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Traffic Assignment:A Case Study Of Avkuda

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Abstract: Traffic assignment is a part of travel demand models. For traffic assignment various input data are required such as road type ,link length ,carriageway ,width , link capacity ,free flow speed ,travel time ,OD matrix etc.
This paper presents the traffic assignment for road network the AVKUDA in Anand district.With traffic congestion on the road delay of commuters has increased and reliability of road network has decreased. So traffic assignment is essential, to understand traffic operations in area. Trip assignment is the fourth step after trip generation, distribution and mode choice for transportation planning. There are different types of traffic assignment models.All-or nothing, user equilibrium and system optimum assignment models are the commonly used models. The existing O-D matrix is used for trip distribution.
GIS based software is a flexible regime to describe TAZs ,it is provide computing origin –destination matrix to any desired level of spatial disaggregation. The analysis is done by using Trans CAD software and scenario generated for future.
Keywords: Traffic, Traffic assignment, network,shortest path,TransCAD

I. INTRODUCTION

Transportation planning is important for any road network.Transportation planning is science that improve transportation facilities in an urban, regional or national level.Travel demand increases with increase in population,income and car ownership .To provide free flow on routes, its necessary to improve the existing transportation road network.Hence it is necessary for identifying and analyzing existing traffic related problems.

Traffic assignment is fourth step of transportation planning after trip generation,distribution and mode choice.There are different method for traffic assignment.This process begins with collection of Extensive data on use,socioeconomic,demographic,and network characteristics[6]

The traffic assignment problem, no matter if macroscopic or microscopic ,static or dynamic[12].The Deterministic user equilibrium (DUE)and stochastic user equilibrium (SUE)traffic assignment problem play the same important role in transportation analysis[2].In network there are three types of flow : path flow,origin-based link flow, and destination-based link flow.[2]

There are number of trips within the zone.Trip assignment determine the volume of travel for each link of the transportation network.

Trip pattern is represented by origin-destination matrix where the individual cell indicate the number of trip.To obtain OD matrix automatic counts from ITS ,such as loop dectectors and video cameras can be readily utilized for traditional synthetic OD estimation techniques[13].

Many computer software have been used for O-D matrix estimation to investigate the relationship between traffic count and O-D matrix. Most widely use Model is TransCAD Model[1].This TransCAD software used for traffic assignment process.

For using user equibrium traffic assignment there are three method : Frank-Wolfe,Disaggregate simplicial decomposition(DSD) and DSD with entropy maximization[9].

TransCAD model offers three network performance measures. The first one is vehicles hours of travel which is the summation of travel time spent by all vehicles in the network. The second one is the total vehicle kilometre travelled which is the summation of the distance travelled by all the vehicles over the network in our the network in hours. The third performance measure is volume over capacity ratio which is a direct indication of the network level of service.[6]

II. PROBLEM IDENTIFICATION

Population of India is nearby 1.34billion and population of Gujrat is 66.3 million. In term of population Ahmadabad is the largest city of Gujarat with 6.2 million. Other major city are Surat, Vaddara, Rajkot, Anand ,Bhavnagar etc. Population of Anand is 1,98,282.Anand is 110km from State capital Gandhinagar. It is a major city of Charotar region.The location of study area is AVKUDA.It is cover 33 villages of Anand taluka.

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Population of AVKUDA is 5,01,526.Road SH 60 is connection from Samarkha to Bhalej. NH 48 is connection between Vasad to Bhumel.Other major roads connect Sojitra to Sarsa. AVKUDA road network carries high volume of traffic.Hence leading congestion on route. Because of congestion there is increased in travel time, loss of fule, accident, delays and environmental problem is occur.

A. AIM

Aim of study is find shortest path from origin to destination and reduce congestion on the route.

B. Objectives

1) Collection of road network data.
2) To estimate the volume of traffic and Prepare O-D matrix.
3) Find out travel time between O-D.

C. Scop Of Work

1) The work is limited to following in AVKUDA area.
a) Volume count survey using moving car method.
b) To prepare O-D matrix with the data collection from origin – destination survey.
c) Use traffic assignment method for traffic on network.
d) Give suggestion for route choice.

III. LITERATURE REVIEW

All assignment techniques are based on route selection. The choice of route is made on the basis of a number of criteria such as journey/travel time, length of route, cost, comfort, convenience and safety. Travel time is often considered as sole criteria since length an cost can be considered as function of time in most cases.

