Project:
Crimson Healthcare: Rating / Classifying Hospitals

Introduction:

In the most part of Africa, People usually spend considerable amount of time citing landmarks and description like “take the third rough road after the big mango tree” to direct ambulance and other services to them. In an emergency, how do you tell ambulance where you are if your house does not have number and your street does not have name. How about an Amazon delivery or when opening bank account and giving address for contact tracing program? Snoocode solved this problem through offline digital addressing system. Now, Snoocode working on improve emergency challenges for Crimson Healthcare project.

Crimson healthcare developed suite of the products around Snoocode Red Ecosystem to improve Emergency, Medical and Public health service delivery in the developing world. Snoocode Red is working for mobile application. The application use for calling ambulance and ambulance service knows about patient details. In this project working on application important module is define hospital level based on hospitals service. Hospital level through emergency service system shows responders the closest health assets to an emergency, classified hospital based on their emergency, triages patients according to the severity of their condition.

Snoocode red give pediatrics and internal medicine dataset to develop one of the module in their project heal application. In dataset experts give level for each service. Also, snoocode gives some questions as per they want in the web application for define the level and give some requirements for UI design. The challenge is need to collect data about capacity and resources at hospitals through questions in the application. Snoocode dataset record helps to set level as per hospital’s facility. As per dataset, there are four levels. Level 1 facility located in an urban, suburban or rural area. Facility should be able to provide specialty services including cardiology, neonatology, endocrinology, oncology, neurology. There should be 24hr service in all major specialties. Level 2 provide less facility than level 1. Same as level 3 provide less facility than level 2. In last, level 4 provides minimal facilities.

Related Works:

In African countries lot of issue of internet connection and without internet connection difficult to find address. Snoocode allows in Ghanaians to navigate using GPS pinpointing without needing traditional address system. Founder of Snoocode is Sesinam Dagadu. Snoocode through millions of people in Ghana have gained access to life saving emergency services. How to work snoocode? Snoocode generates a unique alphanumeric code for each property in Ghana and uses GPS to pinpoint the property's exact location. When an address code has been created, the user enters it into the app and navigation system calculates the best route to the property. Emergency services, taxi drivers, courier, food delivery drivers can also use the application. The same code is always linked to the property, so internet connection isn't required, and basic educated people also use it. The application could be used in counties which face similar difficulties as Ghana and a global version of snoocode is currently being developed.

Snoocode Red is an application of snoocode specially designed for the Ghana National Ambulance Service. Snoocode Red app is used to accurately locate victims in emergency situations, significantly cutting down ambulance response time. Currently, Snoocode is making Project heal mobile application for ambulance service. Snoocode has been identified by World Health Organization (WHO)'s African Network for Drugs and Diagnostics Innovation as a key technology in providing timely emergency care across Africa.

Snoocode working on complete Patient Triage and Hospital classification system such that each patient is matched to the closest, most appropriate hospital once a responder inputs their symptoms? They can have the best patient outcomes even in a mass casualty situation.

Chris M (1 Feb 2016). Finding your way in a country without street addresses. https://www.bbc.com/news/world-africa-35385636.

Problem Description:

In this project, Problem was that ambulance service don't know about hospital's level and information in Ghana. Ambulance service cannot decide to go in which hospital based on patient's emergency because ambulance service has not any data like nearest hospital, hospital name, hospital snoocode address, hospital level. They need to collecting data and define hospital level as per hospital's services through application. Snoocode red have expert's opinion dataset. In the dataset multiple services and experts give their opinion for each service. So, all experts have different opinion for each service. Need to create web application. In this web application through collecting data and define level from hospitals. In the application require to add services name as a question. All questions have two options 'Yes' or 'No'. Snoocode wants to send this web application to all the hospitals in Ghana. Hospitals can fill out answer according to their services. When hospital submit it then snoocode will receive data. Data will be store in drive. Snoocode know about hospital name, address, region, and level. They can add hospital's information in project heal application. It will be useful for ambulance service application.

