techniques to transform narratives into insights for the proactive deployment of TFD CARES resources.

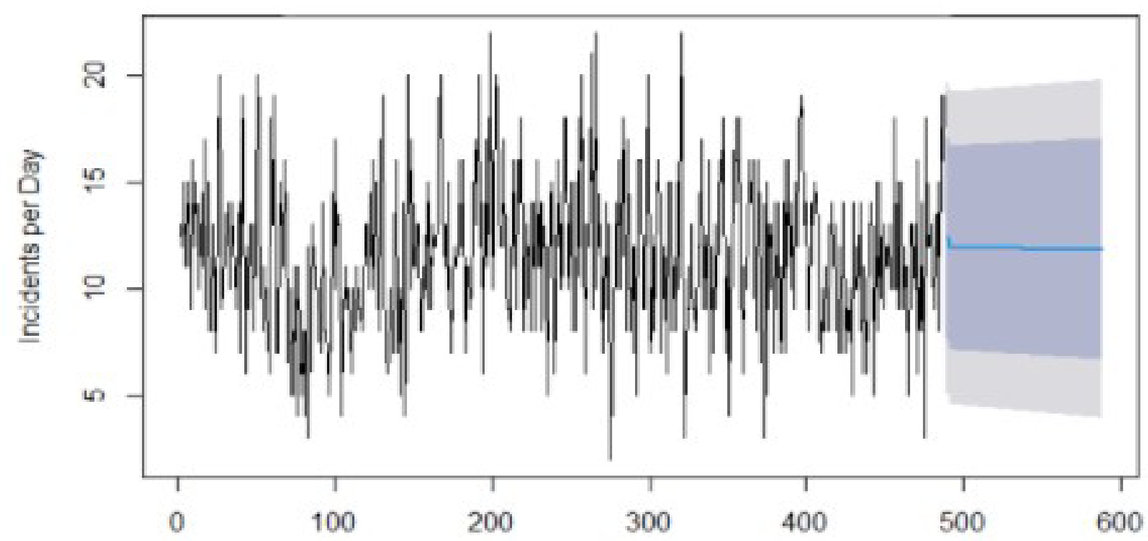
BACKGROUND The City of Tacoma Fire Department responds to fire, emergency, and non-emergency calls for the City of Tacoma and contracts with the Cities of Fife and Fircrest. In 2020, the department responded to 47,414 calls. Approximately 15% of EMS call volume is in response to behavioral health and substance use. This trend has increased from previous years, and the response has been largely reactive.

OPPORTUNITY The department would like to become more proactive in anticipating the volume of calls, adjusting their biennial budget based on future predictions, and redirecting these calls to the proper community partners. This project will address the desire of TFD to better track "hot spots" or areas generating high volumes of calls to which the CARES teams respond. This will enable the deployment of services to the areas with the most need, and be better prepared for future call volumes.

TEXT & DATA MINING SOLUTION FOR PREDICTION

TEXT CLASSIFICATION is the core component of this project as the on-scene assessment is made by responders was recorded in the incident narratives. These were processed to generate TF-IDF scoring which was then put through Gradient Boosting model to classify if the narrative indicated a behavioral health call. The validation set had an accuracy of 88%.

REGRESSION MODEL After the text classification, the predicted variable was now available for both descriptive analysis of historical trends regarding behavioral health but also for creating a predictive model for future trends. Using an ARIMA forecasting model, we were able to obtain a 95% prediction interval for a 100 day forecast for both call types.



CONCLUSION The prototypes demonstrate that there is a significant opportunity for this project and would benefit from further development. The text classification for example could be improved with subject matter experts providing the classification for the training set, and then using n-grams to better capture words that negate a diagnosis. This refinement could yield improved forecasts for call volume. Dashboards and paginated reports were created to support data access and visualization.

APPLICATIONS UTILIZED

python powered

Microsoft Azure

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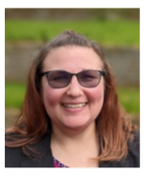

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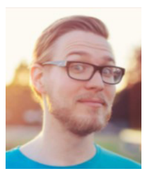

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