Modeling of Driver Behavior for Tier City of India

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Abstract

The driving behavior of driver associated with security and traffic surge. The behaviour of the driver in tier city on the way to the red light violation varies on basis of various factors. To arrive their scrupulous destination people, drive the vehicle quicker and because of that accident will occurs. The red light violation data collected by using video camera for three weeks. The main aim of this psychoanalysis to find the relation between the performance of red light violation and a choice of aspect such as velocity of violator's vehicle, kind of vehicle causes violation, sexual characteristics etc. Using modeling method of logistic the psychoanalysis done. This method shows the red light violated done by youthful driver is at elevated speed than that of centre age driver and aged drivers. The coefficient of explanatory unpredictable age after computation is negative it's explain s that in accordance of the age of violator depart on increasing the possibility of age of red light rule violator depart on declining. It has been seen that all grow old of driver are to be expected to violate red light when green light turns into yellowish light and yellowish light turn into red light. This paper describes manners of driver during red light disobedience. The is used to design effective system to diminish the violation of vehicles.
Keywords: Tier, speed of violation, human factor, vehicle attribute, rule violation, Driver performance

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I. INTRODUCTION

Tier cities of India are confidential on the foundation of various factors. These factors including educational and chronological improvement, sophisticated transportation organization, cost-effective growth infrastructural progress. Tier II cities are usually minors measure up to that of Tier I cities. The inhabitant's population in a Tier II city is in general 10 lakhs or less than that and they are typically any country capital. Tier II cities contain various cities such as Nasik, Ludhiana, Ghaziabad, Faridabad, Kalyan, Vishakhapatnam, Thane, Bhopal, Rajkot, Chhattisgarh, Gurgaon, Indore, Jaipur, Surat, Lucknow, Dehradun, Nagpur etc. The scrutinize of behaviour of the Driver in the direction of the rule violation is significant for the accident inspection and walker protection. If driver is not driving a vehicle appropriately the accident may happen and people may also pass away. Human beings are in general in rush to reach their exacting destination including workplace, academy, school etc. when they are in hasten driver vehicle More rapidly as compared to the accustomed speed so that it's tricky to organize vehicle at elevated speed and accident arises. The rule violation activities of the driver vary from spot, vehicle, age, sexual characteristics etc. To build up the model that prevent the red light violation it is necessary to recognize the various aspects and conditions of red light violation special in the correspondence between the red light rules violation and a variety of factors such as age, sexual category, violation velocity etc.

II. RED LIGHT VIOLATION

There are numerous definitions significant to the red light rules violation. Red light violation purely called as when the driver of the vehicle not thrive to discontinue at a seam when red light turns on or it may also define as the vehicle go into meticulousness section after the red light turn on for more than 0.2 to 0.3 seconds. An unwavering green light on traffic signal designates that we can carry on in the direction of Straight track or may take left turn or right turn. A sturdy yellow light on traffic signal signifies that movement is being completed and vehicle shall not allow crossing the cross roads. Fixed red light on traffic signal implies that way stop clearly before the road scratch s and vehicle will remain stop awaiting green light not turn on. Red light violation causes many difficulty is one of the biggest hindrance is that walker may get harmed or expire due to violation of vehicle.

A. Rule Violation Motive:

− Materialization: When vehicle driver is in emergency such as medical emergency the driver not follow the rules
− Hurry: To reach at fussy place such as headquarters, institution people getting late so as a substitute of stopping on that signal they violate the rules.
− Deliberately: If a quantity of people is violating the traffic signals rule rest of other people is he /she not following the traffic rule why should we follow the rule so they intentionally violate the rules

− Habit: Young vehicle driver have habit to not follow the rule because they think its waste of time if the traffic system is not proper the violates the rule on large scale. So the study of red light violation is important for safety purpose of vehicle driver and pedestrian

III. METHODOLOGY

A. Study Area:

The data has been collected from Mohini Complex Square for three weeks. The traffic data of vehicles that flow from Mohini complex square to Nagpur main railway station. The data collected for both off peak phase from1 February to 6 February2016 and peak phase from 18 January 2016 to 23 January2016 of the intersection. For two-week data collected for evening peak phase from date 18 January to 23 January2016 and 8 February to 13 February 2016 (5 pm to 6 pm) and for one week the data is collected for off phase hour (2.30 pm to 3.30 pm) from 1 February to 6 February at afternoon. The data collected by using method of video graphic. A section of 20 m was mark so that speed of vehicle can be calculated. The data consist of time when violation arises, variety of vehicles, and automobile speed of law and regulation violator vehicle at the instance of red light on chosen interface, set of laws violation, and violator of different age group.

