

Spatial Representation Of Black Spots And Luminous Intensity

¹R.S.Arun Prasanna, ²A.Chitharth, ³K.N.Vinoth , ³H.Thiru Nisha(Guide)

¹²U.G. Students, Department of Civil Engineering ,Ramco Institute of Technology
Rajapalayam, Tamil Nadu

³Assistant Professor ,Department of Civil Engineering , Ramco Institute of Technology
Rajapalayam, Tamil Nadu

Abstract –Road accidents are a major cause of mortality worldwide with immediate action required to mitigate against the negative impacts. As per the statistics of 2015 Tamil Nadu stands second position in number of accidents and stands first in number of persons killed in accidents. Geo spatial data and Geographic information system are essential components for building smart cities in a basic way that maps the physical world into virtual environment as a referencing framework then it serves as a platform for data integration, a system for geospatial analysis and collection of models for visualization and decision making. GIS has provided users with real time urban sensing and visualization and at the same time has challenged existing systems. This project covers the Madurai city for the accident analysis. The black spots in Madurai city are identified and corrective measures are provided with the GIS tool itself.

I. INTRODUCTION

The accidents are increasing day by day. The accidents are analyzed and the black spots are found and represented in the ArcGIS map. After representing the black spots the luminous intensity of that spot are found. The records are poorly maintained and updated and inaccurate feeding of information so that problems are easily rectified by GIS. Thus it is fair to use GIS for bringing about the reduction of traffic accidents by giving alternate solution for the major cause of accidents. Geographical Information System – Geography : pertaining to a certain locality and reference of the location with respect to world geographical system, Information system : Storage of attribute data that describes the properties and characteristics of spatial features. Arc gis is mapping software where boundaries of area can be created, the data for a chosen sector is given as attribute(input) and information becomes computerized and can be assessed by both utility providers and users and for operation and maintenance purposes. It thus serves as a system of records for various public agencies to work in tandem and brings about a traffic free sector. Arc catalog and Arc map are the two main components used for creation of a geo referenced and digitized map.

II. OBJECTIVE

- To collect, compile and manage information about the accident details in spatial form
- To use Arc GIS bridge the gap between different sectors by acting as an integrated cross sector platform
- To reduce the accident rate thereby reducing the number of casualties
- To reduce the usage of paper by compiling information in the form of soft copies and in gis format.

III. PROGRESS OF WORK

- Data collection
- Data analyzing
- Map collection
- Geo – referencing
- Digitizing
- Importing data
- Marking black spots
- Collection of lux values
- Importing lux values
- Interpolation
- Correlating lux values and black spots

IV. DATA COLLECTION

The primary work started with the collection of data. The accident data were collected from Commissioner's office, Madurai. The Madurai city was taken for the project because we have compared accident statistics for three district head quarters madurai, virudhunagar, dindigul. Among the three Madurai has more number of accidents than the other two cities. The accident details collected which includes the date, time, place and other details etc.

IV. DATA ANALYZING

The data collected from the commissioner's office were analyzed keenly to find out the black spots and their details like the accident reason, type of accidents either fatal or non-fatal or grievous etc.

V. MAP COLLECTION

To mark the black spots location we need to import the Madurai city's map as a base map into the ArcGis software. The Madurai city's map was collected from survey of India as a hard copy and then scanned and imported into the ArcGIs.

