Design of Non Accidental Lane

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Abstract: - Design of Non Accidental Lane (DNAL) presents a new optimal lane analysis as a guide for designing of non accidental lane to serve better utilization of lane. The accident factors adjust the base model estimates for individual geometric design element dimensions and for traffic control features. The Design of Non Accidental Lane (DNAL) analysis technique is applied to the proposed design and speed optimization plan. Design of Non Accidental Lane can robustly manage and operations on lane for avoiding accident. Therefore how to increase the Speed optimization with non accidental zone of the Lane is widely concerting issue. There has been a limited research effort on the optimization of the DNAL systems.

Key-Words: - DNAL, Lane, Buffer, Traffic, Geometric, System.

1 Introduction

The challenges of the non accidental lane design system are to move traffic safely and efficiently. Although highways and motor vehicles are designed to operate safely at speed. The purpose of our investigation was to create predictive models for different types of accidents on lane, based on infrastructural design and traffic intensity. In this paper, the results for all injury accidents and fatal accidents are discussed.

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1.1 The first investigation was the identification of different zones on the lane. Three major zones on the lane were defined:

a) Cross zones.
b) Entry zones and
c) Exit zones.

1.2 Many traditional Non accidental algorithms for lane were designed to optimize deterministic problems and therefore they cannot tackle the inherent randomness in the traffic systems.

1.3 The solutions suggested by the traditional Non accidental algorithms for lane cannot answer such questions as “how robust is the optimal solution to avoid accident?” or “How much probability will the optimal solution fail if something unexpected occurs?”.

The purpose of this article is to address these three issues by introducing the showing approximation technique into the optimal DNAL design. We structure this paper into 2 parts:

a) in the first part, we analyze the major issues residing in the latest practice of the accidental lane.

b) in the last part, we discuss the possible applications of this new technique with probabilistic study and new algorithm.

2 Previous Work

This paper proposed by Jake Kononov, Barbara Bailey, and Bryan K. Allery, first explores the relationship between safety and congision and then examines the relationship between safety and the number of lanes on urban freeways. The relationship between safety and congision on urban freeways was explored with the use of safety performance functiuons [SPF] calibrated for multilane freeways in Colorado, California,Texas. The Focus of most SPF modeling efforts to date has been on the statistical technique and the underlying probability distributions.The modeling process was informed by the cosideration of the traffic operations parameters described by the Highway Capasity Manual. [1]

H Ludvigsen, Danish Road Directorate, DK; J Mertner, COWI A/S, DK , 2006, published, Differentiated speed limits allowing higher speed at certain road sections whilst maintaining the safety standards are presently being applied in Denmark. The typical odds that higher speed limits will increase the number of accidents must thus be beaten by the project. The Danish Road Directorate has been asked by the Ministry of Energy and Transport based on a request from parliamentarians to suggest an approach to assess the potential for introduction of differentiated speed limits on the Danish state road network.

A pilot project was carried in late 2006 and the entire state network will be assessed during the first half of 2007 - first of all to identify where speed limits may be raised.

The paper will present the methodology and findings of a project carried out by the Danish Road Direc-torate and COWI aimed at identifying potential sections where the speed limit could be increased from 80 km/h to 90 km/h without jeopardising road safety and where only minor and cheaper measures are necessary. Thus it will be described how to systematically assess the road network when the speed limit is to be increased. [2]

In the Operation and Safety of Right-Turn Lane Designs’s objectives of this research by the Texas Department of Transportation were to determine the variables that affect the speeds of free-flow turning vehicles in an exclusive right-turn lane and explore the safety experience of different right-turn lane designs. The evaluations found that the variables affecting the turning speed at an exclusive right-turn lane include type of channelization present (either lane line or raised island), lane length, and corner radius. Variables that affect the turning speed at an exclusive right-turn lane with island design include : (a) radius, lane length, and island size at the beginning of the turn and (b) corner radius, lane length, and turning-roadway width near the middle of the turn. Researchers for a Georgia study concluded that treatments that had the highest number of crashes were right-turn lanes with raised islands. This type of intersection had the second highest number of crashes of the treatments evaluated in Texas. In both studies, the “shared through with right lane combination” had the lowest number of crashes. These findings need to be verified through use of a larger, more comprehensive study that includes right-turning volume. [3]

