

Explore Optimal Resource Allocation for Diverse Emergency Services in different Times and Townships

Introduction

911 services are around our daily life. Emergency services play a pivotal role in community welfare by ensuring timely assistance during accidents, crises. Inefficiency and misallocations in emergency resources can have severe consequences, including loss of life, prolonged suffering, and increased societal costs. One second faster, one person will be saved. So, helping to improve the system of 911 service is useful and valuable. Therefore, 'Explore Optimal Resource Allocation for Diverse Emergency Services in Different Times and Townships' is my research topic.

The efficiency of these services mostly relies on understanding patterns and trends in emergency calls in different regions. This study uses the 911 call data from <https://www.kaggle.com/datasets/mchirico/montcoalert> (<https://www.kaggle.com/datasets/mchirico/montcoalert>), aiming to explore the relationships between time spend of Emergency Service to response and arrive and various factors such as time, township, the number of different types of emergency and special events. By analyzing these correlations, this project can provide some basic insights that could lead to improved resource allocation and quicker response times. For example, one of my findings is there are more accidents at night. However, this research will merge other datasets in the following projects, like considering the different local policies, economies of different townships, etc. Ultimately, planning allocation schemes and enhancing the well-being of the society. The findings of this analysis also can aid policymakers and emergency service providers in making data-driven decisions, enriching their operation methods, easing their burden and ensuring that help is available when it is needed the most.

set up the variables

The research topic's variable Y is the time spent by Emergency Service to respond and arrive. The variable X is time, the number of different types of emergency and special events. Location(townships) will not be an X variable, but it is important to use and attach it throughout all the projects. The reasons why choosing these variables are Y variable (time spent by Emergency Service to respond and arrive) could reflect the efficiency and effectiveness of resource allocation. Making an allocation plan is mostly based on this outcome(Y).

X variables: Time, time of day/week/month: investigate how emergency service demand varies with different times. This includes analyzing peak hours, days of the week, or months of the year. Certain times may see higher emergency call volumes or traffic conditions, potentially affecting, even delaying response times(Y). Also, time is an important part for us to create plans. Then, the number of different types of emergencies can be categorized emergencies (e.g., medical, fire, traffic) and study their frequency and the resources required for each category. Some emergencies may require longer arrival times (Y) due to the need for specialized equipment or personnel. Special events should be considered and analyzed as well like each year's NBA Champion game, NFL Super Bowl; there are plenty of people

gathered together each year. More and more potential safety hazards appear. This will also affect arrival time and resource distribution. Additionally, such kinds of events are not random, they will definitely happen each year, so it is an independent variable(X).

These factors (Y and X) are crucial for analyzing and optimizing emergency response and arrival time, directly impacting resource allocation schemes and service efficiency.

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Data Cleaning/Loading

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Summary Statistics Tables

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Plots, Histograms, Figures

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Conclusion

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