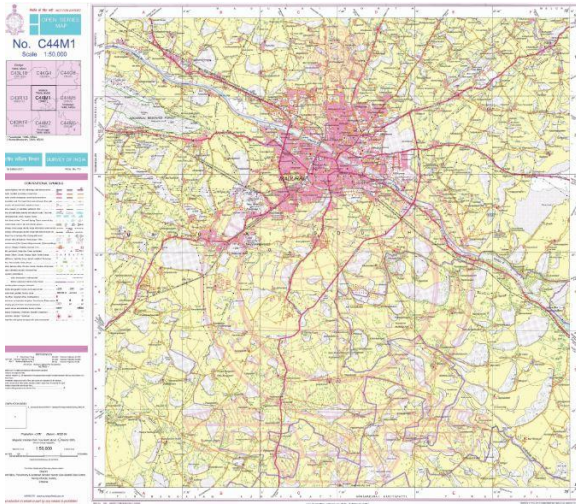


Fig 1: Base map

VI. GEO-REFERENCING

Geo referencing is the process of assigning spatial coordinates to data that is spatial in nature, but has no explicit geographic coordinate system. The ground control points were taken from the Google map or by GPS and were fixed in the base map and correlating its points with it

VII. DIGITIZING

Digitizing is the process of creating roads in the base map. The roads created were major roads minor roads, arterial roads etc. these roads were created by creating layer and shape file in the Arc catalog and imported it in the Arc map.

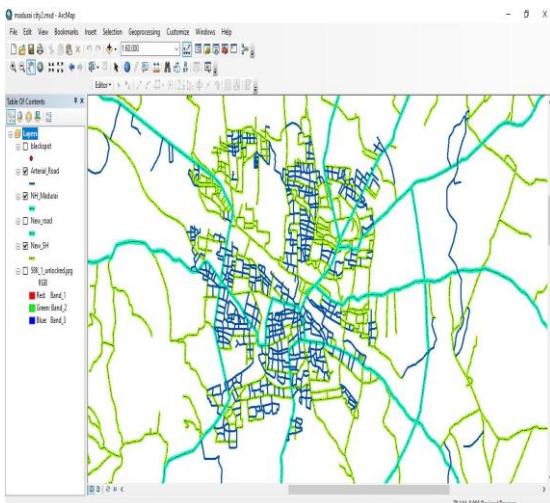


Fig 2: Digitized roads of Madurai city

VIII. IMPORTING DATA

Data collected and analyzed were given as an input for detailing the black spots in the arc map. The data input given are time of accident location of accident,

date of accident occurred and other details. As per the rule the victim details and other confidential details were not allowed to reveal in the project and they were kept confidentially. The details were given in the attribute table in arc map.