C.J. Messer and D.B. Fambro, 1977, presents a new critical lane analysis as a guide for designing signalized intersections to serve rush-hour traffic demands. Physical design and signalization alternatives are identified, and methods for evaluation are provided. The procedures used to convert traffic volume data for the design year into equivalent turning movement volumes are described, and all volumes are then converted into equivalent through-automobile volumes. The critical lane analysis technique is applied to the proposed design and signalization plan. The resulting sum of critical lane volumes is then checked against established maximum values for each level of service (A, B, C, D, E) to determine the acceptability of the design. We provide quidelines, a sample problem, and operation performance characteristics to assist the engineer in determining satisfactory design alternatives for an intersection.[4]

3 Our Work

Design of Non Accidental Lane (DNAL) – finding methods in other literature are a family of optimization algorithms which incorporate level of traffic services in the algorithms. There are two major issues, in the first part, we analyze the major issues residing in the latest practice of the accidental lane; in the last part, and we discuss the possible applications of this new technique with probabilistic study and new algorithm.

Let A = {a1,a2, ……….,an}, B = {b1,b2, ……..,bn}, C = {c1,c2, …….., cn} be three mutually exclusive set, The 3 x N points are to be disbursed in two or more lane, such that the following : --

i) That every element ai, bi, ci, 1<= i <= N where ai, bi, ci belongs to three set A, B, C the property speed/cost/efficiency or symbolic value say Va(ai) > Va(aj) where i>=j.,

ii) This technique is applicable for all nodes and all lanes. 1<=j<=i<=N.

iii) In this work, used B(i) for all lane as buffer, which contain node and used for garbage collection; means if any node value like ai,bi or ci value is <=0 then this node collect by B (i) buffer for avoiding accident.

iv) The speed/cost/efficiency or symbolic value is given on the basis of probability that a(2|3) lane of n nodes having r nodes at any given time, p is the probability of accident and q=1-p, ${}^{n}c_{r}\, p^{r}\, q^{n-r}$.

4 Algorithm

Step1: Insert time_interval

Step 2: Repeat step 3 to 7 for time_interval>0

Step 3: Insert a node say ai,bi,ci 1<=i<=N.

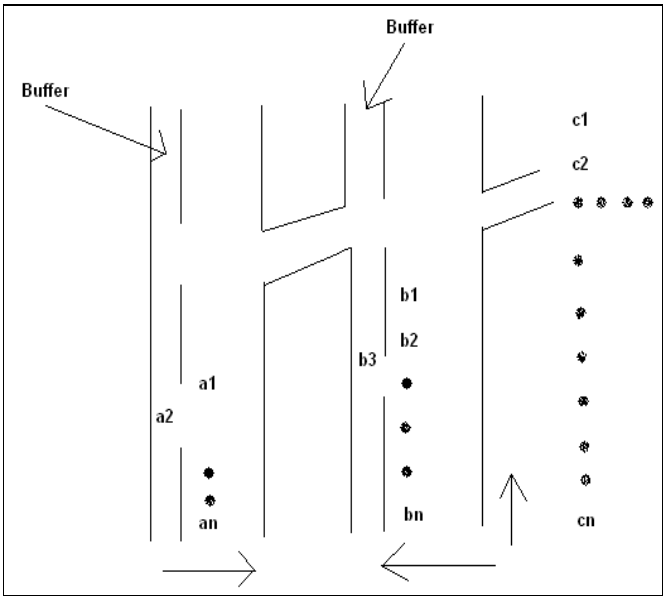

Fig. 1. Vertical lanes that are unidirectional and with the property of the three lane with buffering system.

Step 3.1: if Va(ai) =0 then

PUSH_BUFFER(Transition1,i).

Record accident position.

Increment count of accident by 1.

Step 3.2: if Vb(bi) =0 then

PUSH_BUFFER(Transition2,i).

Record accident position.

Increment count of accident by 1.

Step 3.3: if Vc(ci) =0 then

PUSH_BUFFER(Transition3,i).

Record accident position.

Increment count of accident by 1.

Step 4: Repeat step 3 to step 5

for j=1, 2, 3 ……N.

Step 4.1: if Va(aj) =0 then

PUSH_BUFFER(Transition1,j).

Record accident position.

Increment count of accident by 1.

Step 4.2: if Vb(bj) =0 then

PUSH_BUFFER(Transition2,j).