B. Variables Distributions Regularity:

Regularity count of Explanatory and dependent variables are as follows Set
− Velocity at the times of violation occurs
− Age of that violator
− Sexual characteristics of that violator
− Kind of vehicle due causes violation

Table – 1
Desecration by Red Light Regulations with Age Grouping (Male and Female)

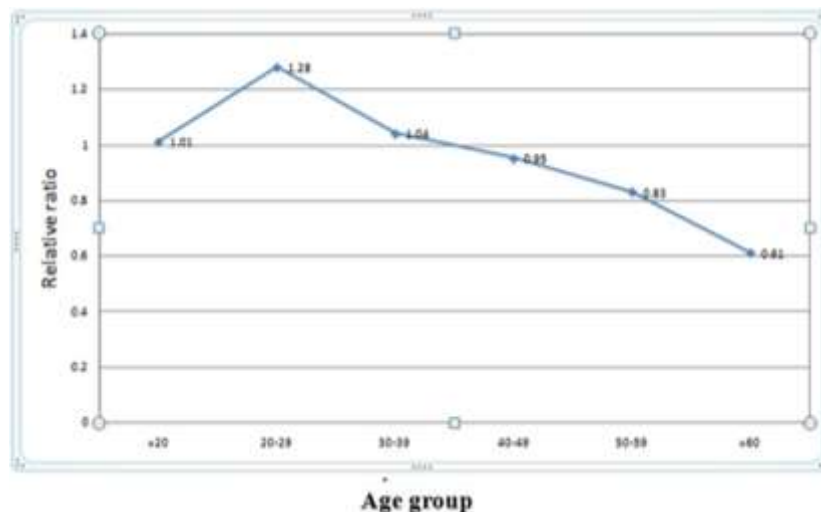| Age Group	No. of licenses driver	%of Licenses driver	No. of rule violation	% of rule violation	%of Rule violation / %Licenses drivers
<20	21966	12.42%	1578	12.60%	1.01
20-29	42035	24.06%	3875	30.92%	1.28
30-39	47119	26.97%	3517	28.06%	1.04
40-49	26940	15.42%	1846	14.73%	0.95
50-59	20249	11.59%	1207	9.64%	0.83
>60	11514	6.59%	508	4.05%	0.61
Total	174707	100%	12531	100%	

Fig. 1: comparative ratio red light violation by dissimilar age group of drive

Table – 2
Violation by sexual category of red light rule

Gender	No. of Licenses driver	% Licenses driver	No. of Rule violation	% Of Rule violations	%of Rule voilation / % Licenses driver
Male	100702	57.64%	9436	75.30%	1.30
Female	74005	42.35%	3095	24.70%	0.58
Total	174707	100%	12531	100 Z%	

C. Modeling Method Of Logistic:

Modeling method of logistic for red light rules violation were built to exploit to the effect of violation time, sexual category, age and the position on two dependent and explanatory variables they are
1) Velocity of the vehicle at the time of violation
2) Time to envelop the selected patch
   The equation for modeling scheme logistic

$$Pi = \frac{\exp.(\alpha i + \beta 1\, x1 + \beta 2\, x2 .... + \beta n\, xn)}{1 + \exp.(\alpha i + \beta 1\, x1 + \beta 2\, x2 .... + \beta n\, .xn)}$$

Where
 Pi = Possible Probability of yi equals to 1
i = 1, 2, 3, 4… n individuals
β = Coefficients corresponding to explanatory variables k x ...x
α = Constant term
x1 ...x n = Explanatory variables
   To investigate the influence of speed and time of violation on sexual characteristics, age, category of automobile models was created. These two models are
1) *Velocity of The Automobile at The Instance of Red Light Infringement:*

- a)   *automobile speed greater than speed perimeter*
- b)   *automobile speed less than speed perimeter*