ID	Shape	M	Date	Time	Location	cause
0	Point	1	14-07-2017	4:30 P.M	Near Jan overpass exports	rash driving by the bus driver who struck the car which caused the car to overturn
1	Point	2	26-04-2017	7:45 A.M	10x4 toll gate Arupulathi Ring Road	bus lost its control and rammed into the center median which caused the bus to overturn
2	Point	3	17-01-2017	12:00 P.M	Inganar nagar chinnaman road Madurai	TRICTC bus driver drove his bus in rash manner and hit a motorcycle
3	Point	7	01-04-2017	05:10 P.M	Wathuthanai, Natar road, Madurai	unknown vehicle hit and run
4	Point	8	06-04-2017	04:40 P.M	Sreen Sha Nil, Palani Station Road, Madurai	rash driving and hit against E post
5	Point	3	04-04-2017	06:30 P.M	Thiruvananthapuram road, Madurai	unknown vehicle hit and run
6	Point	4	31-12-2017	10:00 P.M	Wathuthanai, Natar road, Madurai	lost control of the vehicle due to application of sudden brake
7	Point	8	07-01-2017	09 P.M	Chidigar Road, Madurai	rash driving by the motorist and hit against the cyclist
8	Point	9	18-04-2017	10:45 P.M	Palani toll ring road, Madurai	rear end collision between a car and a 457 van
9	Point	11	28-04-2017	11:45 A.M	Chinnaman road, Madurai	lost control of the vehicle and dashed against the center median
10	Point	13	25-04-2017	11:50 P.M	Opposite of Wathuthanai bus stand Madurai	pedestrian was struck by a TRICTC bus while trying to cross the road
11	Point	10	17-04-2017	2:30 P.M	Vaggaigar Nagar Main Road, Anna Nagar, Madurai	an known vehicle hit and run
12	Point	14	28-04-2017	1:30 P.M	Wathuthanai, Natar road, Madurai	pedestrian was struck by a motor cycle while trying to cross the road
13	Point	12	04-01-2017	04:40 P.M	Saravathi main road Madurai	hit the pedestrian while trying to reverse the vehicle
14	Point	15	01-01-2017	5:30 P.M	Theran Natar Road, Madurai	pedestrian was struck by a van while trying to cross the road
15	Point	16	04-04-2017	11:00 P.M	Near Annapurna temple near main road Madurai	collision between a motorcycle and speeding car
16	Point	17	13-04-2017	10:10 P.M	10th Natar Road Madurai	side on collision by motorist that struck against a Bus sidewalk trying to overtake
17	Point	18	14-04-2017	2:30 P.M	Thiruvagar Madurai	pedestrian was struck by a ferry while trying to cross the road
18	Point	19	29-04-2017	10:00 A.M	Thiruvagar SST road Madurai	motorist lost control of vehicle and fell into the center median
19	Point	20	14-04-2017	7:40 P.M	Vishvanagar Madurai	collision between two motor cycles
20	Point	21	05-02-2017	2:30 P.M	Aasavayuram By Pass Road, Madurai	sidewalk collision between van and motorcycle
21	Point	22	06-02-2017	0:30 P.M	New Ramnathapuram Road, Madurai	pedestrian was struck by a motorcycle while trying to cross the road
22	Point	23	08-02-2017	5:4 A.M	Arupulathi Ring Road, Madurai	lost control of the vehicle due to the application of brake
23	Point	24	16-02-2017	04:04 A.M	Thiruvananthapuram Natar Road, Madurai	pedestrian was struck by a Auto while trying to cross the road
24	Point	25	19-02-2017	2:30 P.M	Aasavayuram Natar Road, Madurai	overturning of Auto due to Bank driving
25	Point	41	22-02-2017	10:30 A.M	Kannanagar, Sarai Madurai	pedestrian was struck by a motorcycle while trying to cross the road
26	Point	28	30-04-2017	7:10 P.M	Koodalpuram road Madurai	collision between motor cycles and cycle
27	Point	27	02-02-2017	7P.M	Wathuthanai Ganthi Nagar main road Madurai	rear end collision between motor cycle and mini bus
28	Point	28	03-02-2017	5:30 P.M	Palanihill Ring road Madurai	rear end collision between motor cycle and van
29	Point	29	04-02-2017	5:20 A.M	Kannanagar main road, Kannanagar Sarai Madurai	an known vehicle hit and run
30	Point	30	05-02-2017	7:10 P.M	Kadakkavandhurai, Dornekulam road Madurai	pedestrian was struck by a motorcycle while trying to cross the road
31	Point	31	06-02-2017	7A.M	Wethanai Nagar Nagar Natar Ring road Madurai	an known vehicle hit and run
32	Point	32	04-02-2017	09 P.M	Arupulathi Ring Road Madurai	an known vehicle hit and run
33	Point	33	01-01-2017	09 P.M	Inganar nagar Anayur Madurai	lost control of the motorcycle
34	Point	34	14-02-2017	09 P.M	In front of 2nd gate New GP Pasangal road Madurai	an known vehicle hit and run
35	Point	35	04-02-2017	10:30 A.M	Near Annapurna temple main road Madurai	an known vehicle hit and run
36	Point	36	05-02-2017	7P.M	10th Natar road Pannalamb Madurai	pedestrian was struck by a motorcycle
37	Point	37	07-02-2017	10:40 P.M	Anandapuram Madurai	collision between motor cycle
38	Point	38	11-02-2017	12:40 P.M	10th Natar road Thiruvagar Madurai	lost control of the vehicle due to the application of brake

