COMPARISON OF METHODS FOR DETERMINING CRASH HOTSPOTS IN THE ROAD TRAFFIC

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Abstract: *Hotspot represent the location of the road which is considered high risk and the probability of traffic accidents in relation to the level of risk in the surrounding areas. Determination of hotspot on the road is determined on the basis of registered safety indicators (number of traffic accidents, the number of deaths, and the number of harder and easier injured people on individual sections of the road). Methodology for identifying hotspot has not been agreed on a global level yet; respectively the principles and techniques for determination of the hotspot are not standardized so the approaches used vary from country to country. Methodologies range from simple marking of places with a large number of traffic accidents to more sophisticated techniques in which evaluation of the expected number of accidents is assessed and the potential for improving safety is determined. To determine the hotspot three basic types of data on traffic accidents are essential such as: the number and severity of accidents (accidents with casualties, heavier and slightly injured), road type (highway, intersection), the time period. In addition to the general analysis of the road traffic safety (extent of the problem of traffic accidents and their consequences, the development trends of occurrence, temporal and spatial distribution of traffic accidents, the circumstances of occurrence of the accident) for each individual road route (per sections) the risks of accidents and casualties in traffic are calculated (collective and individual risk of casualties, collective and individual risk of death, the collective and individual risk of killed and severely injured, collective and individual risk of accidents corrected by their consequences). Based on the obtained results the spatial unevenness in the risk of accidents and casualties on sections which are represented on the unique maps are determined - maps of risk which then indicate the safety performance of roads.*

Detailed analysis and continuous monitoring of the spatial distribution of traffic accidents and casualties of people allows us to more effectively plan and implement measures and activities aimed to their prevention.

Keywords: HOTSPOT, ROAD SAFETY, TRAFFIC ACCIDENTS

1. Introduction

A precondition for the management of road traffic safety is the systematic collection of data on traffic accidents that will enable the identification and determination of the place where there are high concentrations of road accidents. Determination of hotspots is the first step to improve the level of traffic safety on the roads. Interventions in places of accumulation of traffic accidents are considered one of the most effective approaches in prevention of traffic accidents on roads. Among the most important phases of managing risk places and security of the road network, except for analysis and treatment, the identification of hotspots is extracted - covering a range of procedures for the disclosure of such places in the road network. Considering the literature a number of attempts to find and define the most effective methods that would enable the measurement of individual sections of road safety and to determine the most endangered and dangerous places, or hotspots in traffic on the roads was observed. Despite enormous efforts, the principles and techniques for the hotspots are still not fully standardized and the approaches used vary from country to country. Methodologies range from simple marking of a place with large number of traffic accidents to more sophisticated techniques in which evaluation of expected number of accidents is being made as well determination of the potential for improving safety. All this indicates that there is indeed a wide range to determine hotspots on the roads in terms of methodology.

2. The significance and problems of determining the hotspots

When analyzing the available literature, Elvik [2] analyzed in one of his works the several techniques to identify hotspots: (1) the number of traffic accidents in the analyzed period, (2) the rate of accidents (number of accidents per million vehicles km.), (3) the combined number of accidents and accident rates above average, and (4) the expected number of accidents on the particular places. Pei Y. and J. Ding [8] emphasize the six methods to identify hotspots that are commonly used: (1) the frequency of accidents method, (2) method of accident rates, (3) the matrix method, (4) method of the total equivalent number of accidents, (5) method of quality control and (6) method of critical rates. The optimal path for expert identification of parts of the road network on which it should operate from the standpoint of traffic safety should be founded on the basis of identification and analysis of dangerous places, or hotspots. When choosing the method for determining the hotspots, use of international experience and practice is necessary, but it is needed to bear in mind the specific conditions in which it is done, especially regarding the manner and consistency of recording of accidents and their consequences. In the process of identification of dangerous areas, or hotspots several criteria should be taken into account:

2.1. Observation period

An important parameter for making reliable identification of road section which has a statistically significant level of accidents is to determine the period within which the analysis is carried out. In any attempt of identification the following should be considered:

- The analysis period should be long enough to determine the factors of accidents. Assumption is that in most cases a period of 3-5 years guarantees a reliability of the analysis.
- The places where a sudden change in the rates of accidents occurred, analysis of the short time period of one year or less is useful, in order to determine the specific causes and mechanisms that cause traffic accidents,
- To avoid the inconsistency caused by seasonal changes, it is important that the observation is made few years in a row,
- After four or five years of delay, the data on accidents and / or maintenance may not represent actual road conditions and traffic or the development of close activities and user behavior. Therefore, if possible, it is important to use the two periods of analysis. The first period lasts three to five years, ensuring the reliability of the sample, and the second period lasts one year, which will allow detection of changes in the number of accidents caused due to new factors.