Proposed Solution:

The aim is to define hospital level from levels of services provided by hospital and collecting data from the hospital through application. Experts give opinion for each service in dataset. Defined highest number of levels in each service. In some cases, more than one levels were defined in services.

Delphi Experts	The presence of Paediatric Unit in the hospital	Designated head of Paediatric Unit (registered Paediatrician)	Dedicated Medical officers in the Paediatric Unit	Designated 24hr Paediatrician on call
Expert 1	Level 1; Level 2; Level 3	Level 1; Level 2	Level 1; Level 2; Level 3	Level 1; Level 2
Expert 2	Level 1; Level 2; Level 3; Level	Level 1; Level 2	Level 1; Level 2; Level 3	Level 1; Level 2
Expert 3	Level 1; Level 2; Level 3; Level	Level 2	Level 1; Level 2	Level 1; Level 2
Expert 4	Level 1; Level 2	Level 1	Level 1; Level 2; Level 3	Level 1; Level 2; Level 3; Level
Expert 5	Level 1	Level 1; Level 2	Level 3	Level 4
Expert 6	Level 1; Level 2	Level 1; Level 2	Level 1; Level 2; Level 3	Level 1; Level 2
Expert 7	Level 1; Level 2; Level 3	Level 1; Level 2	Level 1; Level 2; Level 3	Level 1; Level 2

(Sample of original dataset)

Sorting data based on experts opinion. Count number of levels for each service. In sample of sorted data show more clear data for understanding. Also know about the which level has more priority for each service through the higher numbers.

HOSPITAL ORGANISATION	Level 1	Level 2	Level 3	Level 4
The presence of Paediatric Unit in the hospital	7	6	4	2
Designated head of Paediatric Unit (registered Paediatrician)	6	6	0	0
Dedicated Medical officers in the Paediatric Unit	6	6	6	0
Designated 24hr Paediatrician on call	6	6	1	1

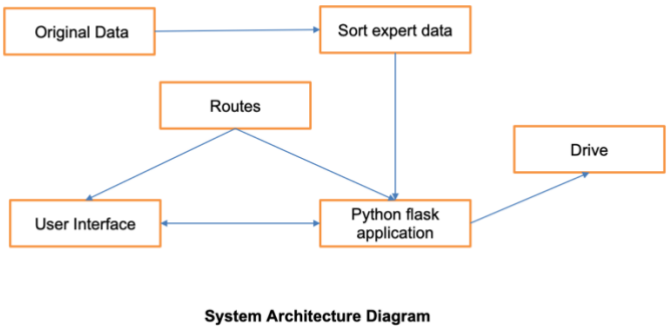
(Sample of Sorted data)

When hospital administrator selects yes in these four questions algorithm will check answers in stored data and intersection rule through defined level. i.e in this type of scenario triggered level will be level 1.

The presence of Paediatric Unit in the hospital	Level 1
Designated head of Paediatric Unit (registered Paediatrician)	Level 1, Level 2
Dedicated Medical officers in the Paediatric Unit	Level 1, Level 2, Level 3
Designated 24hr Paediatrician on call	Level 1, Level 2

(Sample of Stored data)

Need to created web application using python programming language with flask framework. In the web application set all the service name as a question and it's answer in form of yes or no. So, hospital administrator should be answer it according to which services they provide to patients. The level of the services will be set by algorithm according to administrator's answers. From the services marked as yes by the administrator the level of the services will decide the level of hospital. The final level will be the level whose occurrence is highest. It will consider lower level if the occurrence of two levels is same. Finally, hospital name, address, region and level will be stored in the drive after submitting the form.



System architecture Diagram

How to work Algorithm:

- Sorting excel data
- Using get and post method
- Read excel file.
- Stored all the questions and their level in the list.
- Check users all the answers
- If user select no answer, then not showing any level
- If user select yes answer, then store it in the dictionary.
- Using intersection method to check all the answers store in the dictionary.
- Highest number of levels will be triggered.
- In some case two levels get after the intersection then lower level will be consider.
- If user select only one yes answer in that case algorithm check only their level and trigger lower level.