Fig 3: Imported data in Attribute Table

ID	Shape	M	Date	Time	Location	cause
39	Point	39	15-02-2017	1:00 P.M	10th Natar road Pannalamb Madurai	motorist driving in the wrong side
40	Point	29	04-02-2017	5:20 A.M	Kannanagar main road Sarai Madurai	unknown vehicle hit and run
41	Point	37	06-02-2017	7:00 P.M	Wethanai Nagar Nagar Natar Ring road Madurai	an known vehicle hit and run
42	Point	34	14-02-2017	5:00 P.M	In front of 2nd gate New GP Pasangal road Madurai	an known vehicle hit and run
43	Point	30	04-02-2017	6:40 A.M	Vishavathi, Theran main road Madurai	collision between auto and car
44	Point	40	06-02-2017	8:00 P.M	Vishavathi, Theran main road Madurai	collision between motor cycle
45	Point	0	06-02-2017	5:15 A.M	Arupulathi Ring Road Madurai	collision between auto and motor cycle
46	Point	0	13-02-2017	11:45 A.M	Near Annapurna temple main road Madurai	an known vehicle hit and run
47	Point	0	14-02-2017	11:10 P.M	10th Natar road, Pannalamb Madurai	collision between motor cycles and hand drawn vehicle
48	Point	0	25-02-2017	8:45 A.M	Near A. K. Kameswari, Arupulathi main road Madurai	pedestrian was struck by a motor cycle while trying to cross the road
49	Point	0	13-02-2017	9:30 A.M	Chinnaman road, Saravathi main road Madurai	pedestrian was struck by a motorcycle and motor cyclist was deceased
50	Point	0	14-02-2017	9:30 A.M	North main road, Anayuram	pedestrian was struck by a motor cycle while trying to cross the road
51	Point	0	17-02-2017	4:00 P.M	Opposite to menachan college, Nallambadi main road	lost control of the motor cycle and dashed against the Auto
52	Point	0	13-02-2017	10:30 P.M	Near sand hill ring road	pedestrian was struck by a bus while trying to cross the road
53	Point	0	23-02-2017	11:00 P.M	10th Natar road, Saravathi main road	pedestrian was struck by a bus while trying to cross the road
54	Point	0	28-02-2017	10:10 A.M	Near Annapurna temple main road Madurai	lost control of the vehicle due to the application of brake
55	Point	0	02-02-2017	10:40 P.M	Opp. of Royal Club, Vishavathi main road	motor cyclist hit the motorist while motor cyclist and van away
56	Point	0	18-02-2017	05:50 A.M	Near K. K. Kameswari, Anayuram main road	rear end collision between car and a motor cycle
57	Point	0	18-02-2017	02:40 P.M	Near Annapurna temple main road Madurai	an known vehicle hit and run
58	Point	0	18-02-2017	04:40 P.M	Opp. of Singa Statue, Vishavathi main road	motor cyclist lost control of the vehicle while turning
59	Point	0	18-02-2017	8:30 P.M	Near Annapurna temple, 10th Natar road	Deceased hit by motorist but then he got hit by a bus
60	Point	0	23-02-2017	08:10 P.M	Near sand hill ring road, 10th Natar road	Lorry hit the motor cyclist
61	Point	0	23-02-2017	11:00 P.M	Opp. to Vishavathi main road, Saravathi main road	an known vehicle hit and run
62	Point	0	04-02-2017	07:30 A.M	Aasavayuram main road, Saravathi main road	Lorry dashed behind the pedestrian while taking reverse
63	Point	0	14-02-2017	08:00 A.M	Near Jan overpass exports	an known vehicle hit and run
64	Point	0	17-02-2017	05:20 A.M	Near Annambal school, Kannanagar Sarai	Lorry hit the pedestrian while trying to cross the road
65	Point	0	17-02-2017	09:20 A.M	Near Thambal, Pannalamb	motor cyclist lost control of the vehicle while turning
66	Point	0	23-02-2017	12:20 A.M	Near Annapurna temple, Anayuram	unknown vehicle hit and run
67	Point	0	23-02-2017	03:20 A.M	Near Annapurna temple, Anayuram	Lorry hit the pedestrian
68	Point	0	11-02-2017	01:30 P.M	Opp. of 5th complex, Chidigar Road	two motor cyclist hit opposite to each other
69	Point	0	14-02-2017	10:10 P.M	Near Annapurna temple, Anayuram	two motor cyclist dashed against each other
70	Point	0	16-02-2017	03:00 P.M	Opp. of 10th Natar road, Chidigar Road	Lorry dashed behind the motor cycle
71	Point	0	16-02-2017	08:30 A.M	Opp. of 10th Natar road, Saravathi main road	an known vehicle hit and run
72	Point	0	23-02-2017	08:20 A.M	Chinnaman road, Saravathi main road	Auto dashed behind the motor cycle
73	Point	0	23-02-2017	10:00 P.M	Opp. of 10th Natar road, Chidigar Road	lost control of the motorcycle
74	Point	0	21-02-2017	07:00 P.M	Opp. of Thiruvagar motor shop, Saravathi main road	Car dashed against the pedestrian
75	Point	0	21-02-2017	08:00 A.M	Opp. of 10th Natar road, Saravathi main road	two motor cyclist dashed against each other
76	Point	0	28-02-2017	08:00 P.M	Parappanathi, Vishavathi main road	lost control of the motorcycle
77	Point	0	14-02-2017	09:50 A.M	Opp. of 10th Natar road, Saravathi main road	Lorry dashed against the motor cyclist