2.2. Technical identification

Once all relevant data on traffic and accidents are collected, it is necessary to conduct the following technical identification methods:

- Risk rates of accidents must be based on the calculation of mean for networks with similar characteristics,
- Mean of the risk of accidents must be calculated for each interval of the average daily traffic, which represents the different categories of traffic,
- Difference between different categories of roads (road reserved for motor traffic, roads with restricted access, roads with one lane, etc.), between different types of areas (urban areas, rural areas, etc.) and between the other road sections and intersections should be able to be done.

3. Determination of hotspots on roads

The research resulted in the creation of two general databases for determination of hotspots on the roads, both objective and subjective. The objective one is based on data obtained from a database of traffic accidents accompanied by features that define their weight i.e. number of deaths, the number of serious and slightly injured people in some sections of the road. Subjective one is based on surveys and interviews of competent professionals who implement the design, construction, maintenance and supervision of roads, and is complemented with the information collected on the spot.

3.1. Objective method of determination of hotspots

In addition to the general analysis of road traffic safety for each individual road route (per section) the risks of accidents and casualties in traffic are being calculated (collective and individual risk of suffering, collective and individual risk of death, the collective and individual risk of fatalities and severe injuries, collective and individual risk of accidents corrected by their consequences). Based on the obtained results the spatial unevenness in the risk of accidents and casualties on sections is being determined which are presented on the unique maps - maps of risk which then indicate the safety performance of roads, or the risk of death and injury on the tested road sections.

In the process of identifying hotspots the following, generally accepted professional, indicators are used:

• ***Collective risk of traffic accidents and their consequences (KR),*** which represents the density or the total number of accidents and casualties per kilometer of road. This indicator does not take into account the different volume-loading.

• ***Individual risk (IR)*** represents the number of accidents and casualties in relation to the number of vehicles on the observed kilometer at a given location. With increasing of volume / traffic volume the individual risk decreases which is then the lowest on the roads with the highest importance i.e. on the roads with the highest traffic volume.

By researching the foreign literature as new insights and definitions of basic concepts and forms that will be used to determine hotspots on the roads are perceived as follows:

3.1.1. Corrected collective risk of traffic accidents - KRPN (corrected by accident intensity)

According to some authors, while determining and defining the hotspots only data on accidents with fatalities are used, while some also include an accident with injuries. General speaking, into account should be taken the accidents with material damage and with detailed analysis of specific conditions should be checked whether the site has the conditions for the accident involving injuries. In order to correctly take into account all legitimate reasons to highlight the dangers on the road sections, most correctly would be to take into account all traffic accidents, but to take into account the significant differences in the consequences of accidents with fatalities, injuries and material damage, the weighting procedure of accidents is chosen in order to reduce all accidents on the accidents with material damage. It is accepted that one accident with fatalities, on average, is 150 times heavier than an accident with material damage, and that the accident with serious injuries is about 20 times heavier than the accident with material damage. Weighted number of traffic accidents (PBPN) is calculated by following equation:

$$PBPN = (n_1 \bullet 1 + n_2 \bullet 20 + n_3 \bullet 150) \qquad (1)$$

n_1- number of traffic accidents with material damage, n_2- number of traffic accidents with injuries, n_3-number of traffic accidents with fatalities.

However, there are sections that recorded a higher number of deaths among the total injured. In order to take into account the increased number of deaths, the weighted number of traffic accidents is corrected to get some greater values if the observed section reported a higher number of deaths among the injured persons and all that according to the equation:

$$PBPN = (n_1 \bullet 1 + n_2 \bullet 20 + n_3 \bullet 150) \bullet \left(\frac{POG}{(LO + TO + POG)} \right) \qquad (2)$$

POG - number of deaths in traffic accidents, TO - number of severely injured in traffic accidents, LO – number of easily injured in traffic accidents. Putting the ratio of the weighted number of traffic accidents corrected by their intensity and length of the section, the value of the corrected collective risk of accidents (KRPN) is obtained according to the equation:

$$KRPN = \frac{\sum_{i=1}^{G} PBPN}{G \bullet L} \bullet \left(\frac{accidents}{km\ per\ year} \right) \qquad (3)$$

G- number of years (period in which analysis is done), L- length of the observed road section.

