



SAN JOSÉ STATE UNIVERSITY

CMPE 272 Enterprise Software:

Final Project Report

Neighborhood Safety Quotient Predictor

TEAM 8

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Abstract-- People keep relocating to new places due to change of jobs, schools, or other reasons. Safety has been one of the crucial factor involved in deciding to live in a locality. In the recent past, there has been an upsurge in crimes in the bay area. It is often difficult for people to consider the safety of the location due to unavailability of tools to evaluate the trend of crimes and predict if the safety of the place would be favorable during their stay for x number of years in the area. Most of the tools available in the market show recent data, which would be dynamic based on the trends and hence cannot be utilized effectively to predict how the crime rates will look in the next x number of years. Thus, there is a need for an application which would predict the safety value of the locality based on the past history of crimes in and surrounding the location. The application will facilitate the renters and home buyers to make better decision to relocate to the area.

1. Introduction:

Looking at the recent trend of crime in the cities that we live in today. It has become extremely important to evaluate safety as one of the crucial factors for evaluating the decision to travel or move to a new place. After assessing the shortcomings of websites like apartments.com, Airbnb, TripAdvisor on providing a safety factor for its users, we have built an API which will read the past crime records of various city areas and predict the current and future safety score for the same. This can be used as a stand-alone product or can be integrated with existing real estate or hospitality services. When consumed by a third party

application, it can be used to enhance their functionality and credibility to address safety concerns of users before moving or traveling. This product provides data driven results at granular level that will allow people to make better decision. The Safety Quotient Predictor (SQP) of a locality is generated on the basis of per capita crime data of the locality and the city. Various charts demonstrate the prejudice against the victim's gender, race or age if any. Also, a tentative rate of crime for the next few years is predicted based on the past crime. We believe this product will help people ensure their safety.

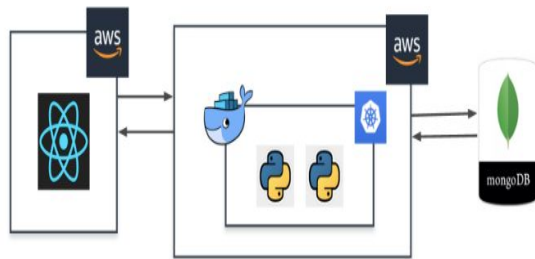
2. Our Idea:

We designed an intelligent and interactive product. Our product, the SQP, will consume all the past crime data, segregate them, cluster them into broader categories, and based on them generate the results for the users.

This product will be inclusive of security so that the users are not shown fabricated data. The basic functionalities are available for all users to view without having to sign in. however, on sign in, more detailed charts are portrayed. Also, if the user is searching an area with a low SQP, the system will intelligently suggest other areas with a higher SQP score. Due to high volumes of unstructured past crime data, we decided on storing them in MongoDB, where the read processes are cheaper. The datastore used is M-Labs. The backend is coded in python whereas the frontend is managed using

REACT JS. The functions are communicating with each other using Restful API calls. Since the backend was designed as the main product being sold as an API to third party partners, the API is containerized using Docker and deployed in Kubernetes on AWS Cloud to manage the auto-scaling and load balancing. The product is available to be used as SAAS from the AWS Cloud.

3. Architecture of Implementation:



a. Amazon EC2



AWS is Amazon's solution to on demand cloud computation platform. It allowed us to create number of virtual instances. The operating system, memory, security details were customized to create our cloud service. We deployed our code in two different EC2 instances, the front-end REACT code in one and the back-end code in the other to avoid single point of failure and manage the security and autoscaling more effectively.

b. Kubernetes



Kubernetes is the cluster and container management tool. It is used in our project to deploy the product on the cloud as SAAS. It will allow the product to be highly available and scalable due to its load balancing and auto scaling features.

c. Docker



Containerizing the different components of the project with docker allowed it be independent of environment. It will also allow us to have different versions of the product running simultaneously for different requirements of our third party clients making it more manageable and secure.

d. Application development

The RestFul Api was developed using Python Flask. The DB layer was built on a NoSQL database - MongoDB. Since we deal with large data sets we preferred document store database. The front end of the application was built on React JS.

4. Use Cases and Personas:



Jamie, a young woman has to travel to San Francisco for the weekend. She needs to book a hotel which is located in a safe neighborhood with not a significantly high rate of crimes being committed against women and at night. The hotel should also be close by to all the places she is planning on visiting. In this case, she can use the application to ensure that the hotel location is safe for women and exploring the area at night is possible without any worry.