Fig 4: Imported data in Attribute table 2

ID	Shape	ID	Date	Time	Location	Case
76	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	unknown vehicle hit the pedestrian and ran away
77	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Blow and collision by the motorcycle with another
80	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Rear end collision by the motorcycle with another
81	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Thrust bus hit the pedestrian while trying to cross the road
82	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van hit the pedestrian while walking on the left side shoulder
83	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van hit the bus and lost its control when it tried to turn left
84	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed behind the motor cycle
85	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle ran over the speed breaker safety
86	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit the roadster and ran away
87	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle lost control of the vehicle while applying brake to save life of a pedestrian
88	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motorcycle hit the pedestrian
89	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	An unknown vehicle hit and ran-pedestrian
90	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Thrust bus hit behind the cyclist
91	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Two motor cycles dashed against each other
92	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle's walking stick struck the ground while riding and lost control
93	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	unknown vehicle hit and ran the motor cycle
94	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle dashed behind the Pedestrian
95	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Rear end collision between tractor and a car
96	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle dashed against the compound wall
97	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Car dashed against the motor cycle
98	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Bus dashed against the motor cycle
99	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle hit the pedestrian while trying to cross the road
100	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Two motor cycles dashed against each other
101	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Auto hit its control and hit the pedestrian, both passenger and pedestrian gets injured
102	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle dashed against a lady sitting in front of her house
103	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	When lorry turned left, the motor cycle lost its control and dashed against the lorry
104	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed against the car
105	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed against the motor cycle
106	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	A bus hit the pedestrian while trying to cross the road
107	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle hit control over the vehicle and dashed against the iron health bar
108	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed against the cyclist while trying to cross the road
109	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle dashed behind the auto and hit down
110	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle hit vehicle while applying the brake when a dog try to cross the road
111	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Car dashed behind the pedestrian while trying to cross the road
112	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Thrust bus dashed against the bicycle rider when he is trying to cross the road
113	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the motor cycle
114	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the victim while she standing in front of her house
115	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle lost control of its vehicle
116	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed against the motor cycle and ran over the head

