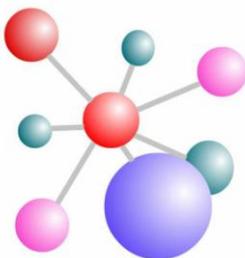


Inglês



Engenharias

Instruções

1	Confira se os dados contidos na parte inferior desta capa estão corretos e, em seguida, assine no espaço reservado para isso. Se, em qualquer outro local deste Caderno, você assinar, rubricar, escrever mensagem, etc., será excluído do Exame.
2	Este Caderno contém 5 questões discursivas referentes à Prova da Língua Estrangeira escolhida pelo candidato. Não destaque nenhuma folha.
3	Se o Caderno estiver incompleto ou contiver imperfeição gráfica que impeça a leitura, solicite imediatamente ao Fiscal que o substitua.
4	Será avaliado apenas o que estiver escrito no espaço reservado para cada resposta, razão por que os rascunhos não serão considerados.
5	Escreva de modo legível, pois dúvida gerada por grafia, sinal ou rasura implicará redução de pontos.
6	Só será permitido o uso de dicionário INGLÊS/INGLÊS.
7	A Comperve recomenda o uso de caneta esferográfica, confeccionada em material transparente, de tinta preta. Em nenhuma hipótese se avaliará resposta escrita com grafite.
8	Utilize para rascunhos, o verso de cada página deste Caderno.
9	Você dispõe de, no máximo, três horas, para responder as 5 questões que constituem a Prova.
10	Antes de retirar-se definitivamente da sala, devolva ao Fiscal este Caderno.

Assinatura do Candidato: _____

As questões de 01 a 05, cujas respostas deverão ser redigidas EM PORTUGUÊS, referem-se ao texto abaixo.

PROPOSING NEW METHODS TO ESTIMATE THE SAFETY LEVEL IN DIFFERENT PARTS OF FREEWAY INTERCHANGES

Hamid Behbahani , Sayyed Mohsen Hosseini, Alireza Taherkhani, Hemin Asadi, and Seyed Alireza Samerei

Since the freeways have always played a significant role in road transportation, determination of the safety level in different segments of the freeways has been one of the main concerns of researchers. Previous investigations are divided into two categories. These two categories include the real-accident data analyzing and the simulation-based safety study. In the real-accident studies, the effect of some factors (such as mainline speed at the beginning of the weaving segments, the logarithm of the volume, the heavy vehicle rate, the hourly traffic volume, etc.) on the number and/or severity of accidents was separately investigated and some models were developed. When there are no registered data about the accidents in a specific facility or when someone is trying to design that facility or when the facility has not yet been built, simulation-based safety studies/estimations such as conflict analysis by microscopic simulation and surrogate safety measures (SSMs) are often used to estimate the danger or risk of possible collisions. It is important to note that the results of using SSMs mostly showed a good relationship between the proposed SSM and actual accident data. So, using the SSM will help to stay far from long-term real-accident data analysis. But, there are some shortcomings in this way. Different surrogate measures for safety result in different outcomes, and unfortunately, an acceptable method to choose the best outcome especially to use as the basis of collision avoidance systems has not yet been presented. In addition, when it is intended to investigate the safety aspects of interchanges, there is not enough literature which focused well on these traffic facilities to review.

In this paper, it was intended to propose a new method to have an exclusive safety indicator among different SSMs at the first step and to develop a model to estimate the safety level according to geometrical and traffic characteristics of different parts of freeway interchanges at the second step. Different surrogate measures were combined using fuzzy logic, and an index called NCPI was defined as a safety level indicator. The variables of NCPI including outputs of four surrogate measures of safety were determined by analyzing the trajectory data. The trajectory data could be either achieved from video processing or derived from microsimulation. Then, NCPI was obtained by applying fuzzy rules to the variables. It was done to estimate the level of safety when there are not enough data or information about the number and severity of accidents or the segment is just being designed and has not yet been built. Due to the difficulties of accessing or obtaining the trajectory data, two models were developed by ANN and PSO algorithms to estimate the safety level based on geometrical and traffic characteristics of interchanges. At last, field studies were carried out to calibrate the simulations, controlling the validity of the proposed fuzzy method and checking the accuracy of safety estimator models.

The results indicated an acceptable confidence about the validity of the proposed fuzzy method. The results also showed a good accuracy of the developed models in terms of compliance with the database generated from data analysis and also surveyed data of the field studies. It also became clear that, in most cases, the results of the ANN-based model have more accuracy than the results of the PSO-based model. In general, the proposed models will be valid when the geometric and traffic characteristics of interchange's parts fall within the range of variables' values used for model development. Definitely, the more the difference between the values of these characteristics and the range of mentioned variable values, the more the reduction in the validity of the models. Another conclusion is that the models could be trained to estimate other traffic parameters such as the density, delay, and speed of interchange's parts or other traffic facilities based on their traffic and geometric characteristics.