Moore's developed a method for dealing with telephone calls on the basis of shortest path, and this became commonly used procedure. In practice different techniques are available for traffic assignment as discussed below:

A. .All-or-nothing Assignment

Under all-or nothing assignment ,all traffic flow between O-D pairs are assigned to the shortest paths connecting the origins and destinations. Minimum path building follows traffic assignment with link having unlimited capacity.

B. Incremental Assignment

Incremental Assignment is process in which fraction of traffic volume are assigned in step. After this link travel time is recalculate based on link volume. When there are many increments used, the flows may resemble an equilibrium assignment.

C. Capacity Restraint

This method as implemented in some software packages attempts to lessen this problem by smoothing the travel time and and averaging the lows over a set of the last inerations.

Capacity restraint is a process in which the travel resistance of a link is increased according to a relation between the practical capacity of the link and volume assigned to the link.The travel resistance in term of travel time is as per BPR as

$$T_Q = T_0 \ [1 + \alpha(Q/Q_{max})^{\beta} \qquad (1)$$

And Devidson (1966)

$$T = T_0 \ [\frac{1-(1-T_Q)Q/Q_{max}}{1-Q/Q_{max}}] \qquad (2)$$

Where

T_Q = Travel time when Volume on link is Q

T_0 = Free flow travel time

Q = Observed volume

Q_{max} = Maximum volume

D. User Equilibrium

User Equilibrium solution, in which no travelers can improve their time by shifting routes. The formulation of the UE problem as a mathematical program ,and the Rank-Wolf solution method revised by Le Blanc is employed in TransCAD.

E. Stochastic User Equilibrium

In this method assumes travelers do not have perfect information concerning network attributes and they perceive travel costs in different ways. Travel time is thus random variable on each link, link based choice probability using multimodal or multinominal probit model is computed and using link and node variables assignment is carried out(Sheffi,1985).

F. System optimum Assignment

System optimum Assignment computes an assignment that minimizes total travel time on the network system.

IV. STUDY METHODOLOGY

To provide route choice for AVKUDA road network first step is identification of problem and formulation of goal and objective. After the study of literature review and building the road network of AVKUDA in Trans CAD software and entering the data. Traffic data collection is done by moving car method. From the data collection estimate OD matrix. Use BPR function function

$$T = T_0 + [1 + 0.15(V/C)^4] \quad (3)$$

T =observed travel time T_0 = free flow travel time

For traffic assignment Stochastic User Equilibrium algorithm are used.

Stochastic User equilibrium is a generalization of user equilibrium that assumes travelers do not have perfect information concerning network attributes and/or they perceive travel cost in different way.SUE assignment produce more realistic results then the deterministic UE model, because SUE permits use of less attractive as the most attractive routes. Less attractive routes will have lower utilization, but will not have zero flow as they do under UE Program Formulation.

Consider the following minimization problem:

$$\min_{x} z(x) = -\sum_{rs} E[\min_{k \in Krs}\{C_k^{rs}\}|c^{rs}] + \sum_a x_a t_a(x_a) - \sum_a \int_0^{x_a} t_a(w)dw \quad (4)$$