Fig 5: Imported data in Attribute table 3

ID	Shape	ID	Date	Time	Location	Case
117	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Car dashed against the motor cycle
118	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the motor cycle and ran over the head
119	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Car dashed against the pedestrian and ran away
120	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motorcycle hit the pedestrian while he is trying to cross the road
121	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle lost control of the vehicle
122	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Corporation vehicle hit and dashed against the motor cycle
123	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the motor cycle
124	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Car dashed against the motor cycle
125	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle dashed against the motor cycle and ran over the victim's neck
126	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Auto dashed against the motor cycle
127	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	A car lost its control and dashed against the centre median
128	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the motor cycle
129	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	A car dashed against the motor cycle
130	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle lost its control while ran over the dip
131	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Van dashed against the motor cycle
132	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle lost control of the vehicle while applying the brake when a dog try to cross the road
133	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit and ran the motor cycle
134	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Tractor dashed against the pedestrian while trying to cross the road
135	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Auto dashed behind the pedestrian while trying to cross the road
136	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit and ran the motor cycle
137	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motorcycle lost control of its vehicle and dashed against the centre median
138	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Always trouble hit control and dashed against the standing pedestrian
139	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Thrust bus dashed against the pedestrian
140	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit and ran the motor cycle
141	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Tractor with water tank hit the pedestrian while trying to cross the road
142	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Motor cycle hit control over the vehicle and fell down on the road
143	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit and ran the pedestrian
144	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Auto dashed behind the pedestrian while trying to cross the road
145	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	A bus dashed behind the pedestrian while trying to cross the road
146	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Bus dashed behind the pedestrian
147	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	THSTC bus dashed against the motor cycle
148	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit the standing person and ran away
149	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Lorry dashed behind the motor cycle and ran over the victim
150	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	THS Auto with water tank hit the pedestrian while trying to cross the road
151	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	THS Auto with water tank dashed against the pedestrian
152	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	A van dashed against the motor cycle
153	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	THSTC bus dashed behind the motor cycle
154	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	Unknown vehicle hit the pedestrian and ran away
155	Point	0136-2017	02/10/17	10:30 P	Old nagar road near air turn stop	College bus dashed against the pedestrian

Fig 6: Imported data in Attribute table 4

IX. MARKING BLACK SPOTS

Marking of black spots were alike creating roads in the base map. The only difference is placing the point shape file as the black spots in the map and their details were already given as an input in attribute table.

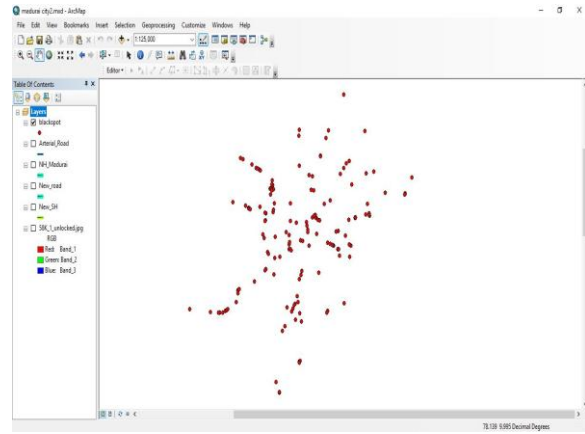


Fig 7: Digitized Black spots

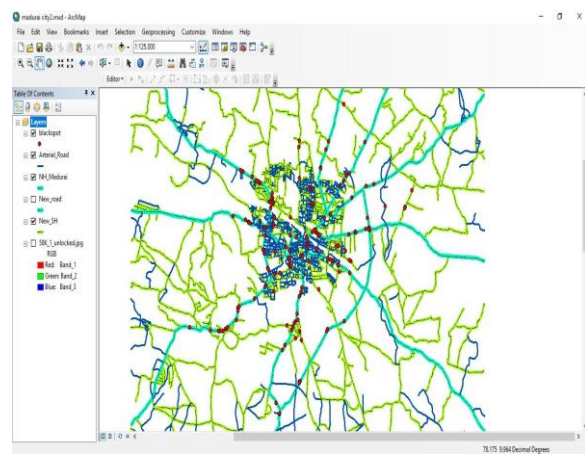


Fig 8: Digitized Roads with Black spots

X. COLLECTION OF LUX VALUES

Lux is the unit of light intensity. We consider that light intensity is also one of the factor for accidents happening in the city. We took the lux values for two black spot places in the city using the instrument called lux meter. Lux is the measure of one lumen per meter square. The lux vales were taken under the street lights of the two black spot places.