3.1.2. Corrected individual risk of traffic accidents – IRPN (corrected by accident intensity)

According to the fact that when calculating the individual risk, the number of vehicles by observed kilometer is taken into account compared with the weighted number of traffic accidents corrected by their intensity and number of vehicles on the kilometer of road section. By that the value of the corrected individual risk of traffic accidents (IRPN) is obtained according to the equation:

$$IRPN = \frac{\sum_{i=1}^{G} PBPN}{L \bullet 365 \bullet \sum_{i=1}^{r} PGDP} \bullet 10^6 \left(\frac{accidents}{mil \bullet vehicle \bullet km} \right) \qquad (4)$$

PGDP – average annual daily traffic that is calculated according to the following equation:

$$PGDP = \frac{vehicle\ per\ year}{365\, days} [vehicle / day] \qquad (5)$$

3.1.3. Collective risk of suffering – KRS (corrected by consequences intensity)

The costs of traffic accidents depend on the severity of injuries that the participants in road accidents suffer. Therefore, instead of the simple sum of the number of victims, their number should be weighted by intensity of consequences. The weights are determined on the basis of overall social consequences that each kind of suffering brings, and with the goal that all injured reduce to the number of easily injured. So, it is determined that one seriously injured person by all consequences, cost the public as five easily injured, and one dead person costs as 50 easily injured people. Weighted number of casualties (PBN) is calculated by the equation:

$$PBN = 1 \bullet LO + 5 \bullet TO + 50 \bullet POG \qquad (6)$$

Putting in relation the weighted number of casualties and the length of the observed section the value of the collective risk of suffering (DRC) is obtained according to the equation:

$$KRS = \frac{\sum_{i=1}^{G} PBN}{G \bullet L}\left(\frac{injured}{km\ per\ year}\right) \quad (7)$$

3.1.4. Individual risk of suffering – IRS (corrected by consequences intensity)

Putting in relation the weighted number of casualties and number of vehicles by kilometer, the value of individual risk of suffering (IRS) is obtained according to the equation:

$$IRS = \frac{\sum_{i=1}^{G} PBN}{L \bullet 365 \bullet \sum_{i=1}^{G} PGDP} \bullet 10^6 \left(\frac{injured}{mil \bullet vehicle \bullet km}\right) \quad (8)$$

3.1.5. Collective risk of fatalities and severely injured- KRPTO

Putting in relation the number of fatalities and severely injured in traffic accidents and the length of observed section, the value of collective risk of fatalities and severely injured (KRPTO) is obtained according to the equation:

$$KRPTO = \frac{\sum_{i=1}^{G} (POG + TO)}{G \bullet L}\left(\frac{\text{fatalities/sever. inju.}}{km\ per\ year}\right) \quad (9)$$

3.1.6. Individual risk of fatalities and severely injured–IRPTO

Putting in relation the number of fatalities and severely injured in traffic accidents and number of vehicles by kilometer, the value of individual risk of fatalities and severely injured (IRPTO) is obtained according to the equation:

$$IRPTO = \frac{\sum_{i=1}^{G} (POG + TO)}{L \bullet 365 \bullet \sum_{i=1}^{G} PGDP} \bullet 10^6 \left(\frac{\text{fatalities/sever. inju.}}{mil \bullet vehicles \bullet km}\right) \quad (10)$$

3.1.7. Collective risk of fatalities – KRP

Putting in relation the umber of fatalities in traffic accidents and the length of the observed road section, the value of collective risk of fatalities (KRP) is obtained according to the equation:

$$KRP = \frac{\sum_{i=1}^{G} POG}{G \bullet L}\left(\frac{fatalities}{km\ per\ year}\right) \quad (11)$$

3.1.8. Individual risk of fatalities – IRP

Putting in relation the number of fatalities in traffic accidents and the number of vehicles by kilometer, the value of individual risk of fatalities (IRP) is obtained according to the equation:

$$IRP = \frac{\sum_{i=1}^{G} POG}{L \bullet 365 \bullet \sum_{i=1}^{G} PGDP} \bullet 10^6 \left(\frac{fatalities}{mil. \bullet vehicle. \bullet km}\right) \quad (12)$$

The size of individual risks by road routes has a different distribution in relation to the size of the collective risk, so the threat between them differs.

