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A Statistical Data Analysis of Road Traffic and Road Accident Analysis of pink City Jaipur

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Abstract: The roads of Jaipur city are tight and intruded by further activities. Bus amenities in precise have worsened, and their competence and service quality have deteriorated, prompting commuters to personalize mode and IPL. This not only restricts the traffic flow, but also endangers the lives of road users. The total number of fatal accidents as well as related accidents in the city has been increasing over the years. People killed per 100 accidents during the year 2018 are alarmingly high, as many as 28. Pedestrian deaths are also very high as a percentage of road accidents. During current years, they found more than 85% of all road deaths. BLOS is essentiallyanorderingproblematic and cluster analysis is considered the utmost appropriate technique to solve this classification problem. The ASW is calculated for each clustering technique to associate between clustering techniques and find the best clustering method. K-Mean cluster analysis is establish to be the utmost appropriate technique in significant BLOS limits for the level of service kinds of urban roads in the Indian context.

Keywords: Road safety, fatal accidents, Pedestrian deaths, NH-11, NH-8

I. INTRODUCTION

The National Research Council provides a research document established in the Transportation Research Record 1578 and these Bicycle Level of service are based upon it. .The models based on Bi-cycle Law of Service were established with a contextual of over 250,000 miles of assessed urban, semi urban, and Village roads in whole North America. These reputabletechnique of evaluating and establishing the roadway networks planning agencies play ansignificant role in the in many urban as well as in rural areas. Because of the laws in favour of BLOS not easy to understand and not defined properly in Indian context, this recent study is being carried out to understand the BLOS in depth. By the study of various literatures the BLOS model is finalized by the Department of transportation of Florida. These are similar terminology Bicycle level of service (BLOS) and bicycle level of comfort (BLOC), that is what is the possibility of to be satisfied by the bicyclist during his journey period. In the network of urban road these BLOS and BLOC are determined by experienced attain in the particular time period by the bicyclist. The rating is designated as A to F, where A refers to best and F refers the vanquish scaling of level of services.

II. LITERTURE REVIEW

Kendrick et al. (2011) have tried to determine and associate the instantaneous ultrafine particulate acquaintance (UFP) for cyclists in a conventional bicycle lane and a bicycle path for town areas. Ultrafine elementacquaintancemeditations were compared in two backgrounds: (a) a bicycle track design with a parking lane that separates vehicles from cyclists from traffic lanes and (b) a conventional bicycle lane adjacent to vehicles' traffic lanes.

Elias (2011) using the novel multimodal LOS procedure, which was founded on an NCHRP project and foreseeable in NCHRP Report 616, has an auto-oriented design for both the entire road and four specific right-of-way (ROW) widths. Investigated and their impact on pedestrians and cyclists.

Yang et al. (2010) analyzed individualissues influencing people's decision to travel by bicycle, including travel distance, commuter demographic characteristics, and perceived benefits. To find the effects of individual factors on the cycle, the authors modeled it with a latent variable and a binomial logit prototypicaldeprived of a latent variable, compared to a binomial.

Monsieur et al. (2012) to test amenities that were understood to provide a higher level of comfort to bicycle riders through separation from motor vehicle traffic, the authors noted two new types of isolated bicycle facilities such as bicycle tracks and buffers Has assessed the user's perceptions. Bike lane installed in Portland. The survey found a better perception of safety and comfort among cyclists, especially women, after one year of its use.

III. METHODOLOGY

In the BLOS prototypical, cycle LOSs are founded on five variables of relative prominence ordered in the following list:

- Usual effective width of the outside lane
- Volume of Motor-powered vehicles
- Speed of Motor-powered vehicles
- Heavy vehiclevolumes

1.1 BLOS model and The Terms used

1. Wtdimension is done as of the middle of the road (yellow strip) to the channel pan of the restraint (or to the restriction if there is no channelpresent).
2. In the circumstance of a multilane conformation, it is calculated from the outdoor lane strip to the edge of pavement. Wtdoes not include the gutterpan.
3. When there is angled parking contiguous to the outdoor lane, Wtis designed to the traffic-adjacent end of the parking stallstrips.
4. The occurrence of unstriped on-street parking does not alteration the dimension; the dimension should still be occupied from the center of the road to the channelpan.
5. When there is angled parking in line to the outside lane, Wlis measured to the traffic- side end of the parking stallstrips.

