



Street Light Intensity Map using Unsupervised Machine Learning Techniques.

Under the Guidance of
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Abstract

- Streetlights are the raised source of light on the edge of a road or walkway, which are switched ON in the evenings near the sunset time to provide the lighting for the passer by.
- Streetlights helps in prevention of accidents and increases safety
- According to studies most of the crashes happen in darkness and they involve pedestrians.
- The main aim of this project is to provide insight on the streetlight intensity distribution and classify the danger zone in low light intensity areas.
- The collected data include GPS data and light intensity data. This data is further clustered using k-means algorithm

Methodology

1. Data Gathering

Collection of light intensity of manipal road using smartphone sensors (in the initial stage).

2. Data Cleaning:

Extracted useful data from raw data.

3. Clustering

Clustering of data according to the light intensity using K-means clustering algorithm.

4. Gmaps API's

Gmaps API's such as Google Place API, Google Direction API, Google Geolocation API, Google JavaScript API, Google Geocoding API are enabled, and API key gets generated.

5. Mapping

With the help of API key and clustered light intensity data mapping is made.

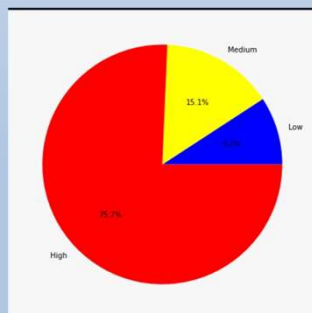


Data

- The data set includes GPS data and light intensity data with respect to the GPS data.
- GPS data includes latitude, longitude and altitude data. At every latitude and longitude light intensity in terms of lumens is collected and stored as a csv file.

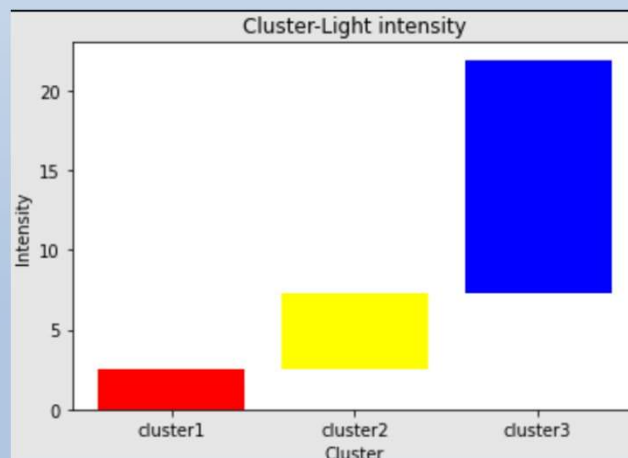
index	latitude	longitude	light
0	-1.0	-1.0	999.0
0	13.355266	74.794785	5.72
1	13.355319	74.7948	0.0
2	13.355515	74.79477	0.0
3	13.355734	74.794754	0.0
4	13.355952	74.79473	2.64
5	13.356178	74.79469	18.37
6	13.356416	74.79466	0.0
7	13.356657	74.79463	3.96

index	latitude	longitude	light	seg_100_m	avg_light_int	cluster
0	-1.0	-1.0	999.0	-1	999.0	1
0	13.355266	74.794785	5.72	1	1.672	2
1	13.355319	74.7948	0.0	0	1.672	2
2	13.355515	74.79477	0.0	0	1.672	2
3	13.355734	74.794754	0.0	0	1.672	2
4	13.355952	74.79473	2.64	0	1.672	2
5	13.356178	74.79469	18.37	1	5.5825000000000005	4
6	13.356416	74.79466	0.0	0	5.5825000000000005	4
7	13.356657	74.79463	3.96	0	5.5825000000000005	4
8	13.356778	74.79445	0.0	0	5.5825000000000005	4
9	13.356795	74.794205	4.73	1	4.5925	4
10	13.356816	74.793945	0.0	0	4.5925	4
11	13.356836	74.79366	0.0	0	4.5925	4
12	13.356852	74.79338	13.64	0	4.5925	4
13	13.356876	74.7931	0.0	1	17.072	3



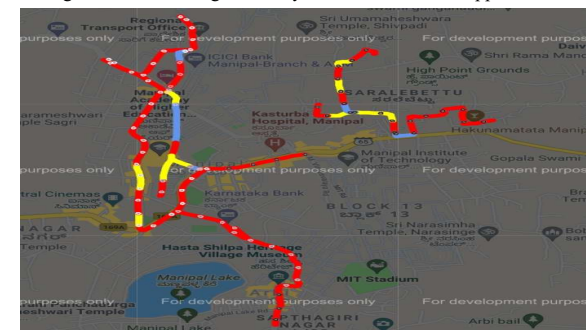
Results

- K-means is a clustering algorithm that groups similar items in the form of clusters.
- We use this algorithm to group the light intensity data into categories such as very good, good, average, poor and no light.
- This gives us a basic idea of how the light intensity is spread across a city.



Conclusions

- Mapping of our data gives us a graphical representation. It helps us in the better understanding of the spread spectrum of light intensity of a given area.
- Mapping of our collected data can be easily achieved with the help of GMAPS API. It consists of many functions which can be utilised to map the data.
- For our project we divided the streets into 100m segments and found the average light intensity in the 100m segments, then average intensity was clustered and mapped.



Future Directions

- We would further improve the clustering accuracy by collecting more data.
- We would take the resultant data as labelled data and create a model to classify the light intensity and predict the danger zones.
- This model can be loaded into an Arduino or a Raspberry Pi with light and GPS sensors and this device can be used as a safety device in a vehicle.



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