In this paper, it was proposed to use fuzzy logic and the algorithms of ANN and PSO to estimate the safety level of different parts of freeway interchanges. But, there will be a long way to reach a point that these methods become general and be used in every situation. In this way, we propose that these methods can be applied in a wider range of variables' values and also be used in other segments of the freeway which include traffic conflicts, merging, or diverging.

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Questão 1

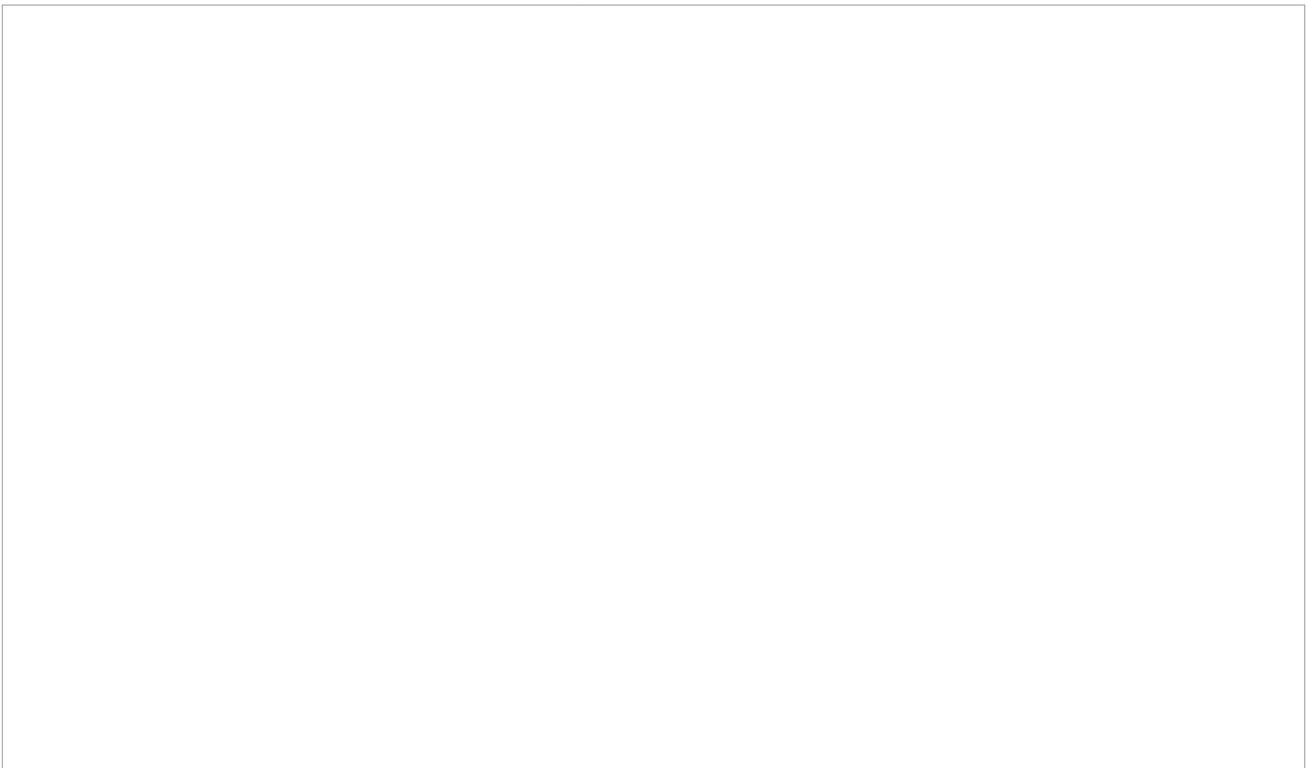
Explique quais são, segundo os autores, as categorias nas quais estudos prévios se embasam e o que determina a utilização de cada uma delas.

Espaço para Resposta

**Questão 2**

Descreva, segundo os autores, as limitações apresentadas pelos modelos baseados em simulação.

Espaço para Resposta



Questão 3

Discorra sobre os objetivos do estudo reportado no texto e sobre os passos implementados para atingi-los.

Espaço para Resposta

**Questão 4**

Explique os resultados a que os pesquisadores chegaram com o estudo descrito no texto.

Espaço para Resposta