Identified hotspots are classified into three categories, as follows:

a) place with a very high risk for traffic accidents and high levels of consequence intensity
b) place with a very high risk for traffic accidents and low levels of consequence intensity, and
c) place with a low risk for traffic accidents and low levels of consequence intensity.

3.2. Subjective method of determination of hotspots

Subjective method for identifying hotspots is based on expert analysis on managing road traffic, police officers and inspectors. The first step includes interviews with experts by individual countries in order to identify hotspots. The second step is more complex and includes verification of certain road sections that are identified as hotspots by experts of traffic department. The third step involves establishing a database of hotspots on the road network.

4. Methods of determination of hotspots on roads in some countries

As part of a large research project funded by the European Commission a study of current approaches in the identification and regulation of hotspots and analysis of security in some European countries is carried out.

Austria considers as a hotspot on the roads every place that fulfills one of the following criteria:

a) Three or more similar accidents with injuries within three years period and the risk coefficient Rk of at least 0.8.

The value of the risk coefficient is calculated as follows:

$$Rk = \frac{U}{0{,}5 + 7 \bullet 10^{-5} \bullet AADT} \quad (13)$$

U- number of traffic accidents with injuries in three year period, AADT- annual average daily traffic [vehicles/24 hours].

b) Five or more traffic accidents (including ones with only material damage) that are similar during one year period.

Critical value of the risk coefficient by 0.8 will be reached if the following is registered:

- three accidents in three years and PGDP up to 10700 vehicles/24 hours,
- four accidents in three years and PGDP up to 16700 vehicles/24 hours,
- five accidents in three years and PGDP up to 22600 vehicles/24 hours,
- six accidents in three years and PGDP up to 28600 vehicles/24 hours.

Managing the hotspots in road network of Austria is consisted of the following steps:

- statistical analysis of hotspots includes the type of accident, time and road conditions during the accident, participants, and severity of accidents.
- local assessment of hotspots includes a detailed assessment of the environment, the access road, traffic directing, lighting at night, dusk ...)
- proposing the measures based on analysis and local assessment should be reflected by the road network, speed, installation of street lighting, installation of pedestrian pushbuttons, etc..
- measures are implemented in accordance with the possible availability of financial resources,
- after implementation of measures occurrence of traffic accidents is observed to assess the reduction in the number and severity of accidents, if that is not the case then further actions are being taken.

In ***Belgium***, the hotspot means the place where there were registered three or more traffic accidents in observed period of last three years. Each place is considered as dangerous, or as hotspot if its priority value (P) is equal to or greater than 15, which is obtained from the equation:

$$P = X \bullet Y + 3 + 5 \bullet Z \quad (14)$$

X- total number of easily injured, Y- total number of severely injured, Z- total number of fatalities.

Therefore it is considered that the persons who have spent more than 24 hours in the hospital suffered serious injuries and fatal injuries if every victim died within 30 days from the consequences of the accident. For identification the period of three years and the length of location no greater than 100 m are used. The severity of accidents is tried to be taken into consideration in Belgium. So, the place where two traffic accidents with fatal consequences occurred and one with severe injuries receive priority value of 14, while the location where there has been ten accidents with minor injuries receives a value of 10 points.

Denmark determines hotspots on the roads by relying on a detailed classification of road system, the different types of road sections and intersections. In identifying the benefits the test based on Poisson's distribution is used. According to that distribution the number of traffic accidents in some period of time can vary between places, what can be explained by differences in the characteristics of individual locations, and as such is widely accepted as the best model. The minimum number of traffic accidents to consider the location dangerous is four accidents in the period of five years. Ratings of normal number of traffic accidents are obtained by applying the prediction model. Assumption is that the normal number of accidents at one point is estimated through the value of 2.8 (over 5 years), and that five accidents have been registered, which is derived from equation (15). In Poisson's distribution, the probability that at least five accidents will happen, bearing in mind the average number of 2.8, has a value of 0.152, which is derived from the equation (16) and which means that this place can not be classified as dangerous.

