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Car and Road Surface Damage Detection using CNN

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Abstract: The "Road and Car Damage Detection" challenge utilizes advanced Convolutional Neural Network (CNN) models to automate the detection and assessment of damage to roads and vehicles by analyzing visual data. CNNs play a vital role in this process as they excel at identifying intricate features and patterns within images and video frames, enabling precise recognition and categorization of various types of damage, whether related to road surfaces or vehicle components. This systematic approach encompasses multiple stages, including data acquisition, meticulous labeling, model training, seamless integration, and real-time processing capabilities.

Crucially, this system goes beyond mere detection by incorporating a robust mechanism to evaluate the severity of any identified damage. The integration of CNN models not only streamlines the detection process but also bolsters the accuracy of classification and severity assessment. This approach underscores a promising avenue for advancements in road safety, enabling prioritization of maintenance needs, expediting insurance claims processing, and ultimately contributing to an overall enhancement of road and vehicle safety standards.

Moreover, the implementation of cutting-edge data augmentation techniques, transfer learning methodologies, and the incorporation of real-world scenarios highlight the adaptability and efficiency of the proposed solution across diverse environments. This versatility underscores the solution's practicality and potential for meaningful societal impact.

By leveraging advanced data manipulation strategies like augmentation along with transfer learning that harnesses knowledge from pre-trained models, the system can be effectively tailored to operate reliably in a wide range of contexts and conditions. Simultaneously, the explicit consideration of realworld scenarios ensures that the solution remains grounded in practical applications, further amplifying its potential to deliver tangible benefits to society.

Keywords: Convolutional Neural Network (CNN), Damage detection, Data labeling, Data acquisition, Model training, Damage severity evaluation, Insurance claims processing, Advanced datamanipulation

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