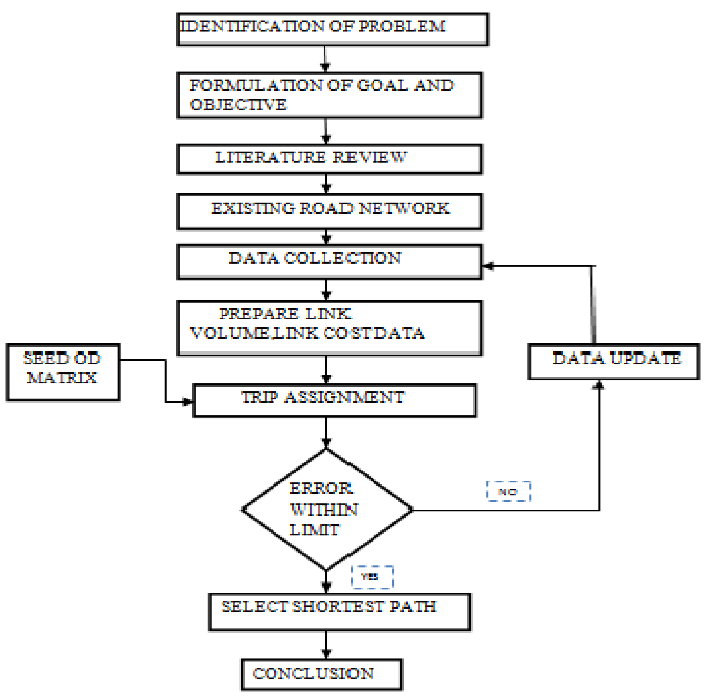

Fig.1. Study Methodology flow diagram

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V. DATA COLLECTION

A. Road network

Network is commonly used to describe a structure that can be either physical or conceptual. Network includes two types of elements: a set of points called nodes and a set of line segments connecting these points. Each link is typically associated with some impedance which depend on the flow using it. The units of measurement of this impedance depend on the nature of the network and the link flows, impedance can represent electrical resistance ,time, cost, utility, or any other relevant measure.

The roadway network in an urban area includes intersection and streets through which traffic moves.

In order to achieve the objectives of study work starting with data collection including road network characteristics and traffic volume. First of all zoning of AVKUDA is done for O-D matrix. Fig 2.shows the 33 zones of AVKUDA. The Second step building the road network. By taking one level low road category network is created. Links are identified by ID, name of road, Physical capacity by inventory survey.

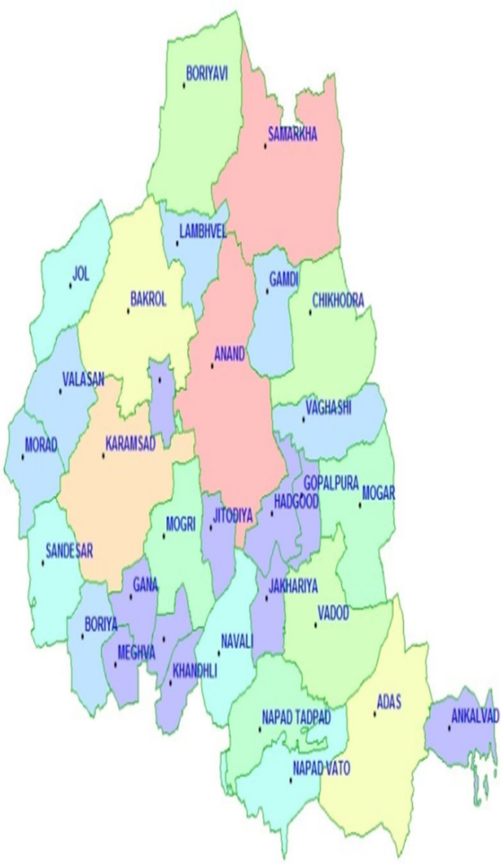

Fig.2. zoning of study area

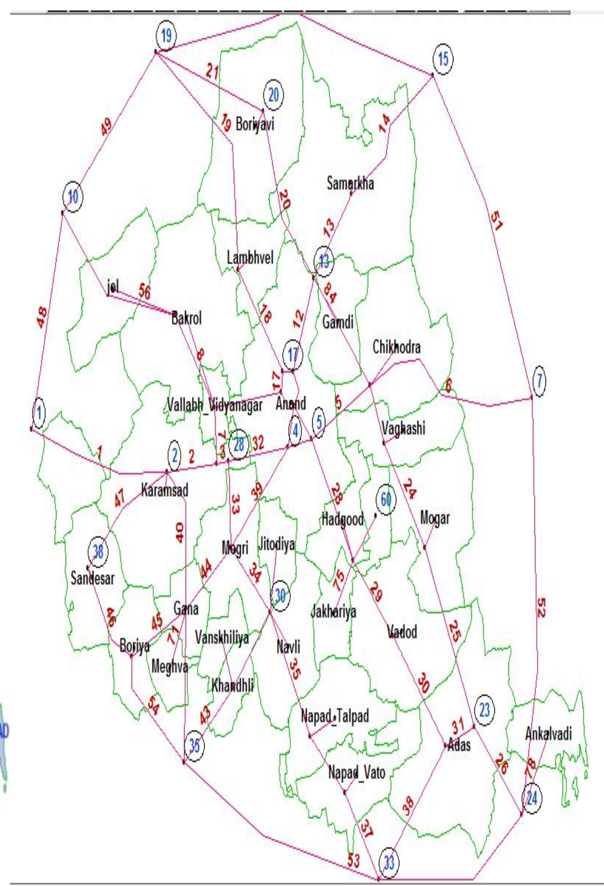

Fig.3 Road network with centroid connector in AVKUDA

The road network with centroid connector are shown in fig.3 centroid connector. The trip to access the road network uses centroid connector. Table 1 shows some selected network attributes.

