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ROAD DAMAGE DETECTION

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Abstract:

Many municipalities and road authorities seek to implement automated evaluation of road damage. However, they often lack technology, know-how, and funds to afford state of-theart equipment for data collection and analysis of road damages. Although some countries, like Japan, have developed less expensive and readily available Smartphone based methods for automatic road condition monitoring, other countries still struggle to find efficient solutions. This work makes the following contributions in this context.

Firstly, it assesses usability of Japanese model for other countries. Secondly, it proposes a large-scale heterogeneous road damage dataset comprising 26620 images collected from multiple countries using smartphones. Thirdly, it proposes models capable of detecting and classifying road damages in more than one country

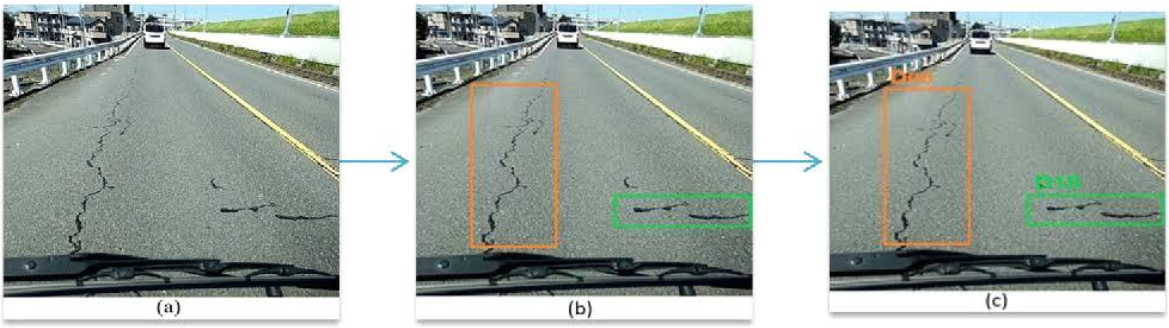
I . INTRODUCTION

Road infrastructure is a crucial public asset as it contributes to economic development and growth while bringing critical social benefits. It connects acommunities and businesses and provides access to education, employment, social, and health services.

However, road surface wears and deteriorates over time from factors related to location, age, traffic volume, weather, engineering solutions, and materials used to construct The impact of roadway deficiencies on safety and economy has been widely studied(Miller and Zaloshnja (2009) and Rojo, Gonzalo-Orden, Linares al. (2018)).

Pavement distress, one of the pavement condition characteristics, can be evaluated using three approaches: manual,semi-automated, or fully automated.

The traditional methods for collecting pavement condition data involve manual and semi-automated surveys In manual approach, raters perform a visual inspection of the pavement surface through either walking or driving along the pavement surface using a slow-moving vehicle. Visual inspection of the road surface suffers from a subjective of inspectors.



II. LITERATURE SURVEY

Literature related to the Indian Road Damage Dataset and Model :

The detection method developed by Maeda et al. (2018) classified pavement deterioration of India road network into eight categories based on images captured by mobile devices. The corresponding dataset, named RDD-2018, was made publicly available in 2018, and a Smartphone-based application was also introduced for real-time road condition assessment. Since then, this application is being used by several municipalities in india for faster monitoring of road conditions. As a result, the underlying data, method, and models have gained wide attention from researchers all over the world. A technical challenge was organized in December 2018 as a part of the IEEE Big Data Conference held at Seattle, USA, which utilized this data for evaluating the performance of several models for road condition monitoring. In total, teams participated in the challenge from 14 different countries. These teams, although provided solutions having better accuracy than the original models included in Maeda et al. (2018), the new solutions were mostly based on changing the underlying network models and hyper-parameter configurations (Alfarrarjeh, Trivedi, Kim, and Shahabi (2018 Although some authors suggested improvements in the dataset but the teams themselves did not modify the dataset in their work**.**

III. OBJECTIVE

The objective of road damage detection is to identify and assess various types of damage or deterioration in road infrastructure, such as highways, streets, and bridges. This is typically done through the use of technology, including cameras, sensors, and machine learning algorithms, to achieve the following goals:

1. Safety: Detecting road damage helps enhance road safety by identifying hazards and issues that may pose risks to drivers, pedestrians, and cyclists. Prompt repair and maintenance can prevent accidents and injuries.

2. Infrastructure Maintenance: Road damage detection is crucial for maintaining and prolonging the lifespan of road infrastructure. Identifying issues early allows for timely repairs, preventing the deterioration of roads and reducing long-term maintenance costs.

3. Cost Efficiency: By identifying and addressing road damage in its early stages, it is often less expensive to fix problems. Preventing minor issues from becoming major ones can lead to cost savings in the long run.

4. Resource Allocation: Road authorities can use the data collected from road damage detection to allocate resources more effectively. This information helps them prioritize repairs and maintenance based on the severity and location of the damage.

5. Data-Driven Decision Making: Road damage detection provides data that can inform decision-making processes for government agencies and organizations responsible for road maintenance and infrastructure management. This data-driven approach helps in making informed choices and optimizing budgets

IV CONCLUSION

The presented study is conducted to address the need of readers of other countries when one other country releases its data and model for automatically detecting and classifying road damages for itself. To achieve the aforementioned objective, he authors proposed a large-scale heterogeneous road damage dataset comprising 26,620 annotated road images collected from multiple countries. Further, the authors explored how the images collected from any country affect the per formance of deep learning-based road damage detection and classification model in other countries.

The experiments illustrate that an efficient road damage detection model canbe developed for a country by mixing the data from another country with the local data. An extensive, comprehensive and rigorous analysis of Japanese data-based models to detect and classify road damages in Indiaand the Czech Republic is presented for the demonstration.

V. REFERENCES

Certainly, you can find information and resources related to road damage detection onvarious websites. Here are some websites where you can explore articles, researchpapers, and resources related to road damage detection:

1. IEEE Xplore (https://ieeexplore.ieee.org/): IEEE Xplore is a digital library thatprovides access to a vast collection of research papers, conference papers, and articleson road damage detection and related topics. You can search for specific papers and articles on this platform.

2. ResearchGate: (https://www.researchgate.net/): ResearchGate is a platform where researchers share their publications. You can find academic papers and articles related to road damage detection by searching the platform's database.

3. Google Scholar: (https://scholar.google.com/): Google Scholar is a search engine that focuses on scholarly articles and research papers. You can use it to search for papers related to road damage detection and related technologies.

4. Transportation Research Board (TRB) (https://www.trb.org/): TRB is a leading source for transportation-related research and publications. They have resources related to road damage detection and maintenance