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Deep Learning for Car Damage Detection: A Comprehensive Review

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Abstract: *The accurate and efficient assessment of vehicle damage is a critical requirement for industries such as automotive insurance, car rentals, and resale markets. Traditional manual inspection methods are slow, subjective, and prone to inconsistency. With the rapid evolution of Artificial Intelligence, particularly deep learning and computer vision, automated car damage detection has gained significant research attention. This review presents a comprehensive study of major advancements in deep learning-based vehicle damage detection, covering foundational CNN models, transfer learning approaches, object detection frameworks, and hybrid architectures. Key challenges—including limited datasets, difficulty detecting subtle damages, lack of severity estimation, and computational complexity—are highlighted. The review also discusses future research directions to achieve fully automated, robust, and interpretable real-world systems*

Keywords: Car Damage Detection, Deep Learning, CNN, Transfer Learning, Object Detection, Computer Vision

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