B. Volume count survey(Moving car method)

Volume count survey is carried out using moving car method on working day from time to time. The average flow, journey time, speed and dealy of traffic on a road link are obtained. The data on link volume ,speed etc is given in table 2.

C. Seed Matrix

For traffic assignment , seed O-D matrix is required. The seed O-D matrix is taken from dissertation work(unpublished) by Roshni Makwana.The O-D matrix is given in Table 3.

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Table : 1 road attributes

link name	distance(KM)	link type	no of lane
ravipura-karmsad	5.5	two way-undivided	single lane
karmsad-jata chokdi	3.7	two way-divided	2 lane
janta chokdi-amin auto	2	two way-divided	2 lane
amin auto-borsad chokdi	1	two way-divided	2 lane
borsad-chikodra chokdi	3.6	two way-divided	2 lane
chikodra -bedva	5.6	two way-undivided	single lane
bedva-sarsa	5.6	two way-divided	2 lane
bhumel-boriyavi	3.7	two way-divided	2 lane
boriyavi-samarkha chokdi	4.4	two way-divided	2 lane
samrkha chokdi -chikodra chokdi	3.2	two way-divided	2 lane
chikodra chokdi-mogar	5	two way-divided	2 lane
mogar-adas	4.7	two way-divided	2 lane
adas-vasad	3.6	two way-divided	2 lane
bumel-lambhvel	5	two way-divided	2 lane
lambhvel-indra statue	2.9	two way-divided	2 lane
indra statue-town hall	0.8	two way-divided	2 lane
town hall-borsad chokdi	1.5	two way-undivided	single lane
indra statue-bhalej bridge	1.4	two way-divided	2 lane
bhalej bridge-samrkha chokdi	2	two way-divided	2 lane
samrkha chokdi-samrkha	3	two way-divided	2 lane
samrkha-bhalej	5.8	two way-undivided	single lane
vadtal-bakrol gate	2.7	two way-undivided	single lane
bakrol gate-bhaikaka	7.5	two way-undivided	single lane
bhaikaka-janta chokdi	2	two way-divided	single lane
borsad chokdi-hadgood	3.2	two way-undivided	single lane
hadgoo-vadod	3.8	two way-undivided	single lane
vadod-adas	6.9	two way-undivided	single lane