$$\lambda = \frac{\sum_{y=x_1}^{x_2} C_y}{365 \bullet 5} = \frac{5}{365 \bullet 5} = 2{,}739 \cong 2{,}8 \quad (15)$$

λ- average number of traffic accidents that happened in the observed time period, x_1, x_2- observed time period, C_y- number of accidents per year.

$$f_{(x)} = \frac{e^{-\lambda} \bullet \lambda^{c_y}}{C_y!} = \frac{e^{-2{,}8} \bullet 2{,}8^4}{4!} \cong 0{,}152 \quad (16)$$

$f_{(x)}$- probability of traffic accidents in determined period of time.

After analyzing traffic accidents the priority is given to safety treatments for the elimination of identified hotspots.

In ***Hungary***, outside the urban area, hotspots are considered those places where at least four traffic accidents are registered during the three years on the road section no longer than 1000 m. Within the urban area, hotspots are considered to be places with at least four traffic accidents registered over three years on the road sections no longer than 100 m. Once hotspots are being identified, further studies are carried out and based on the total results the preventive measures are implemented.

Norway as hotspot considers any road section which length is not greater than 100 m with at least four traffic accidents with injuries registered in the previous five years. In addition, hotspot is any section of road no longer than 1000 m with a minimum of ten traffic accidents with injuries registered in the previous five years. After identifying hotspots, they are ranked according to the assessment of the costs of accidents, the assessment of the expected number of accidents and the cost of accidents For places that are highly ranked, a detailed study that includes a detailed analysis of traffic accidents is conducted, return at the accident site to perform traffic criminal trials to check the circumstances that caused the accident, the observation of users behavior on risky road sections. Based on detailed analysis, measures to improve safety are proposed, the costs are being assessed and effects of already implemented.

In ***Germany***, the hotspots on the roads are set by maps of traffic accidents. It is believed that the hotspot is present, if a large number of traffic accidents happen in a very small part of the road in the road network. In the identification process the period of one or three years is used. If one year is being used, the place is classified as a hotspot, if it is registered with five similar traffic accidents, regardless of intensity (including accidents with only material damage) and the length of the road section does not exceed 100 m. If a period of three years is being used, hotspot means any place which registered five or more accidents with slightly injured, or three or more accidents with seriously injured. Places to act in a preventive-repressive terms are ranked on the simple and complex. Simple hotspots (those on which in one year five accidents of similar type are recorded) were ranked by number of comparable accidents, and complex ones by the density of serious injuries i.e. the number of traffic accidents with serious injuries per kilometer of road per a year.

Portugal defines hotspot as a road section with a maximum length of 200 m with five or more traffic accidents and indicators with severity up to 20 in one year of the analysis. Differences in the characteristics of roads are not included. Severity index is calculated by the weighted sum of (PZ) from the equation:

$$PZ = 100 \bullet SO + 10 \bullet TO + 1 \bullet LO \quad (17)$$

SO- number of fatal injuries, TO- number of severe injuries, LO- number of slightly injured.

Portugal is the only country that partially implements the application of estimating model with the empirical Bayes (EB) approach. According to the empirical Bayes method the best estimation of safety on the observed part of the road network is obtained by combining two sources of data - record number of traffic accidents at a specific location and accident prediction showing how different factors affect on the occurrence of accidents. The best estimation of the expected number of accidents in a certain place is obtained by the equation:

$$E(\lambda / r) = \alpha \bullet \lambda + (1 - \alpha) \bullet r \quad (18)$$

E (λ/r) - expected number of traffic accidents, r– recorded number of traffic accidents, λ- normal, expected number of traffic accidents according to estimation of prediction model, α- weight parameter.

The method which by the plan on road safety for the period 2004-2010 Portugal used, takes into account the different characteristics of road typical in a particular area where hotspots is identified. When it comes to pavements with single lane the length of 250 m is taken into consideration and in the case of pavement with two lanes - 500 m, and the identification is carried out separately for each lane. The road network is divided into classes of roads, according to the number of lanes (one or two), the width of one lane (below or equal to 6.00 m and no greater than 7.00 m, below or equal to 7.75 m, and greater than 7.75 m) and number of lanes in each pavement. A five year period is taken for the observation. This method is based on the following equation:

$$E(\lambda) = \beta_1 \bullet ADT^{\beta_2} \bullet CW^{\beta_3} \bullet e^{(\beta_4 \bullet ADT / 1000)} \quad (19)$$

E(λ)- expected number of traffic accidents in a five year period, ADT- average daily traffic, CW- lane width, β- estimation parameter.

