Analyse government's medical emergency service failure and predict his improvment

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1. Introduction

1.1 Context

The cameroonian's government as any other government have the responsability to deliver the healthcare of his citizens. One of the most important health service that the government provide to the citizens, is the 24h/7d medical emergency system service.

1.2 Problem

The medical emergency system service since his effective deployment, is rated 23% of patients's satisfaction with a rising death level along the years.

Due to that failure, the government want to understand the raisons and the different factors influencing the failure. The government's goals is to master all theses factors so that it can turn this failure into success.

The project's aim is to use data from different sources like csv patients's requests phone call record, geolocation of medical structure participating to the medical emergency service, csv file of district location in the town of Yaundé ; to predict medical structure abble to better adressed a medical case, or closer to the patient's location.

1.3 Interest

The cameroonian's citizens living in Yaounde, medical structure located in Yaounde and abble or interested to deliver the medical emergency services, and the cameroonian's government.

2. Data acquisition and cleaning

2.1 Data sources

The cameroonian's government has dedicated un call center for the medical emergency service. The call center record all the patient's phone call request and produce an csv file like this, with data about some important features like : patient's disease, patient's district, patient's age, medical structure assigned to the patient's treatment, patient's call date.

Foursquare and Google Earth contribute to medical structure geolocation, but data coming for these platforms are insufficient, we have to complete them with dataset of Yaoundé's district geolocation here.

2.2 Data cleaning

The file downloaded comes with a lot of features without any medical importance. The call center have a set of rules concerning the private live protection then, decision was taken to give to us only two days's call transcription and some medical information was hidden to us.

We create a file with district's geolocation (latitude, longitude) data, our aim was to join geolocation to patient's call transcription file.

File giving to us have a lack of information about our case, but we tried to create some important features like "distance-to-medicalstruct" we calculated it using medical structure location and patient location.

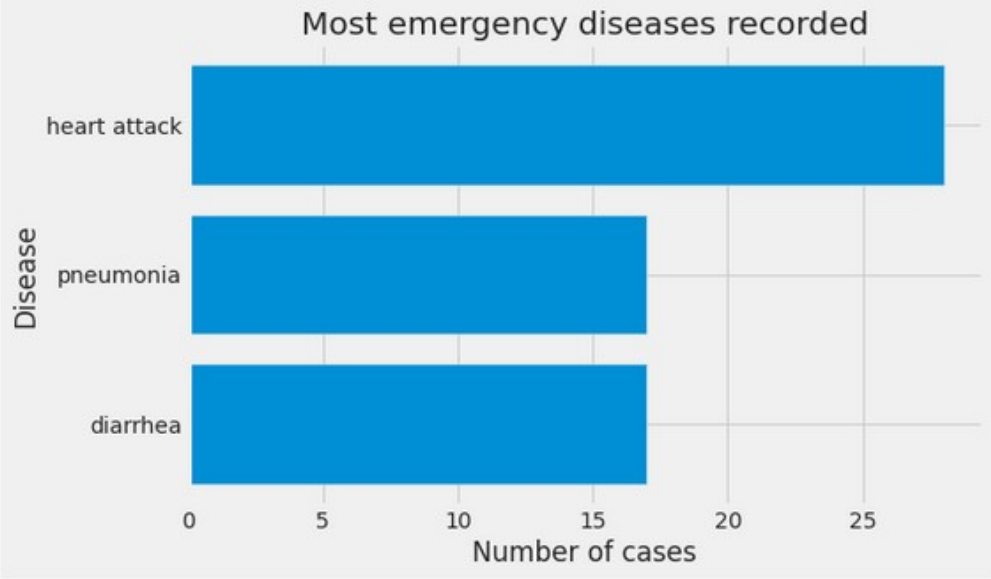
2.3 Features selected

- District name
- Medical structure
- Distance-to-medicalstruct
- Disease
- Date
- Patient's weight
- "tih" (Time In Hospitalization)
- Doctor type (specialist or generalist)
- Latitude