Table : 2 Traffic volume count

link name	distance(KM)	TIME(min)		DELAY(sec)		OVERTAKEN		OVERTAKING		OPPOSITE DIRECTION		FLOW(PCU/hour		speed	
		AB	BA	AB	BA	AB	BA	AB	BA	AB	BA	AB	BA	AB	BA
ravipura-karmsad	5.5	8.18	7.87	1.33	3.1	6.6	7.03	4.85	4.15	119.3	128.46	439	469	40	41
karmsad-jata chokdi	3.7	5.56	4.29	5.5	0	5.21	6.26	1.85	3.23	82.16	93.91	480	553	39	51
janta chokdi-amin auto	2	3.96	3.31	8.33	0	4.9	3.7	4.02	0.55	125.46	123.15	1028	990	30	36
amin auto-borsad chokdi	1	2.71	3.21	2	3.1	3.13	3.95	1.21	5.02	51.76	59.88	505	617	22	18
borsad-chikodra chokdi	3.6	7.41	7.77	4.16	4	7.36	8.45	1.62	0	264.7	223.38	1023	849	29	27
chikodra -bedva	5.6	8.67	8.96	0.5	0.33	6.18	3.75	0.5	0.3	87.68	78.9	279	256	38	37
bedva-sarsa	5.6	5.45	5.45	0.33	1	3.85	2.91	0.25	0.25	45.3	38.38	229	196	61	61
bhumel-boriyavi	3.7	4.08	4.14	0	0	3.05	4.13	9.32	13.05	68.35	67.5	544	557	54	53
boriyavi-samarkha chokdi	4.4	5.64	6.12	0.33	0.5	3.2	5.11	8.32	12.42	80.65	87.13	437	481	46	43
samrkha chokdi -chikodra chokc	3.2	4.54	4.51	1.22	0.16	5.11	6.03	2.65	6.3	82.88	65.93	533	438	42	42
chikodra chokdi-mogar	5	6.31	6.16	0	0	5.01	4.05	14.05	12.57	88.53	87.63	469	462	47	48
mogar-adas	4.7	6.24	5.91	0	0	4.46	4	7.35	3	64.03	90.2	330	440	45	47
adas-vasad	3.6	5.35	5.33	2	0	3.45	4.35	9.5	7.17	73.56	71.76	447	418	40	40
bumel-lambhvel	5	4.53	5	0	7.5	5.31	3.73	0.62	2.135	107.56	99.28	647	615	66	60
lambhvel-indra statue	2.9	4.6	4.85	0	2	2.61	4.51	3.15	2.8	102.66	94.11	655	586	37	35
indra statue-town hall	0.8	2.27	2.57	0.07	0.66	3.93	3.43	2.22	2.32	81.75	97.35	992	1193	21	18
town hall-borsad chokdi	1.5	2.56	2.28	2	0.5	6.26	5.5	4.4	3.77	88.58	106.65	1078	1300	35	39
indra statue-bhalej bridge	1.4	3.07	2.91	0.5	0.66	6.41	7.06	1.3	2.17	73.66	69.61	687	649	27	28
bhalej bridge-samrkha chokdi	2	2.91	2.66	2	0.33	6.9	6.2	1.92	1.55	109.98	116.93	1131	1209	41	45
samrkha chokdi-samrkha	3	3.94	3.4	8.33	1	6.13	4.33	3.37	2.05	93.75	62.41	743	491	45	52
samrkha-bhalej	5.8	8.14	8.3	0.3	4	5.88	5.06	4.25	7.55	120.65	102.5	434	383	42	41
vadtal-bakrol gate	2.7	9.24	9.21	0	0	9.03	10	4.1	2.25	121.3	152.98	378	472	17	17
bakrol gate-bhaikaka	7.5	3.55	2.55	8	0	5.01	5.38	2.77	2.17	104.63	67.95	1007	636	30	35
bhaikaka-janta chokdi	2	4.37	3.12	45	0	6.31	8.15	1.55	2.05	53.18	55.38	387	394	27	38
borsad chokdi-hadgood	3.2	5.61	6.26	0	3	0	0	0.55	0.25	14.46	9.05	75	47	34	30
hadgoo-vadod	3.8	5.26	7.9	0	24	0	0.25	2.7	0	4.35	4.91	32	21	43	28
vadod-adas	6.9	20	16	180	120	0	0	1.1	1.7	2.91	0.13	6	3	20	25

The conversion of production and attraction to origins and destinations is based on an estimation of when the P-A trip depart and return. In a translation from a 24-hour P-A matrix to 24 hours O-D matrix