Methods:

Pandas is data analysis library. When it comes to analyzing data with python and it is one of the most preferred and widely used for data.

Flask is web application framework. It is a python module that develop web application. I am using flask framework to create application and using xlrd library module for reading data from csv file. Also, using json format is used to serializing and transmitting structure data over network connection. Requests modules allow to

send http request, add content form data, multiple files and parameters via python libraries. It also allows us to access response data of python in the same way. Render template module is used to generate output from a template file based on the jinja2 engine that is found in application's templates folder.

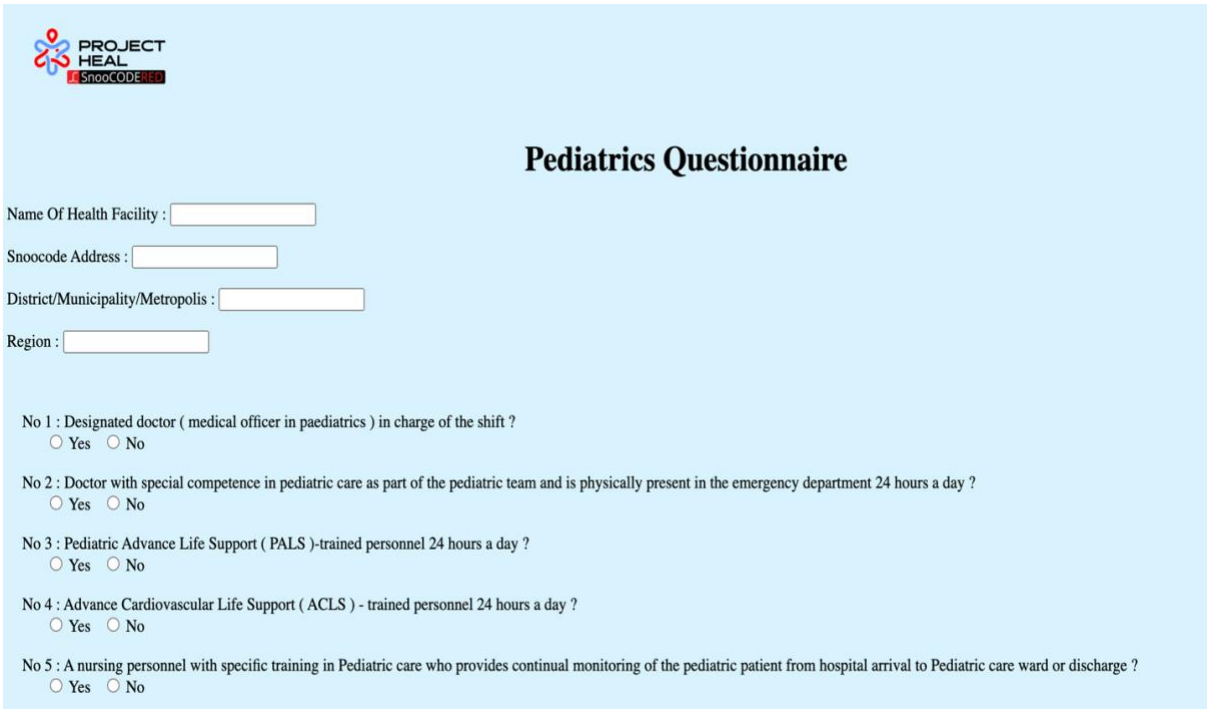
GoogleAuth and googledrive module used for saving all the information in the drive. Evert request of application sends to the Drive API must include an authorization token.