D. Procedure Of Red Light Violator Investigation:

Numerous trails were completed using various set-up for categorized the different age group. These age groups are age of driver are categorized from16-31 years are taken as youthful driver,32-50 years are taken as centre age driver and above 50 years' age is taken as old driver. The velocity of vehicle varies from category of vehicle. Two wheeler are miniature in size than that of to three wheeler profitable and non-commercial vehicles and four wheelers. They are stretchers and take low space. Finally, four-wheeler includes cars, public transport such as mini bus, star bus, commercial vehicles such as truck, MPV (multi-purpose vehicle) are large in size and not flexible. Also the speed of the vehicle varies from dissimilar age group peoples. It has been seen that immature youthful driver generally most rule violator. The red light rule violation through by youthful driver is greater as compare to adulthood driver and old drivers. Young driver violates light at greater speed than that of speed limit and in that violation the run the red light using two-wheeler. A section on 20m was mark at the site where data is collected. By evaluating collected data of red light rule violation of diverse vehicle that we gauge the vehicle speed at the time of red light rule violation. Determination of red light rule violation occurs and plots the graph. From the graph it has been seen that as the speed of the vehicle increasing the percentage of rule violation also goes on increasing but at the same time goes on decreasing.
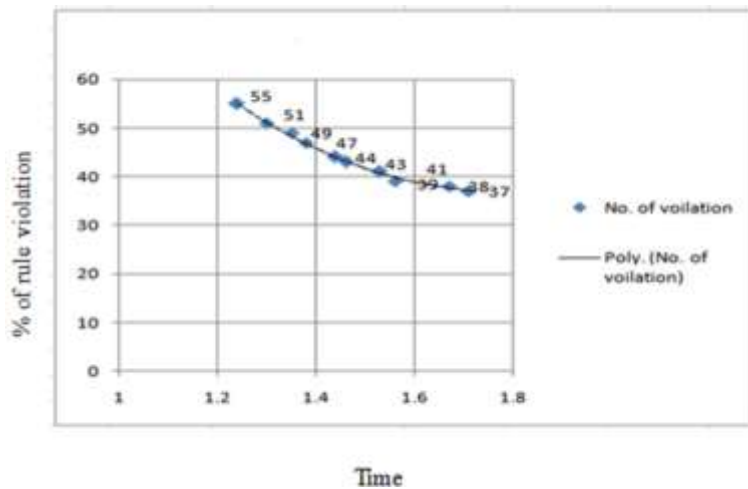
Fig. 2: % of violation of violator vehicle vs Time

Using SAS software completes deterioration of logistic inspection of red light law regulation violation data. For the investigation purpose we generate a system in the SAS software. Data serene for 4 different timing these four dissimilar variables codes for different times. These times are Time 4, Time 3, Time 2 and Time 1. These are the mannequin explanatory variables for disparate time when the experiment was performing. Likewise, for speed, age of violation combines with sexual category diverse codes are creates for both explanatory and dependent variables. In the software the different situation is there and generates he codes as per circumstances satisfies. After the software analysis is done we calculate different terms. This term includes average error, estimated coefficient and odd ratio.

There are different relations between the various factors. This important association is the connection between Age of driver and velocity of violation, types of automobile and velocity, times of violation and sexual characteristics etc.\

Table – 3
Analysis codes for logistics methods of regression

Variable Description	Variable code	Variable codes	Data Format	SAS code
Speed of vehicle at the Time of violation, Kmh.	Speed	Dependent	Violation speed<=speed limit.	0
			Violation speed > speed limit	1
Age of the Red Light violator.	Age	Explanatory	Teenagers, 15-30 Years Old	1
			Middle-Age, 30 to 60 Years Old	2
			Older, 60 Years or Older	3
Sexual characteristics of the Red Light violator.	Sexual category	Explanatory	Male	0
			Female	1
Time of the Red Light Violation.	Time 4	Explanatory	2.30 pm to 3.30 pm	2
			3.30 pm to 4.30 pm	3
	Time 3		4.30 pm to 5.30 pm	0
	Time 2			
	Time 1		5.30 pm to 6.30 pm	1

Table – 4
Data Estimated for Modelling of Logistic Method with Speed of Automobiles

S.N	Different Variable codes for age and time	Standard error	Estimated error	p value	Odd ratio	1/ Odd ratio
1	Age	0.0371	-0.9707	<0.001	0.9321	1.07
2	Age	0.1263	-0.9948	<0.001	0.9675	1.033
3	Age	0.1075	-0.9956	<0.001	0.9698	1.031
4	Age	0.0381	-0.112	<0.001	0.9728	1.027
5	Time1	0.0499	-0.4093	<0.001	1.3749	0.7273
6	Time2	0.8589	-0.2665	<0.001	1.9894	0.5026
7	Time3	0.9521	-0.6729	<0.001	1.4721	0.6793
8	Time4	0.9826	-0.1465	<0.001	1.9408	0.5152