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Table : 3 estimate OD matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	48.72	0.34	0.67	0.34	0.02	0.17	2.52	0.34	0.50	0.02	7.39	0.02	0.02	0.02	0.02	0.02
2	0.34	9.07	0.17	0.17	0.02	0.02	3.02	0.34	0.50	0.17	15.79	0.02	0.02	0.02	0.02	0.02
3	0.67	0.17	9.74	0.02	0.02	0.01	2.02	0.02	0.02	0.00	7.22	0.02	0.02	0.02	0.02	0.02
4	0.34	0.17	0.02	18.14	1.18	0.34	24.86	0.17	12.60	0.02	18.48	0.02	0.02	0.02	0.02	0.02
5	0.02	0.02	0.02	1.18	36.29	0.17	3.67	0.02	0.67	0.02	3.70	0.02	0.02	0.02	0.02	0.02
6	0.17	0.02	0.00	0.34	0.17	10.75	4.03	0.02	4.03	0.02	3.86	0.34	0.84	0.02	0.02	0.02
7	2.52	3.02	2.02	24.86	0.55	4.03	53.42	4.87	31.75	4.20	42.50	5.71	3.86	4.37	1.18	4.54
8	0.34	0.34	0.02	0.17	0.02	0.02	4.87	2.35	1.51	0.34	9.91	0.02	0.02	0.02	0.02	0.02
9	0.50	0.50	0.02	12.60	0.67	4.03	31.75	1.51	108.02	11.73	33.10	1.68	4.03	0.67	1.68	1.68
10	0.02	0.17	0.01	0.02	0.02	0.02	4.20	0.34	1.71	115.92	10.12	0.02	0.02	0.02	0.02	0.02
11	7.39	15.79	7.22	18.48	3.70	3.86	42.50	9.91	33.10	1.49	230.66	2.02	3.36	1.01	0.84	1.51
12	0.02	0.02	0.02	0.02	0.02	0.34	5.71	0.02	1.68	0.02	2.02	18.82	0.02	0.02	0.02	0.02
13	0.02	0.02	0.02	0.02	0.02	0.84	3.86	0.02	4.03	0.02	3.36	0.02	18.82	0.17	0.02	0.02
14	0.02	0.02	0.02	0.02	0.02	0.02	4.37	0.02	0.67	0.02	1.01	0.02	0.17	5.71	0.02	0.02
15	0.02	0.02	0.02	0.02	0.02	0.02	1.18	0.02	1.68	0.02	0.84	0.02	0.02	0.02	2.69	0.34
16	0.02	0.02	0.02	0.02	0.02	0.02	4.54	0.02	1.68	0.02	1.51	0.02	0.02	0.02	0.34	16.80
17	0.00	0.02	0.02	0.84	0.34	0.02	10.58	0.17	10.75	0.02	5.54	0.02	0.02	0.02	1.01	0.01
18	0.34	0.17	0.01	0.67	0.01	0.17	1.01	0.34	2.18	0.34	6.55	0.02	0.02	0.02	0.02	0.02
19	0.02	0.02	0.02	0.02	0.02	0.02	0.50	0.00	0.02	0.17	7.06	0.02	0.02	0.02	0.01	0.17
20	0.02	0.02	0.02	1.01	0.02	0.02	3.02	0.17	2.86	0.02	14.11	0.02	0.02	0.02	0.02	0.02
21	0.02	0.02	0.02	0.01	0.02	0.02	2.52	0.00	0.50	0.02	4.03	0.02	0.02	0.02	0.02	0.02
22	0.02	0.17	0.02	0.02	0.02	0.02	1.85	0.34	0.02	0.84	7.39	0.02	0.02	0.02	0.02	0.02
23	0.02	0.01	0.02	0.02	0.02	0.23	1.47	0.11	0.74	0.14	0.88	0.02	0.02	0.02	0.02	0.74
25	0.02	0.02	0.02	0.02	0.02	0.02	1.01	0.02	0.02	0.16	1.76	0.02	0.02	0.02	0.06	0.06
26	0.02	0.02	0.02	0.34	0.02	0.00	1.91	0.02	2.35	0.17	4.37	0.02	0.02	0.02	0.01	0.01
27	0.17	0.34	0.17	0.02	0.02	0.02	1.01	0.02	0.50	0.02	7.90	0.02	0.02	0.02	0.02	0.02
28	0.02	0.02	0.02	0.02	0.02	0.02	3.04	0.17	1.68	0.02	0.84	0.02	0.02	0.02	0.02	0.02
29	0.02	0.02	0.02	0.02	0.02	0.02	2.04	0.02	0.50	0.02	6.89	0.02	0.30	0.02	0.02	0.02
30	0.02	0.02	0.02	0.02	0.02	0.02	0.38	0.34	2.35	0.02	1.34	0.02	0.02	0.02	0.02	0.02
31	0.02	0.02	0.02	0.02	0.02	0.02	2.51	0.02	0.02	0.02	1.01	0.02	0.02	0.02	0.02	0.02
33	0.02	0.02	0.02	0.02	0.02	0.02	202.55	0.02	0.17	0.02	0.34	0.02	0.02	0.02	0.02	0.02
Sum	61.81	30.56	20.39	79.43	43.29	25.24	431.94	21.68	228.82	135.97	461.49	29.00	31.78	12.36	8.18	26.21