After that the security diagnosis is selected and interventions in order to eliminate hotspots are undertaken.

In ***Switzerland***, as a hotspot on the road is considered every place with the registered number of traffic accidents with considerably greater mean number of traffic accidents in similar places. Similar places are defined by classification system on different types of sections and crosses. In each group the rate of traffic accidents is evaluated. Based on the obtained rates the critical value for the minimum number of registered traffic accidents during the period of two years is defined, so that the place would be classified as dangerous. Ten is the critical number on highways for all traffic accidents, four for accidents with injuries and two for accidents with casualties. On rural roads is a critical value of eight for all accidents, four for accidents with injuries and two for accidents with casualties. At intersections in populated areas is a critical value of ten for all accidents, six for accidents with injuries and two for accidents with casualties. The length of the dangerous places on the roads, except when it comes to crossing, moves between 100 and 500 m, depending on the volume of traffic.

5. Results and discussion

Review and mutual comparison of methodologies for determining hotspots indicates that no country has fully implemented approach in determining hotspots. Applied methods of identification, each within its field of application, are useful in identifying hotspots on the roads and each one has specific strengths and weaknesses. Since the level of service at risky road sections is significantly reduced it is necessary to conduct a thorough analysis which can be done by an objective method that covers a series of indicators that show the degree of risk. The advantage of subjective methods is reflected in very fast results and a simple application, what is acceptable in terms of poor data availability and their quality. The main disadvantages are that the quality of identification depends on the expertise and dedication of the experts interviewed, there are different criteria from person to person and thus all the experts do not recognize the same place equally risky. There is no standard way of determining the intensity of each accident, and there are three different approaches to such identification. One approach gives the critical value to those places where there are a larger number of traffic accidents with serious injuries in relation to the lighter. Another approach applies the weighting of accidents according to their consequences, while the third approach takes into account the estimation of the costs of accidents. These costs vary according to the severity of injuries, and these costs will be higher in places that have a high risk of fatal accidents or seriously injured. The length of time that is used to identify hotspots varies from one to five years, but most commonly is used a period of three years. Longer period gives a better basis for statistical research, which removes the influence of random changes. Since the principles and techniques for determining the hotspots are not completely standardized a question whether some methods in any sense are better than others must be asked. To answer this question it is necessary to first know what means to classify a method as good one. Overgaard Madsen sets out very detailed criteria for identifying hotspots that could describe the method as a good one. It is necessary to control and take into account the random fluctuations in the number of traffic accidents, to determine more factors that influence the level of traffic safety, to take into account the severity of accidents and the effects of local factors related to road design and traffic control. The first criterion suggests that the identification should rely on the expected number of accidents, not on recorded one. In practice this is difficult because the expected number is not observed but estimated. This is provided by an empirical Bayes (EB) method. The second and fourth criteria also suggest the use of EB methods. However, from the prediction model is not realistic to expect taking into assessment the impact of all the factors that influence the number of accidents, such as the factor that explains variations in the number of accidents, the differences in traffic volume, the various characteristics of roads, etc. The third criterion implies that the identification of hotspots should depend on the severity of accidents as well, which assigns a higher risk to those places that have reported fatal and serious injury in relation to the places where the accident with only material damage occurred [7].

6. Conclusion

Identification and management of hotspots has a long tradition in traffic engineering, but it is clear that European countries still do not fully use the same principles to identify hotspots. The aim of this study was to describe the approaches used by some European countries for the identification and management of hotspots, i.e. to carry out a comparison of methods for determining the hotspots in the road traffic. There is no universally accepted definition of hotspots, but generally hotspots represent the location on the road which is attributed as highly risky and with greater probability of traffic accidents in relation to the level of risk in the surrounding areas. Determination of hotspots is the task for improving road safety, as the methodology of identifying hotspots has not yet been harmonized at the global level it is necessary to give greater importance to standardization and improvement of methods for identification in order to realistically determine the locations that cause the appearance of greater risk on the roads.

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