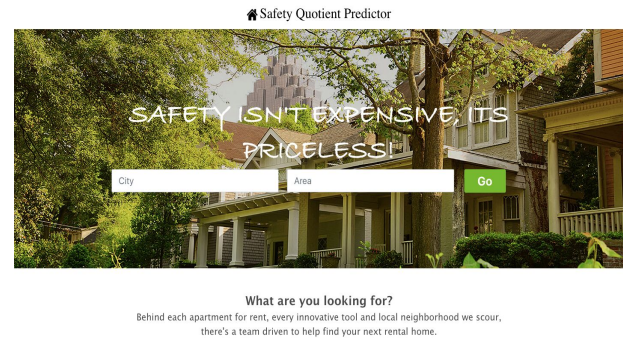


Bill, a retired senior citizen and a grandparent, is looking for a home to live out his retirement years. So, he is looking for a neighborhood which is not only currently safe but one which shall not turn into a highly crime infested area in the future as well. The Prediction feature can help him with this decision. Also, he needs a neighborhood where the crimes against the elderly is not prevalent. Since he has two grandchildren, they will probably come to visit him for the summer or winter breaks and hence the neighborhood should be kid friendly as well. Our application can help him with each of his criterion to finally decide on the ideal location for a home.

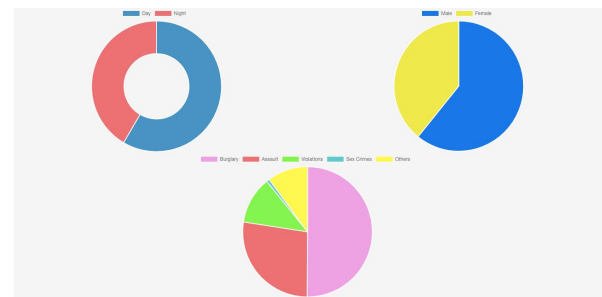
5. Our Design

To facilitate the requirements of the user scenarios, we have created the design in below screenshots.

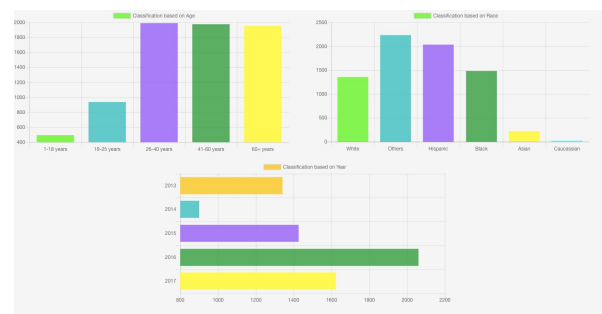
i. Home Screen:



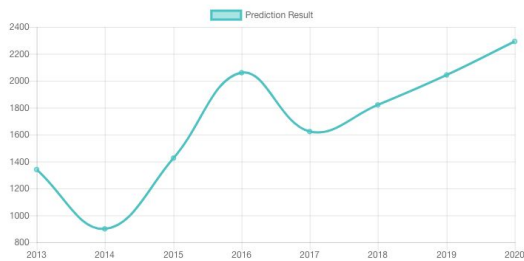
ii. Crime Data at granular level for categories like Victim age, Victim race, Victim sex.



iii. Crime types, Crime summary over past 5 years.



v. Prediction of crime of next 3 years



v. SQP score provides a safety score from 0 to 100 to an area which will help users compare safety value of the area in the city. The higher the number the safer the place.



vi. Provide user recommendation of areas in the city which has better SQP score than the searched area.

Recommended Areas based on your search

#	City	Locality	SQP Score	↑ %
1	Los Angeles	Van Nuys	99.99	12.62
2	Los Angeles	West Valley	99.90	12.52
3	Los Angeles	N Hollywood	99.89	12.51
4	Los Angeles	Southeast	99.88	12.50
5	Los Angeles	Devonshire	99.88	12.50

6. Future Goals :

Sell it as a SAAS product to prospective Clients:airbnb, HomeAway, Apartments.com, Zillow, realtor.com, trulia

7. References:

<https://kubernetes.io/>

<https://www.neighborhoodscout.com/>

<https://www.data.gov/>

<https://www.airbnb.com/>