	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31	33	Sum
1	0.02	0.01	0.34	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.17	0.02	0.02	0.02	0.02	0.02	61.82
2	0.02	0.02	0.17	0.02	0.02	0.02	0.17	0.00	0.02	0.02	0.34	0.02	0.02	0.02	0.02	0.02	30.54
3	0.02	0.02	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.17	0.02	0.02	0.02	0.02	0.02	20.38
4	0.02	0.84	0.67	0.02	1.01	0.00	0.02	0.02	0.02	0.34	0.02	0.02	0.02	0.02	0.02	0.02	79.42
5	0.02	0.34	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	46.39
6	0.02	0.02	0.17	0.02	0.02	0.02	0.02	1.47	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	26.48
7	4.54	10.58	1.01	0.50	3.02	2.52	1.85	0.23	1.01	0.28	2.01	1.16	3.17	1.63	0.51	29.46	252.36
8	0.02	0.17	0.34	0.01	0.17	0.01	0.34	0.73	0.02	0.02	0.02	0.17	0.02	0.34	0.02	0.02	22.33
9	1.68	10.75	2.18	0.02	2.86	0.50	0.02	0.12	0.02	2.35	0.50	1.68	0.50	2.35	0.02	0.17	238.23
10	0.02	0.02	0.34	0.17	0.02	0.02	0.84	0.88	1.03	0.17	0.15	0.02	0.02	0.02	0.02	0.02	136.32
11	1.51	5.54	6.55	7.06	14.11	4.03	7.39	0.13	0.26	4.37	7.90	0.84	6.89	1.34	1.01	0.34	450.60
12	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	29.00
13	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.07	0.02	0.02	0.02	31.56
14	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	12.36
15	0.34	1.01	0.02	0.00	0.02	0.02	0.02	0.02	0.30	0.00	0.02	0.02	0.02	0.02	0.02	0.02	8.40
16	16.80	0.00	0.02	0.17	0.02	0.02	0.02	0.12	0.30	0.00	0.02	0.02	0.02	0.02	0.02	0.02	25.81
17	0.01	11.09	0.02	0.02	0.02	0.02	0.02	0.01	0.06	0.02	0.02	0.02	0.04	0.15	0.02	0.02	40.88
18	0.02	0.02	14.45	0.02	0.17	0.02	0.34	0.02	0.06	0.34	0.50	0.02	1.68	0.02	0.02	0.02	29.54
19	0.17	0.02	0.02	10.42	0.02	0.02	1.01	0.02	0.02	0.02	0.17	0.17	0.02	0.02	0.02	0.02	20.03
20	0.02	0.02	0.17	0.02	14.95	0.02	0.02	0.50	0.00	0.30	0.06	0.00	0.02	0.50	0.02	0.02	37.96
21	0.02	0.02	0.02	0.02	0.02	1.68	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	9.17
22	0.02	0.02	0.34	1.01	0.02	0.02	20.83	0.02	0.02	3.02	2.69	0.17	0.02	0.30	0.17	0.02	39.41
23	0.74	0.00	0.02	0.02	0.50	0.02	0.02	17.47	0.15	1.01	0.02	0.02	0.50	0.17	0.02	0.02	24.39
25	0.06	0.30	0.30	0.02	0.01	0.02	0.02	0.04	8.74	0.01	0.02	0.02	0.01	0.17	0.02	0.02	12.92
26	0.01	0.02	0.34	0.02	0.06	0.02	3.02	1.01	0.00	17.81	0.08	0.17	0.16	0.88	0.02	0.02	32.90
27	0.02	0.02	0.50	0.17	0.30	0.02	2.69	0.02	0.02	0.44	23.52	0.34	0.19	0.84	0.17	0.17	39.64
28	0.02	0.02	0.02	0.17	0.01	0.02	0.17	0.02	0.02	0.17	0.34	14.45	0.70	2.79	0.02	0.02	24.84
29	0.02	0.15	1.68	0.02	0.02	0.02	0.02	0.50	0.00	0.88	0.31	2.83	14.11	0.84	0.02	0.02	31.35
30	0.02	0.04	0.02	0.02	0.50	0.02	0.06	0.17	0.17	0.14	0.84	0.42	0.84	24.53	0.02	0.02	32.40
31	0.02	0.02	0.02	0.02	0.02	0.02	0.17	0.02	0.02	0.02	0.17	0.02	0.02	0.02	8.40	0.17	12.85
33	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.17	0.02	0.02	0.02	0.17	10.75	214.56
Sum	26.21	41.10	29.75	20.03	37.98	9.17	39.17	23.66	12.36	31.86	40.29	22.71	29.17	37.12	10.84	41.47	2074.83

D. Traffic Assignment

The traffic volume counts, travel time and seed matrix used for traffic assignment. TransCAD software has produced thematic map as shown in fig.4. The different methods produced result as given in Table

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Fig.4 Traffic Assignment

Table 4 Comparision f result by using different assignment method

METHOD	LINK FIELD	RESULTS	TOTAL V-TIME	TOTAL V-DIST	RUNNING TIME (sec)
All-or-Nothing	Travel time	-	15977.21	273502.29	175
Incremental	Travel time Capacity Alpha beta	-	16523.64	273454.26	266
Capacity restrained	Travel time Capacity Alpha beta	Relative Gap=0 RMSE = 0 % RMSE = 0 Max.Flow change= 0	16520.73	273436.32	171
User equilibrium	Travel time Capacity Alpha beta	Relative Gap=0 RMSE = 0.53 % RMSE = 3.48 Max.Flow change= 3.09	16523.04	273437.49	235
Stochastic user equilibrium	Travel time Capacity Alpha beta	Relative Gap= RMSE = 0 % RMSE = 0 Max.Flow change = 0	16523.06	273456.92	219
System optimum	Travel time Capacity Alpha beta	Relative Gap= 0 RMSE = 0.58 % RMSE = 3.84 Max.Flow change =3.41	16523.04	273435.13	219

E. Conclusion

The traffic assignment methods for small network gives similar result as in table .The RMSE values shows that the user equilibrium and system optimum are good for assignment.

