

ROAD CONSTRUCTION ANALYZER

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ABSTRACT

- The ability to predict the final result of construction projects based on limited initial input data could be a very valuable tool for every project manager and/or construction enterprise.
- India is a country with the second largest road network in the world. Out of the total stretch of 5.4 million km of road network, almost 97,991 km is covered by national highways.
- It is already a huge challenge for the Indian government to provide world-class roads, due to the sheer magnitude.
- On an average, a person spends anywhere between 30 minutes to two hours of their day driving. Which means, in a year, it is almost 360 hours.
- If India has to maintain its growth, it will require around 15,000 km of new expressways in the coming 10-12 years.
- Keeping in mind the scale at which road infrastructure is required to grow; a prior analysis on where new roads should be paved will hugely reduced the pre-planning time and logistics required.
- This project will help analyze traffic intensity and flow; enabling us to predict where to construct new roads resulting in reduced traffic overload, lower travel time and sustainable infrastructure.

OBJECTIVES

- To visualize the whole road network of India before and after adding a new node.
- To compare the difference in the results.
- To visualize the traffic flow through Manhattan before and after adding a node.
- To compare the difference in results.
- To infer from the above results.

METHODOLOGY

- Data collection:
 - Dataset 1:
 - The whole surveyed road network of India
 - Pickup/Source and Drop Off/Destination locations (Latitude and Longitude)
 - Dataset 2:
 - New York cab dataset to simulate traffic intensity through a day.
- Designing an algorithm to analyze, simulate traffic flow and intensity before and after the addition of a new road(s).
- Implementing the algorithm on the collected data.
- Concluding whether the proposed road should be constructed or not based on the analysis.

DATA SET

DATA SET 1:

- The dataset used contains Pickup and Drop Latitude and Longitudes.
- The data has 4 columns and rows.
- Using these values the whole roadway network has been plotted and visualized.

Clipboard		Font		Alignment		Number		Styles		Cells		Editing	
F5		fx											
	A	B	C	D	E	F	G	H	I	J	K		
1	PickUp_Latiude	Pickup_Longitude	Drop_Latitude	Drop_Longitude									
2	14.43333	79.96667	25.35	74.63333									
3	26.22361	78.17917	23.21667	72.68333									
4	16.7	74.21667	10.98333	77.3									
5	11.35	77.73333	25.6	85.11667									
6	17.68333	75.91667	26.85	80.91667									
7	26.85	80.91667	20.66667	85.6									
8	27.5	77.68333	26.46667	80.35									
9	23.31667	75.06667	14.23333	76.4									
10	16.85438	74.56417	19.98333	73.8									
11	28.35	79.41667	16.51667	80.61667									
12	13.65	79.41667	25.18333	75.83333									
13	15.86667	74.5	23.83333	78.71667									
14	18.51957	73.85535	10.80289	78.69875									
15	21.01667	75.56667	22.56667	72.93333									
16	15.2	76.68333	30.32295	78.03168									
17	26.61667	81.36667	22.3	73.2									
18	15.48333	73.83333	19.95	79.3									
19	15.15	76.93333	25.6	85.11667									
20	25.45	81.85	25.6	85.11667									
21	28.66667	77.43333	23.03333	72.61667									
22	16.51667	80.61667	26.16667	75.78333									
23	31.32556	75.57917	23.6	72.95									
24	23.16697	79.95006	21.7	72.96667									
25	28.66667	77.43333	17.68333	75.91667									
26	22.56972	88.36972	19.01441	72.84794									
27	29.68333	76.98333	24.58333	80.83333									
28	23.21667	72.68333	13.08784	80.27847									
29	24.7	84.98333	25.18333	75.83333									
30	26.61667	81.36667	20.63333	72.93333									
31	22.6	75.3	20.9	74.78333									
32	28.83333	78.78333	15.35	75.16667									
33	8.48333	78.11667	19.98333	73.8									
34	21.7	81.08333	25.45	81.85									

DATA SET 2:

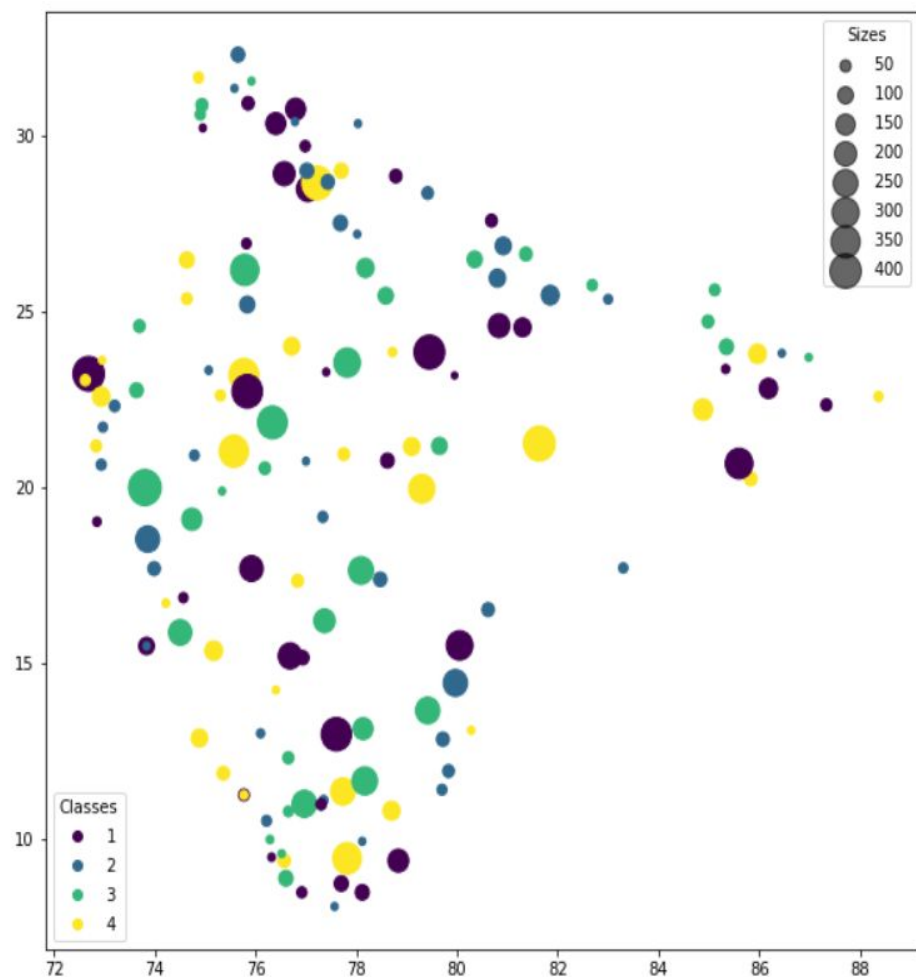
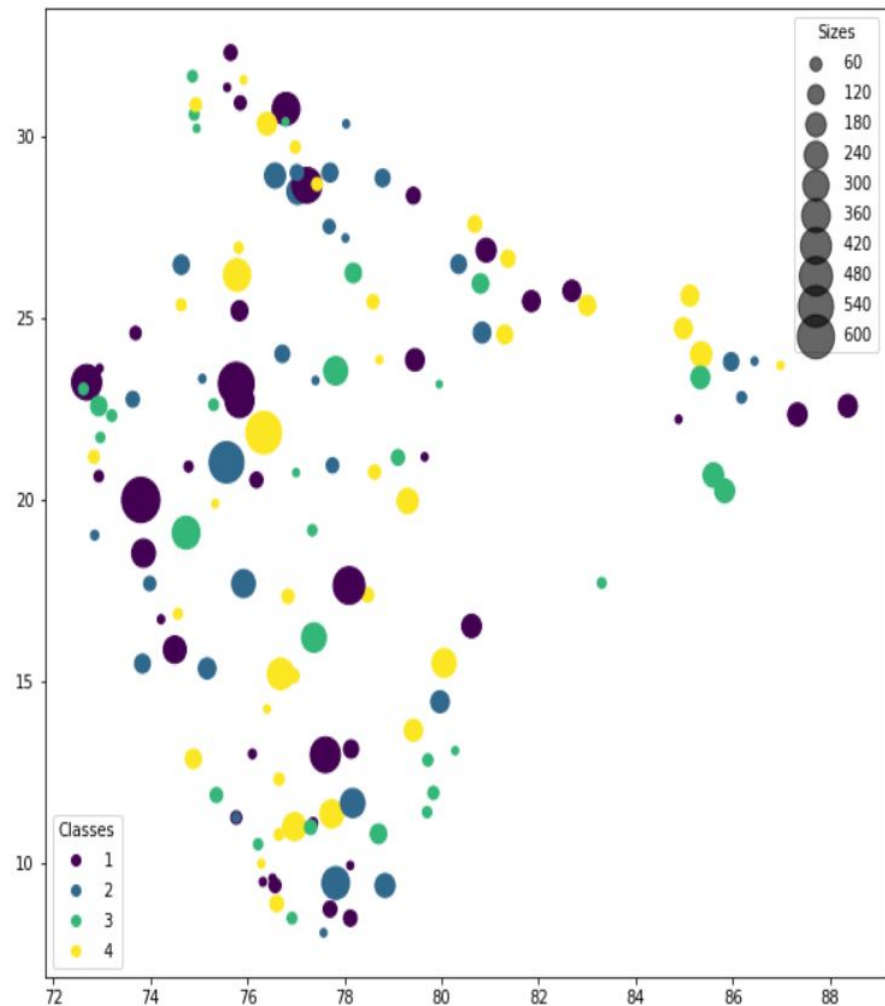
- We have used this cab ride data for New York to visualize the traffic flow in the city through the day.
- The dataset contains 11 columns and 1458644 rows.
- This is a **time series** data.
- Out of the 11 only 6 columns have been used. These are pickup and dropoff date and time, pickup and dropoff latitudes and longitudes.