XI. IMPORTING LUX VALUES

The lux values taken from the street lights were imported in the attribute table alike given in the black spots details, its values were given as an input

FID	Shape *	Id	Lux_Values
0	Point	0	4.2
1	Point	0	16.7
2	Point	0	16.1
3	Point	0	16.3
4	Point	0	11.1
5	Point	0	3.9
6	Point	0	3.6
7	Point	0	9.3
8	Point	0	15.6
9	Point	0	15.5
10	Point	0	9.3
11	Point	0	3.5
12	Point	0	3.4
13	Point	0	9.5
14	Point	0	15.7
15	Point	0	15.6
16	Point	0	9.4
17	Point	0	3.4
18	Point	0	3.6
19	Point	0	9.4
20	Point	0	15.5
21	Point	0	15.7
22	Point	0	9.3
23	Point	0	3.6
24	Point	0	9.4
25	Point	0	9.4
26	Point	0	15.7
27	Point	0	15.7
28	Point	0	9.3
29	Point	0	3.5
30	Point	0	3.3
31	Point	0	9.3
32	Point	0	15.6
33	Point	0	15.6
34	Point	0	9.4
35	Point	0	3.6
36	Point	0	3.2
37	Point	0	15.6
38	Point	0	15.6

Fig 9: Imported Lux values in Attribute table

FID	Shape *	Id	Lux_Values
39	Point	0	15.5
40	Point	0	9.4
41	Point	0	3.5
42	Point	0	3.2
43	Point	0	9.2
44	Point	0	15.5
45	Point	0	15.5
46	Point	0	9.5
47	Point	0	3.5
48	Point	0	3.3
49	Point	0	9.3
50	Point	0	15.8
51	Point	0	15.6
52	Point	0	9.7
53	Point	0	3.5
54	Point	0	4.6
55	Point	0	15.4
56	Point	0	16.7
57	Point	0	15.9
58	Point	0	15.3
59	Point	0	3.8
60	Point	0	3.2
61	Point	0	9.8
62	Point	0	15.4
63	Point	0	15.5
64	Point	0	10.1
65	Point	0	3.7
66	Point	0	3.3
67	Point	0	9.7
68	Point	0	15.6
69	Point	0	9.8
70	Point	0	3.5
71	Point	0	3.2
72	Point	0	9.8
73	Point	0	9.6
74	Point	0	15.4
75	Point	0	15.7
76	Point	0	9.7
77	Point	0	3.4

Fig 10: Imported Lux Values in Attribute table 2

FID	Shape *	Id	Luxyyy
0	Point	0	32.1
1	Point	0	26.5
2	Point	0	6.7
3	Point	0	3.3
4	Point	0	27.2
5	Point	0	7.9
6	Point	0	32.5
7	Point	0	27.3
8	Point	0	6.3
9	Point	0	32.5
10	Point	0	26.8
11	Point	0	9.5
12	Point	0	33.3
13	Point	0	27.1
14	Point	0	9.9
15	Point	0	32.9
16	Point	0	26.3
17	Point	0	27.6
18	Point	0	33.3
19	Point	0	27.5
20	Point	0	6.2
21	Point	0	33.5
22	Point	0	28.4
23	Point	0	6.4
24	Point	0	32.6
25	Point	0	27.9
26	Point	0	6.4
27	Point	0	33.1
28	Point	0	26.5
29	Point	0	27.5
30	Point	0	31.9
31	Point	0	25.5
32	Point	0	6.9
33	Point	0	32.3
34	Point	0	26.4
35	Point	0	27.3
36	Point	0	34.1
37	Point	0	28.3
38	Point	0	9.1

Fig 11: Imported Lux values in Attribute table 3

XII. INTERPOLATION

With the imported lux values the point shape file were plotted in the road stretch in the Arc Map for interpolation. In interpolation the spread of light in the streets will be shown in the arc map by raster interpolation in 3D analyzing.