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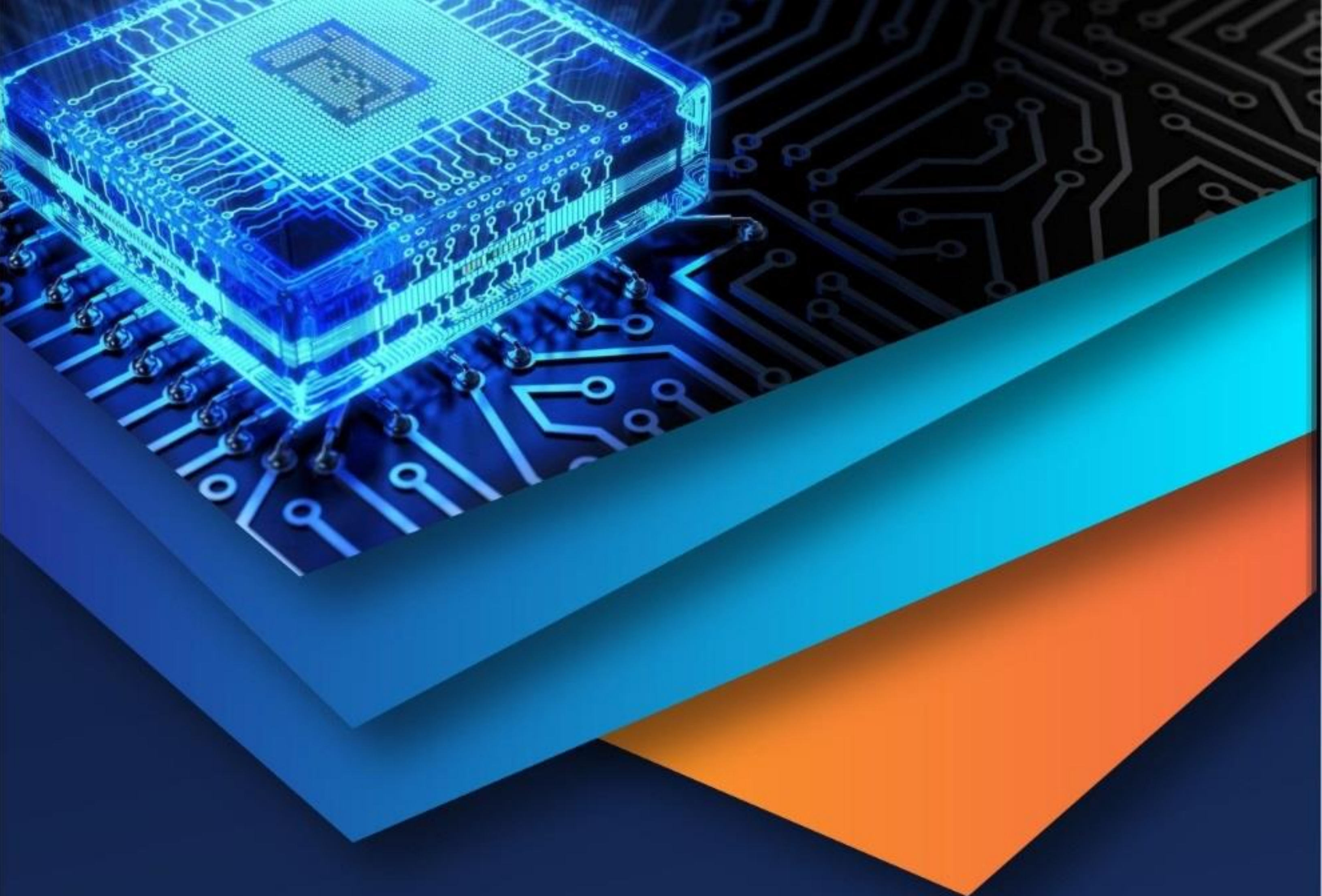

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