Record accident position.

Increment count of accident by 1.

Step 4.3: if Vc(cj) =0 then

PUSH_BUFFER(Transition3,j).

Record accident position.

Increment count of accident by 1.

Step 5: if Va(ai) < Va(aj) then

Step 5.1 if Va(aj) < Vb(bi) then

5.1.1 if Va(aj) < Vc(ci) then

PUSH(Tansition1,aj);

Endif

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            Endif

        Endif

Step 6: if Vb(bj) > Vb(bi) then

        6.1 if Vb(bj) > Vc(ci) then

            PUSH(Transition2,bj);

          Else

            If Vb(bj) > Va(ai) then

                PUSH(Transition1,bj);

              Endif

            Endif

        Endif

Siep 7: if  Vc(cj) > Vc(ci) then

        7.1 if Vc(cj) > Vb(bi) then

            PUSH(Transition2,cj);

          Else

            7.1.1 if Vc(cj) > Va(ai) then

                    PUSH(Transition1,cj);

                    Endif

                Endif

            Endif

[End of Loop]

[End of Loop]

[End of Loop]

Step 8: Show statistics of accident points and number of
accidents in 3 lanes.

Step 9: Exit
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5 Result

Our work aimed to design "Design of Non Accidental Lane" in an open unplanned area, so as to increase traffic movement in rush hours and to minimize accident using the concept of Cross Over between adjacent Lanes and also implementing buffering system on each lane.
Fig. 1, States three vertical lanes that are unidirectional, and A = {a1,a2,……,an}, B = {b1,b2,…….bn}, C = {c1,c2,….,cn}, with the property of the three lanes. B [i] used for buffering management over each set A,B and C. Here we assume that each and every lane's car speed not less then 30 kmph. If any car's speed less then 30 kmph then we assume that there may be problem. This is why we explicitly push into Buffer which exist in every lane.
The randoms distribution of entities in an open area to lanes is taken care as far as possible.

Analysis:

- The above algorithm is a 3 lane design with 3 buffer implemented on open unplanned area.
- The objective will follow linear queue as long as speed/value/cost of proceeding to greater than the immediate next.
- Transition/Cross over are used and they again follow appropriate data structure in order to maintain the preceding step rule.
- Here we assume the lanes are narrow enough to limit the bidirectional approach.
- Here we maintain optimize speed for each lane.
- Here we also maintain a buffer transition (three in number) if speed/value/cost of a car is found zero to maintain the normal movement and transition in all the three lanes.
- Accident/Break down is recorded with their position and number and it follows appropriate data structure in order to maintain the buffer storage rule.

Graphical View of Accident in Lane is shown in Fig. 2.

6 Conclusion

The main limitation of the approach is that vertical Bi-Directional movements are not taken care off. Our future effort will certainly be on that direction. In future we maintain both side buffering system for an internal lane.
Here in this work, we have tried to optimize the speed of the vechicles, in a secured collision manner.

7 Acknowledgement

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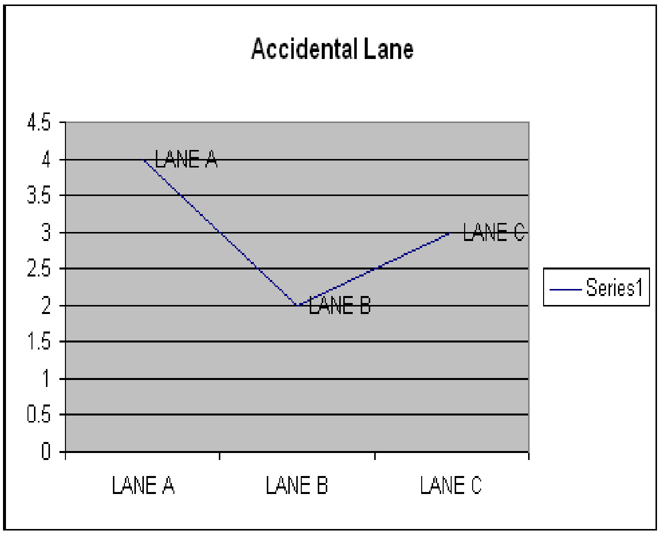

Fig. 2. In the above graphical chart describe, each lane with accidental point, which assume with time and number of car of each lane.

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