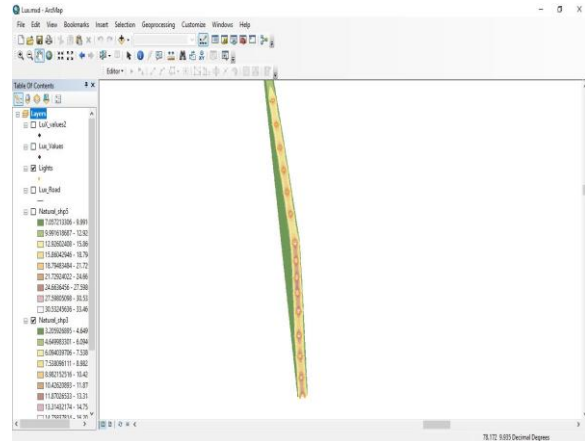


Fig 12: Interpolation of Lux Values for Road 1

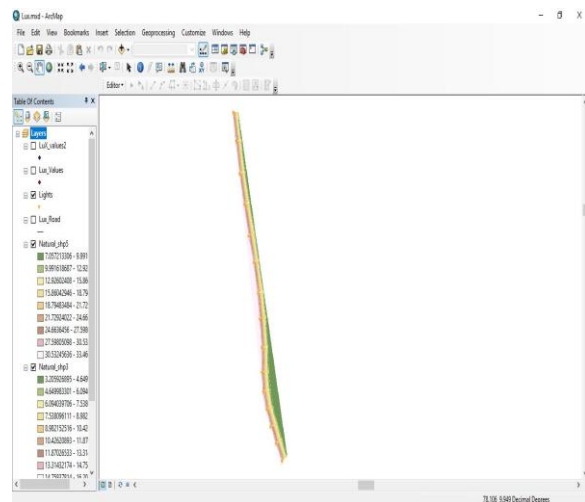


Fig 13: Interpolation of Lux Values for Road 2

XII. CORRELATING LUX VALUES AND BLACK SPOTS

After interpolation of lux values the black spots in that particular place should be correlated with the lux values of that stretch of road in the map. This is how it is shown that it was related to the accident spots.

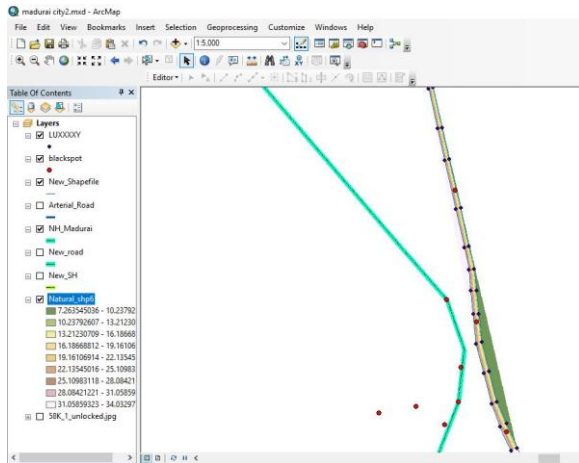


Fig 14: Correlation of Lux Values with Black spots

XIII. CONCLUSION

From the data's collected from S.P office and Commissioners office were analyzed and the various reasons for the black spots found out. Mostly the speed of the vehicle is the primary reason as well as the driver's negligence that leads to accident. In order to reduce these accidents proper road sense has to be taught to all the road users and certain geometric designs as well as modern tools are such as speed gun

and exclusives lanes required bringing down the speed of vehicle and co ordinate the moving vehicles in proper order.

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