3.2 Study Area and Data Collection

3.2.1 Study Segments

The pink city of Jaipur, the capital of the state of Rajasthan, and the city of Sanganer are considered areas of study for this investigation. Fifteen sections of the Sanganer road grid and twenty sections of the Jaipur road network are seen in the present study. Road segments are preferred at both of these sites as differences in road geometry and traffic behavior are observed. As considered in other parts of India, traffic flow at these two sites is highly skewed. In Sanganer (a sub-urban city of Jaipur), road segments are taken into account, which are mostly carriageways divided without two lanes and some segments are four lane split carriageways. Whereas, the road segments in Jaipur city are usually four-lane divided carriageways, some sections are six-lane divided and some sections are two-lane un-divided.

3.2.2 Data Collection

Data collection work was performed using a handicam mounted on a tripod stand and video recordings were made for two to three hours throughout both before noon and twilight hours for each

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study of each section. The average method peak in this study is taken into consideration using fifteen minutes of data. Originally seven types of data sets were collected and analyzed such as amount of motorized vehicles, proportion of weighty vehicles, number of lanes, usual travel speed on apiece section, width of bicycle lane if contemporary, Rating of road surface condition and fraction of sections by on-street parking.

3.3 Cluster Analysis

The niceties of procedures used in essential levels of service standards for bicycle of city streets are presented.

3.3.1 ClusterPartitions

One of the possible classifications of clustering procedures can be whether the subset is crunchy (rigid) or fuzzy, since clusters can be legally viewed as subdivisions of data sets. Hard clustering approaches are based on traditional set theory, and necessitate that an objective either belongs to the cluster or not.

IV. RESULTS OF CLUSTER ANALYSIS (LOS CRITERIA)

1.2 K-meansClustering

In this figure, both the X and Y axes symbolize the BLOS score and the BLOS range "A" to "F" are shown by different colors and cryptograms. On or after this figure it is experiential that the BLOS score (554. 55) signifies LOS A and the BLOS score (L6) represents LOS F. On or after the cluster analysis it has been found that more BLOS score data are below LOS C. , D, E and F compared to A, B, showing that cyclists travel less than average and lower to the level of service. Some factors affecting BLOS need to be addressed in order to provide better service quality (A, B).

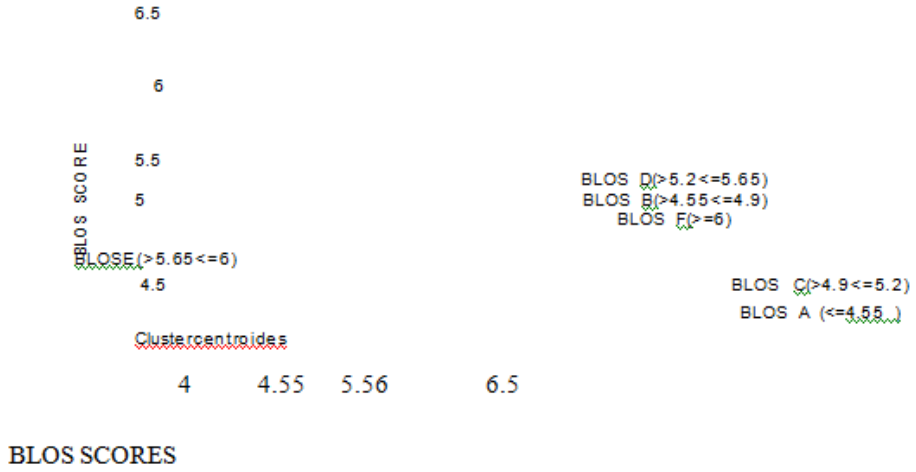

Figure 4.1 K-Means clustering of BLOS Scores

4.2 Hierarchical Agglomerative Clustering (HAC)

In this technique, the categorized tree of binary clusters was not speaking into large clusters using the cluster occupation and the anticipated number of clusters molded. In this figure, BLOS scores for the six groupings "A" to "F" for urban highwaysections are exposed by different colors and sizes. From this figure it is seen that BLOS score (54. 5) LOS A and BLOS score () 5. 85), LOS represents F. Figure A represents the additional dense groups C, D, E and F than B. In addition, the data groupsbelow BLOS groupings A and B follow smaller ranges than the others. Traffic flow on these two improved service groupings follows a more similarmovement with better highway geometry characteristics. However, traffic flows for furthergroupings are assorted with different road facilities,

leading to more congestion for flow by vehicles and cyclists.