Conclusion:

Finally, this project through defined hospitals levels based on their services and hospital details will be store in the drive. Sorted Dataset is more important to define level for pediatrics and internal medicine. This dataset through algorithm checks all answers and provide level. Project heal is mobile application for emergency services. In Project heal mobile application snoocode put all the hospital's level with name of health facility, snoocode address, district, and region. So, Ambulance should be easily take decision in emergency time and Ghana people can check the hospital's level and choose hospital as per their symptoms. Here, I attached screenshot of application.

https://github.com/jaimin1997/Snoocode-Red-Internal_Medicine
https://github.com/jaimin1997/Snoocode-Red-Peadiatric

Demo:



PROJECT HEAL
SnooCODERED

Pediatrics Questionnaire

Name Of Health Facility :

Snoocode Address :

District/Municipality/Metropolis :

Region :

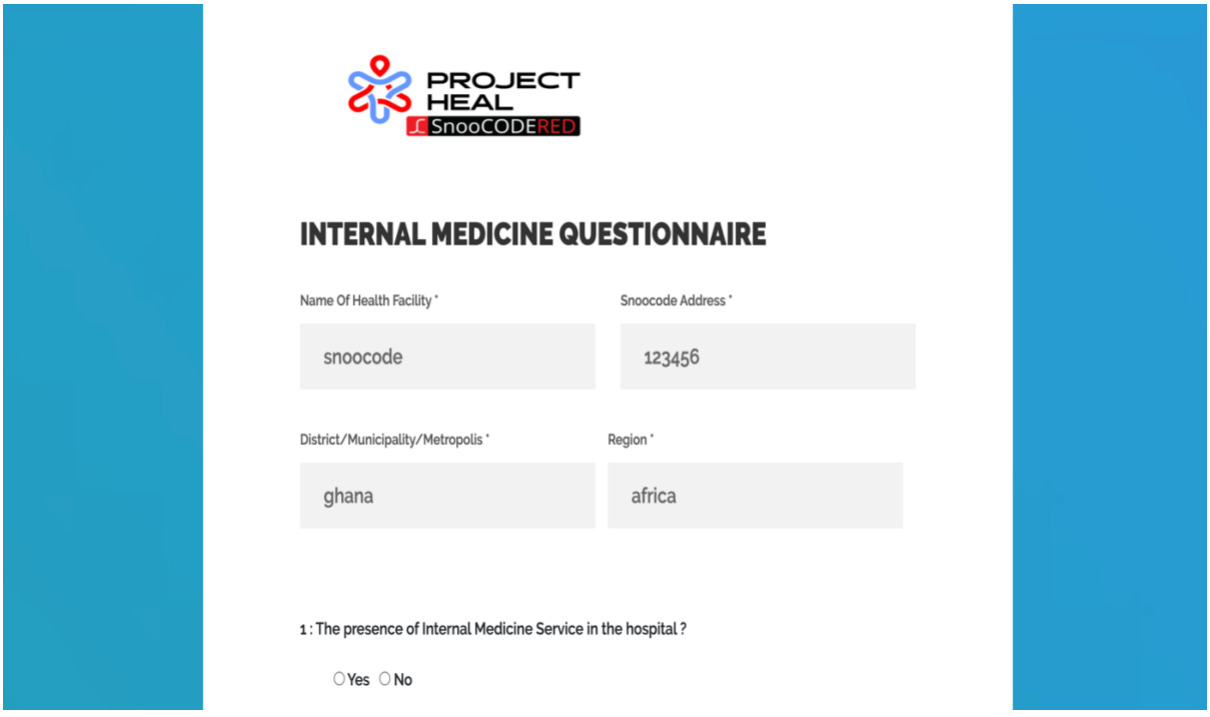
No 1 : Designated doctor (medical officer in paediatrics) in charge of the shift ?
○ Yes ○ No

No 2 : Doctor with special competence in pediatric care as part of the pediatric team and is physically present in the emergency department 24 hours a day ?
○ Yes ○ No

No 3 : Pediatric Advance Life Support (PALS)-trained personnel 24 hours a day ?
○ Yes ○ No

No 4 : Advance Cardiovascular Life Support (ACLS) - trained personnel 24 hours a day ?
○ Yes ○ No