M7													
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	id	vendor_id	pickup_date	dropoff_date	passenger_count	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	store_and_fwd_flag	trip_duration		
2	id2875421	2	#####	#####	1	-73.98215485	40.76793671	-73.96463013	40.76560211	N	455		
3	id2377394	1	#####	#####	1	-73.98041534	40.73856354	-73.9994812	40.73115158	N	663		
4	id3858529	2	#####	#####	1	-73.97902679	40.7639389	-74.00533295	40.71008682	N	2124		
5	id3504673	2	#####	#####	1	-74.01004028	40.7199707	-74.01226807	40.70671844	N	429		
6	id2181028	2	#####	#####	1	-73.97305298	40.79320908	-73.97292328	40.78252029	N	435		
7	id0801584	2	#####	#####	6	-73.98285675	40.74219513	-73.99208069	40.74918365	N	443		
8	id1813257	1	#####	#####	4	-73.96901703	40.7578392	-73.95740509	40.76589584	N	341		
9	id1324603	2	#####	#####	1	-73.96927643	40.79777908	-73.92247009	40.76055908	N	1551		
10	id1301050	1	#####	#####	1	-73.9994812	40.73839951	-73.98578644	40.73281479	N	255		
11	id0012891	2	#####	#####	1	-73.98104858	40.74433899	-73.97299957	40.78998947	N	1225		
12	id1436371	2	#####	#####	1	-73.98265076	40.76383972	-74.00222778	40.73299026	N	1274		
13	id1299289	2	#####	#####	4	-73.99153137	40.74943924	-73.95654297	40.77062988	N	1128		
14	id1187965	2	#####	#####	2	-73.96298218	40.75667953	-73.98440552	40.7607193	N	1114		
15	id0799785	2	#####	#####	1	-73.95630646	40.76794052	-73.96611023	40.76300049	N	260		
16	id2900608	2	#####	#####	1	-73.99219513	40.72722626	-73.97465515	40.78306961	N	1414		
17	id3319787	1	#####	#####	1	-73.955513	40.76859283	-73.94876099	40.77154541	N	211		
18	id3379579	2	#####	#####	1	-73.99116516	40.75556183	-73.99929047	40.72535324	N	2316		
19	id1154431	1	#####	#####	1	-73.99425507	40.74580383	-73.99965668	40.7233429	N	731		
20	id3552682	1	#####	#####	1	-74.00398254	40.7130127	-73.97919464	40.74992371	N	1317		
21	id3390316	2	#####	#####	1	-73.98388672	40.73819733	-73.99120331	40.72787094	N	251		
22	id2070428	1	#####	#####	1	-73.98036957	40.7424202	-73.96285248	40.76063538	N	486		
23	id0809232	2	#####	#####	1	-73.97953796	40.75336075	-73.96399689	40.76345825	N	652		
24	id2352683	1	#####	4/9/2016 3:41	1	-73.99586487	40.75881195	-73.99332428	40.74032211	N	423		
25	id1603037	1	#####	#####	1	-73.99355316	40.74717331	-74.00614166	40.70438385	N	1163		
26	id3321406	2	#####	6/3/2016 8:56	1	-73.95523071	40.77713394	-73.78874969	40.64147186	N	2485		
27	id0129640	2	#####	#####	1	-73.95658112	40.77135849	-73.97496796	40.7327919	N	1283		
28	id3587298	1	#####	#####	1	-73.98376465	40.74987411	-73.95883179	40.80096054	N	1130		
29	id2104175	1	#####	#####	1	-73.95843506	40.71319199	-73.94953918	40.68025208	N	694		
30	id3973319	2	#####	#####	1	-73.99421692	40.71330643	-73.98284912	40.69229889	N	892		
31	id1410897	1	#####	#####	1	-73.9821167	40.75635147	-73.86569214	40.77098846	N	2331		
32	id0266980	1	#####	#####	1	-73.97093964	40.76166916	-73.99623871	40.7253685	N	1479		
33	id2822549	2	#####	#####	1	-73.99826813	40.72003937	-74.01036072	40.67213821	N	1048		
34	id3075007	2	#####	#####	2	-74.00550079	40.70658875	-73.98581696	40.74420166	N	1022		