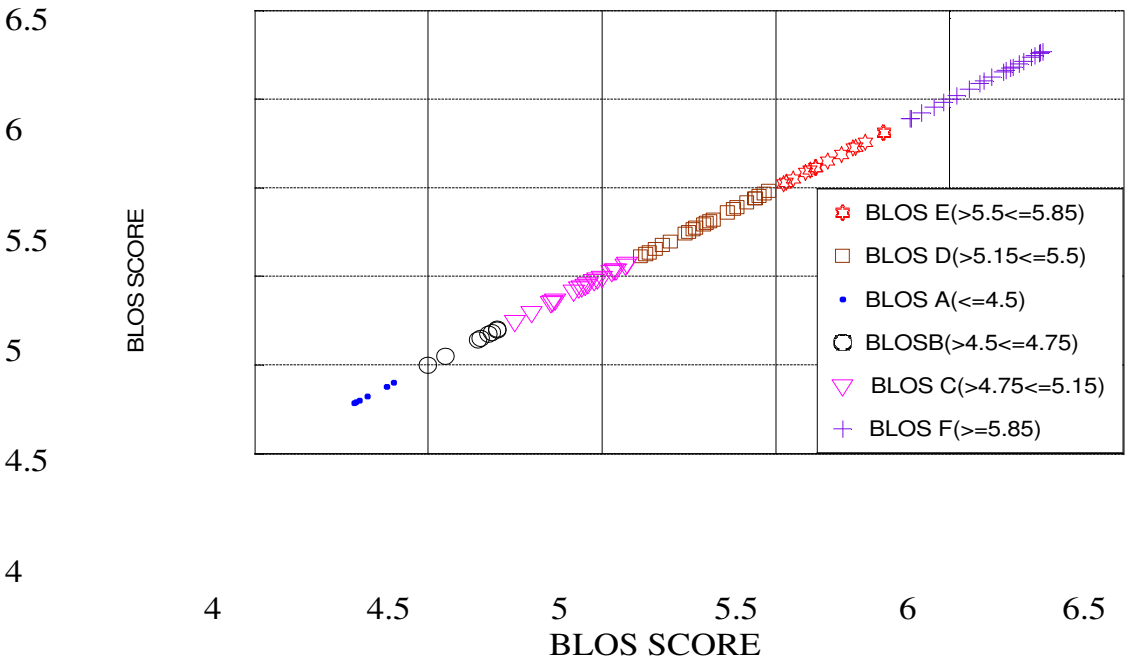

Figure 4.2 HAC of BLOS Scores

4.3Fuzzy C-Means (FCM)Clustering

The idea of a membership coefficient originates from fuzzy logic but the relationship among fuzzy logic and fuzzy cluster examinationfrequently occurs only concluded the application of membership coefficients, and not from a more comprehensive theory.

Fuzzy clustering simplifies partition clustering techniques (such as k-means) by allowing an individual to be partially classified into more than one cluster. In partition clustering, each individual is a member of only one cluster. Where no particular cluster is assigned to a fuzzy clustering object: they have membership coefficients indicating strength of membership in all or some groups. This is called affication of cluster configuration. In a fuzzy cluster analysis, the number of subsets is known, and the estimation of the membership coefficient of each object in each cluster is based on an iterative technique, frequently a normal optimization method.

4.4 Affinity Propagation (AP)clustering

When a data set is clustered with its optimal number of clusters, the quality of the cluster is best because the variance between data points belonging to a particular cluster is minimal. AP which is a new clustering tool developed in recent times is used to classify BLOS scores for various urban roads to find the categories of LOS categories.

Table 4.1 Classification of scores to define BLOS categories in Indian context

BLOS	*K*-means Clustering	Hierarchical Agglomerative Clustering (HAC)	Fuzzy C- Means (FCM) Clustering	Affinity Propagation (AP) clustering	GA-Fuzzy	Self-Organizing Map (SOM)
A	≤4.55	≤4.5	≤4.5	≤4.5	≤4.5	≤4.85
B	>4.55≤4.9	>4.5≤4.75	>4.5≤4.9	>4.5≤4.85	>4.5≤4.9	>4.85≤5
C	>4.9≤5.2	>4.75≤5.15	>4.9≤5.2	>4.85≤5.16	>4.9≤5.16	>5≤5.4
D	>5.2≤5.65	>5.15≤5.5	>5.2≤5.6	>5.16≤5.55	>5.16≤5.6	>5.4≤5.65
E	>5.65≤6	>5.5≤5.85	>5.6≤6	>5.55≤5.85	>5.6≤6	>5.65≤6
F	≥6	≥5.85	≥6	≥5.85	≥6	≥6
Average Silhouette Width ASW	0.7263	0.604	0.7167	0.571	0.564	0.465

Numerous ranges of Regular Silhouette Width are obtainable in table 4.2 designate the strength and faintness of the structure.

