LITERATURE SURVEY

Wireless Digital Traffic Signs of the Future

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Traffic signs have come a long way since the first automobile was invented. They have long served the purpose of warning and guiding drivers and also enforcing the traffic laws governing speed, parking, turns, and stopping. In this study, the authors discuss the issues and challenges facing current traffic signs, and how it will evolve into a next-generation traffic sign architecture using advanced wireless communications technologies. With technological advances in the areas of wireless communications and embedded electronics and software, we foresee that, in the future, digital traffic sign posts will be capable of transmitting the traffic sign information wirelessly to road users, and this will transform our roads into intelligent roads, where signs will appear promptly and automatically on in-vehicle displays to alert the driver. There is no longer the need to watch out for traffic signs since the detection will be automatic and performed wirelessly. This transformation will lessen burden on the drivers, so that they can then focus more on the traffic ahead while driving. Also, this evolution into wireless digital sign posts will fit well with the vision of future smart cities, where smart transportation technologies will be present to transform how we drive and commute, yielding greater safety, ease, and assistance to drivers.

Application of machine learning methods for traffic signs recognition

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This paper focuses on solving a relevant and pressing safety issue on intercity roads. Two approaches were considered for solving the problem of traffic signs recognition; the approaches involved neural networks to analyse images obtained from a camera in the real-time mode. The first approach is based on a sequential image processing. At the initial stage, with the help of colour filters and morphological operations (dilatation and erosion), the area containing the traffic sign is located on the image, then the selected and scaled fragment of the image is analysed using a feed forward neural network to determine the meaning of the found traffic sign. Learning of the neural network in this approach is carried out using a back propagation method. The second approach involves convolution neural networks at both stages, i.e. when searching and selecting the area of the image containing the traffic sign, and when determining its meaning. Learning of the neural network in the second approach is carried out using the intersection over union function and a loss function. For neural networks to learn and the proposed algorithms to be tested, a series of videos from a dash cam were used that were shot under various weather and illumination conditions. As a result, the proposed approaches for traffic signs recognition were analysed and compared by key indicators such as recognition rate percentage and the complexity of neural networks' learning process.

Integration of Image-Based Fog Detection with Autonomous Decision System for Intelligent Road Sign

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The paper presents the description of the decision system implemented for Intelligent Road Signs. It focuses on the implementation of the novel air transparency analysis system and its integration with the rule system and the speed control infrastructure. Moreover, there are presented issues of making decisions about the content displayed in the case of autonomous and cooperating signs. To reflect more closely on real-life situations, it is assumed that the content presented by the IRS changes dynamically, depending on the road traffic and weather parameters. The IRS system operation was presented using fog detection as an example.

Development and Testing of Road Signs Alert System Using a Smart Mobile Phone

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Road traffic accident is a major problem worldwide resulting in significant morbidity and mortality. Advanced driver assistance systems are one of the salient features of intelligent systems in transportation. They improve vehicle safety by providing real-time traffic information to the driver. Road signs play an important role in road safety. To be effective, road signs must be visible at a distance that enables drivers to take the necessary actions. However, static road signs are often seen too late for a driver to respond accordingly. In this study, a system for alerting drivers about road signs has been developed and tested using a smart mobile phone. The study was carried out in Tanzania along an 80 km highway stretch from Arusha to Mos-hi town. The Haver-sine formula was used to measure and estimate the distance between two pairs of coordinates using the smartphone-based navigation application, Google Map. The application provides a voice alert to a needed action that enhances driver's attention. We propose an alternative method that identifies and modifies a specific class of energy inefficiencies. According to the experimental results, the proposed methodology has the benefits of high accuracy within a user radius of 10 meters, minimum bandwidth, and low-cost application. Furthermore, the system application was secured by limiting access to the application program interface key to avoid unauthorized access to sensitive information.

A Comprehensive and Effective Framework for Traffic Congestion Problem Based on the Integration of IoT and Data Analytics

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Traffic congestion is still a challenge faced by most countries of the world. However, it can be solved most effectively by integrating modern technologies such as Internet of Things (IoT), fog computing, cloud computing, data analytics, and so on, into a framework that exploits the strengths of these technologies to address specific problems faced in traffic management. Unfortunately, no such framework that addresses the reliability, flexibility, and efficiency issues of smart-traffic management exists. Therefore, this paper proposes a comprehensive framework to achieve a reliable, flexible, and efficient solution for the problem of traffic congestion. The proposed framework has four layers. The first layer, namely, the sensing layer, uses multiple data sources to ensure a reliable and accurate measurement of the traffic status of the streets, and forwards these data to the second layer. The second layer, namely, the fog layer, consumes these data to make efficient decisions and also forwards them to the third layer. The third layer, the cloud layer, permanently stores these data for analytics and knowledge discoveries. Finally, the fourth layer, the services layer, provides assistant services for traffic management. We also discuss the functional model of the framework and the technologies that can be used at each level of the model. We propose a smart-traffic light algorithm at level 1 for the efficient management of congestion at intersections, tweet-classification and image-processing algorithms at level 2 for reliable and accurate decision-making, and support services at level 4 of the functional model. We also evaluated the proposed smart-traffic light algorithm for its efficiency, and the tweet classification and image-processing algorithms for their accuracy.