No 5 : A nursing personnel with specific training in Pediatric care who provides continual monitoring of the pediatric patient from hospital arrival to Pediatric care ward or discharge ?
○ Yes ○ No



PROJECT HEAL
SnooCODERED

INTERNAL MEDICINE QUESTIONNAIRE

Name Of Health Facility *

snoocode

Snoocode Address *

123456

District/Municipality/Metropolis *

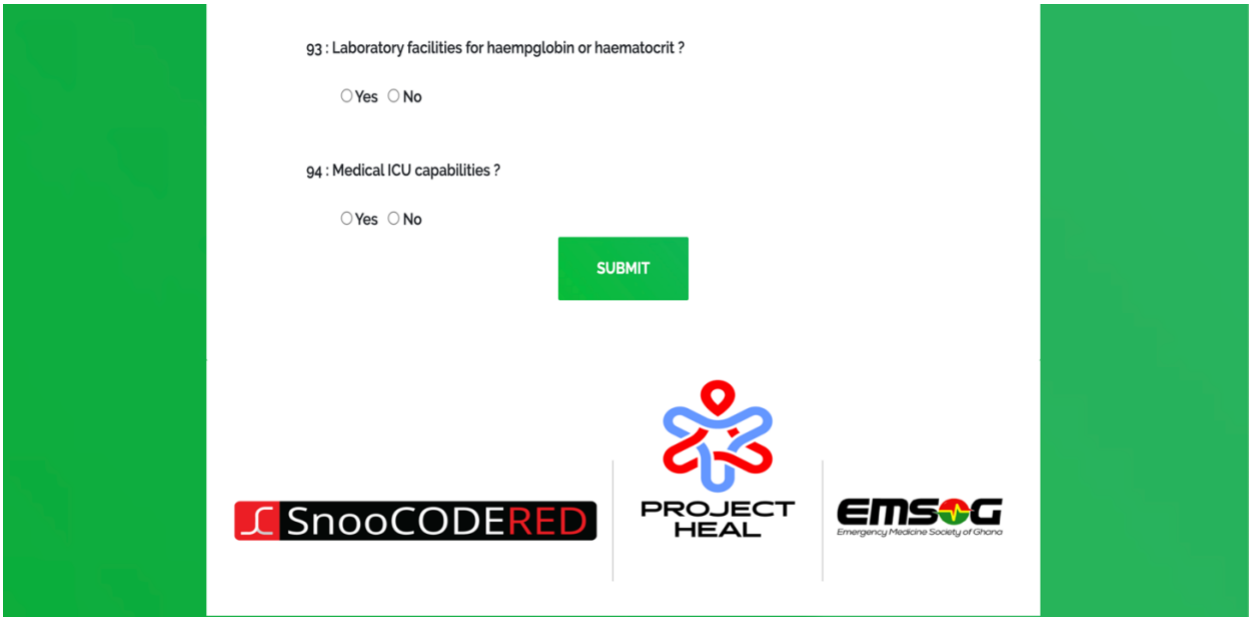
ghana

Region *

africa

1 : The presence of Internal Medicine Service in the hospital ?

○ Yes ○ No



Health Facility : Snoocode

Snoocode Address : 823565

District/Municipality/Metropolis : ghana

Region : africa

Triggered Level : Level 2

References

[1]https://snoocode.com/red
[2]https://www.bbc.com/news/world-africa-35385636
[3]https://warwick.ac.uk/newsandevents/pressreleases/pioneering_app_gives/
[4]https://www.f6s.com/snoocodered
[5]https://www.projectpro.io/recipes/upload-files-to-google-drive-using-python
[6]towardsdatascience.com/solving-a-simple-classification-problem-with-python-fruits-lovers-edition-d20ab6b071d2
[7]A_Comparative_Study_of_Classification_Algorithms_f.pdf
[8]https://www.cs.princeton.edu/courses/archive/fall13/cos521/lecnotes/lec8.pdf