Table 4.2 Varieties of ASW (Source: Kaufman &Roosseeuw 1990)

I	0.71-1.00	A strong structure has been found
II	0.51-0.70	A reasonable structure has been found
III	0.26-0.50	The structure is weak and could be artificial
IV	≤ 0.25	No substantial structure has been found

ASW of numerouscastoff clustering techniques is different as of one to another and associated as shown in figure 4.1.

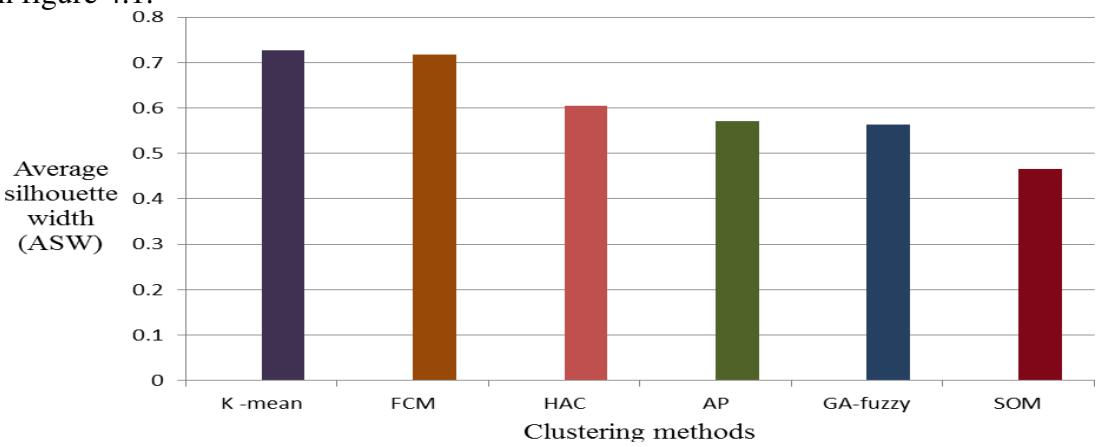

Figure 4.3Evaluation of ASW values of numerous clustering techniques

Since K-mean clustering has the uppermostnormal silhouette width compared to the further five clustering methods, K-mean is anadditional appropriate technique for classifying the BLOS score of urban on street road segments in the Indian context. The BLOS score ranges of each individual level of service category using K-means clustering are detailed in Table 4.3. On or after the table it can be underlined that the level of service range exceeds the limits provided by FDOT. According to Kaufmann and Roosivu (1990) the ASW value represents a strong structure. K-instrument and FCM have ASW ranges between 0.71–1.0 (solid structure), ASW ranges between HAC, AP and GA-fuzzy are 0.51–0.70 (sensible structure) and SOM has ASW varieties between 0.26–0.50 (weak). Structure).

Table 4.3 Comparison of BLOS ranges in Indian context with FDOT BLOS ranges

BLOS	K-MEAN CLUSTERING BLOS RANGES	FDOT BLOS RANGES
A	≤4.55	≤ 1.5
B	>4.55≤4.9	> 1.5 and ≤ 2.5
C	>4.9≤5.2	> 2.5 and ≤ 3.5
D	>5.2≤5.65	> 3.5 and ≤ 4.5
E	>5.65≤6	> 4.5 and ≤ 5.5
F	≥6	> 5.5

V. CONCLUSIONS

The succeeding are the significant conclusions drawn on or after the current study in defining the service criteria for bicycle roads for urban roads in the Indian context (Jaipur City).

The average silhouettes width (ASW) being higher in K-means is considered better for classifying BLOS score data than the other five clustering methods applied in this study. Furthermore, it was found that the bicycle traveled more frequently on the poor quality of service of "D", "E" and "F" than on the good quality of "A", "B" and "C".Cycle LOS on urban on-roads is defined based on the BLOS score used by the six cluster analysis methods.

BLOS scores defined for LOS categories are found to be different for all six clustering methods. In the present study the BLOS score range for LOS ranges (A – F) is found to be higher (lower in BLOS) than the ranges provided by FDOT (2009). The absence of separate bicycle lanes due to poor quality of service is a extremely heterogeneous traffic flow on urban road access strip with variable geometry in India.

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