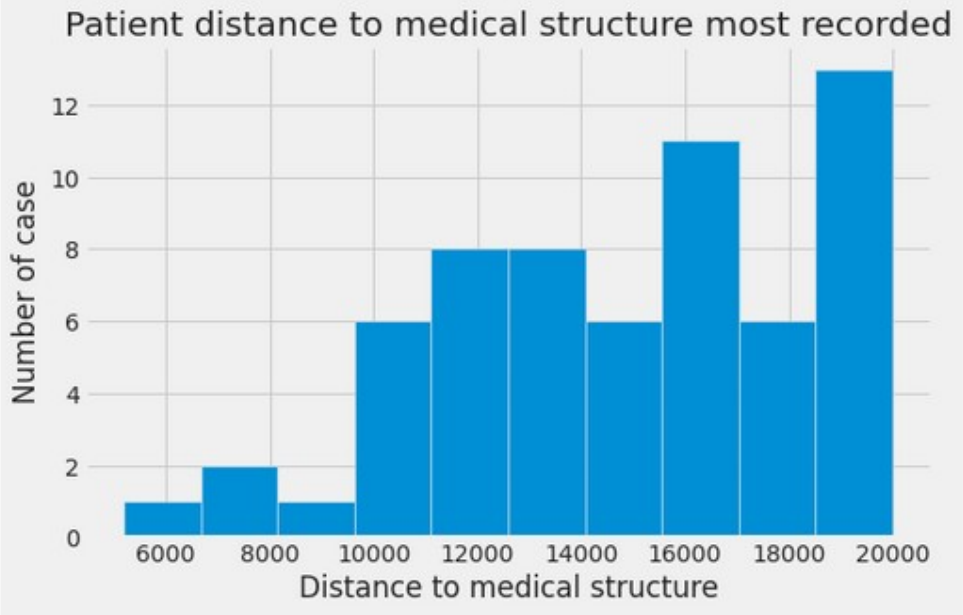
– Longitude

3. Exploratory data

3.1 Impact of disease on emergency case follow by death



3.2 Impact of "distance-to-medicalstruct" on emergency care death recorded



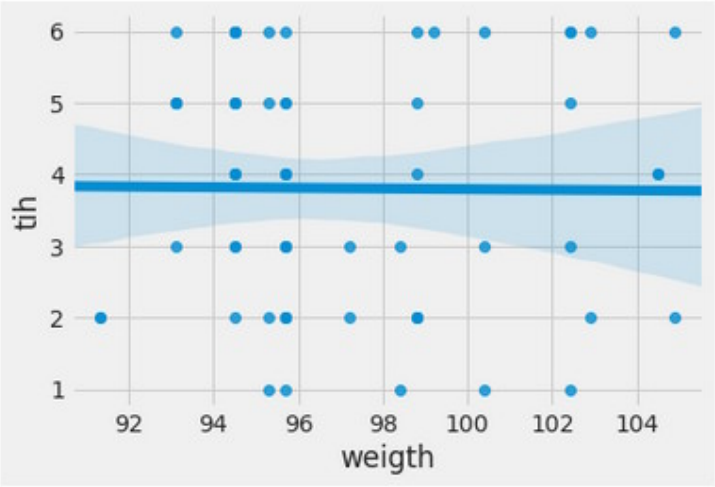
3.3 Impact of patient's weight on death case

4. Predictive modeling

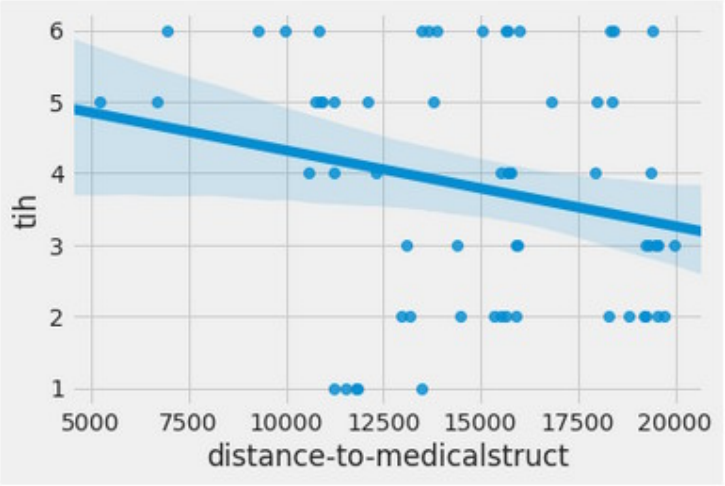
There are two types of models, regression and classification, that can be used to predict features influencing death case in medical emergency service. Regression models can provide additional information on the amount of death case, while classification models focus on the probabilities a death case appear.

4.1 Regression model

Finding correlation between weight and 'Time In Hospitalization' tih



Finding correlation between 'distance-to-medicalstruct' and 'Time In Hospitalization' tih



5. Discussion

By exploring and analyzing data, we observe that the distance between the patient's location and the medical structure that is able to cure him, have a high influence on the patient's case result. Shall him recovered or deceased?

We also observe that when the agent who take care of the patient is a specialist, probability to have a death is lower.

Lack of places in medical structure is also a reason of death case in emergency care, the “tih” (time in hospitalization) has to be reduce to avoid that problem.

6. Solution

Solutions should be :

- The government have to add more medical structure in the service, so that the in every district we have at least one medical structure capable to address patient case.

- The emergency care service should then be able to redirect the patient to the nearest medical structure from his location.

- Government has to associate more specialist doctor to the service and in each hospital delivering the service

The Emergency care service should use the FOURSQUARE Api service to find medical structure near of patient's location.

7. Conclusion

In this project, I analyze the relationship between emergency care death case and some medical information and the context when the case happening. I identify three features that impacting the death case in emergency care: weight, disease and distance between the patient location and the medical structure. I used regression model to predict how "tih" can be ameliorate. This solution will be precious to the government to make his emergency care more efficient, and for the patient to have best probability to be cure.