ANALYSIS

DATA SET 1:

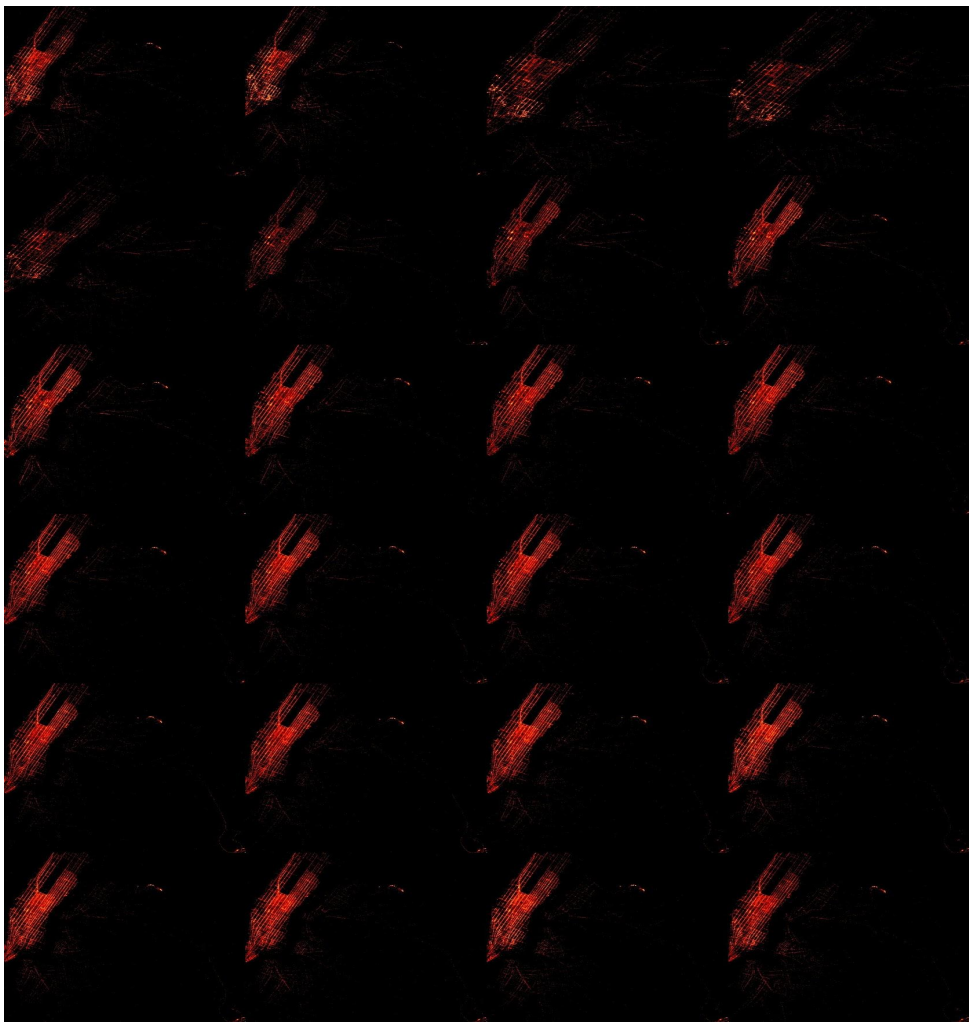
Intensity at each node before and after adding adding a new node.



- From the previous slide
- We can clearly see that the **intensity/frequency** has **decreased** from the previous results across all bins. The maximum drops from **600 to 400**.
- **From here we can confirm and conclude that the addition of this node will be valuable and will reduce the traffic intensity significantly across most nodes, especially major nodes.**

DATA SET 2:

Traffic flow pattern before and after addition of a new node



- We can clearly see that the addition of a node results in a little or no difference in the traffic intensity through the area, the traffic pattern remains the same.
- Here, we can observe that from **3-5 am** the traffic **intensity reduces** and then gradually increases with the **maximum intensity** around **1900 hrs.**
- This way this visualization helps us to allocate resources to the required location at a given time of the day.

CONCLUSION

- With the increasing population the state has to keep up with the infrastructure.
- New roads have to be paved to distribute traffic flow and intensity.
- Using this model we can predict whether a road if constructed will be able to help in doing so or not.
- For the used dataset and the assumed added node we can clearly conclude that the added node will successfully be able to reduce traffic and flow across other nodes in the network.
- For the 2nd dataset we can see that the addition of a new node makes a little or no difference in reducing the traffic intensity.
- Hence, we switch to data visualization.
- We visualize the traffic flow of the area for the whole day and identify a pattern.
- After successful identification of a pattern in the traffic intensity through a day, the resources can be allocated accordingly by the respective authorities.