After finding the possibility of the variables we calculated Coefficient of estimated variable, standard error and odd ratio. We calculate estimate of coefficient for different variables such as time and age. When calculate estimated coefficient for collected data for the explanatory variable age. The calculation of odd ratio is completed. The value of odd ratio for Age is 1.07. This value indicates that young whose age from 17- 30 years' driver violates the red light signal at greater speed. This value is twice that of 30-60-year age group and above 60-year age group people.

After the analysis of data using logistic model it has been found that young driver from age group 16-31 years drive the vehicle uncompromisingly than that of centre age set people (30-61years) and old age set people (age <60). After that estimated coefficient is calculated for explanatory variable time. The data collection is done in four different times. These data collected in both evening peak hour and off peak period. The estimation of coefficient calculated for Time I, Time II and Time III are found negative. The negative estimated coefficient value for explanatory variable indicated that red light violation for this timing is less in off peak hours i.e. Time I (2.30pm to3.30 pm), Time II(3.30 pm-4.30 pm) and Time III(4pm to 5 pm) and red light violation is more in peak hours (5 pm -6 pm).

In this section using Logistic regression model completes calculation. The result shows that influence of explanatory variables (age, time, gender) is presented.
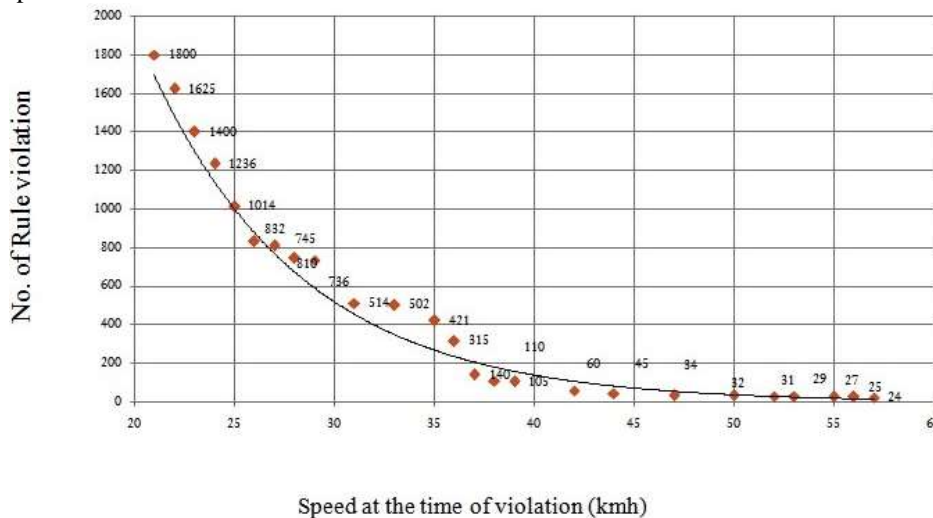

Fig. 3: No of violation of violator vehicle vs speed of violators at the time of violation

Graph of no. Of rule violation vs speed shows no. Of red light rule violation increases with vehicle speed. Total 12521 vehicles out of 30574 are rule violations. This vehicle includes 2W, 3W (both vendeur and non vendeur) and 4W (vendeur and non vendeur). The violation speed ranges from 40-56 km/h. The highest speed Is 56 km/h

IV. CONCLUSION

Based on the red light transgression during peak rassemblement and experimental study the following conclusion have been drawn. Red light violation takes places during evening peak session (5 to 6 pm) and also on weekdays peak session is spare than off peak session in weekdays. The average light violation speed was 35 km/h but more than 55% of red light violations speed is 35km/h or

less. Teenagers driver (21%)violates the red light at speed of 50 km/h or more than That speed. About 95% of red light violation is after 2-3 seconds when green light turns to yellowish and yellowish light turn to red. The red light rule violation is more in peak period and weekends. The facture we calculate from red light transgression data is setting antipathetic it signifies that in accordance of Age of red light rule transgression the possibility of red light rule violation with age and speed of the vehicle. The maximum rule violation of red light is by teenager's drivers by two-Wheeler.

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