

Multinational advancements for AI-driven road inspection

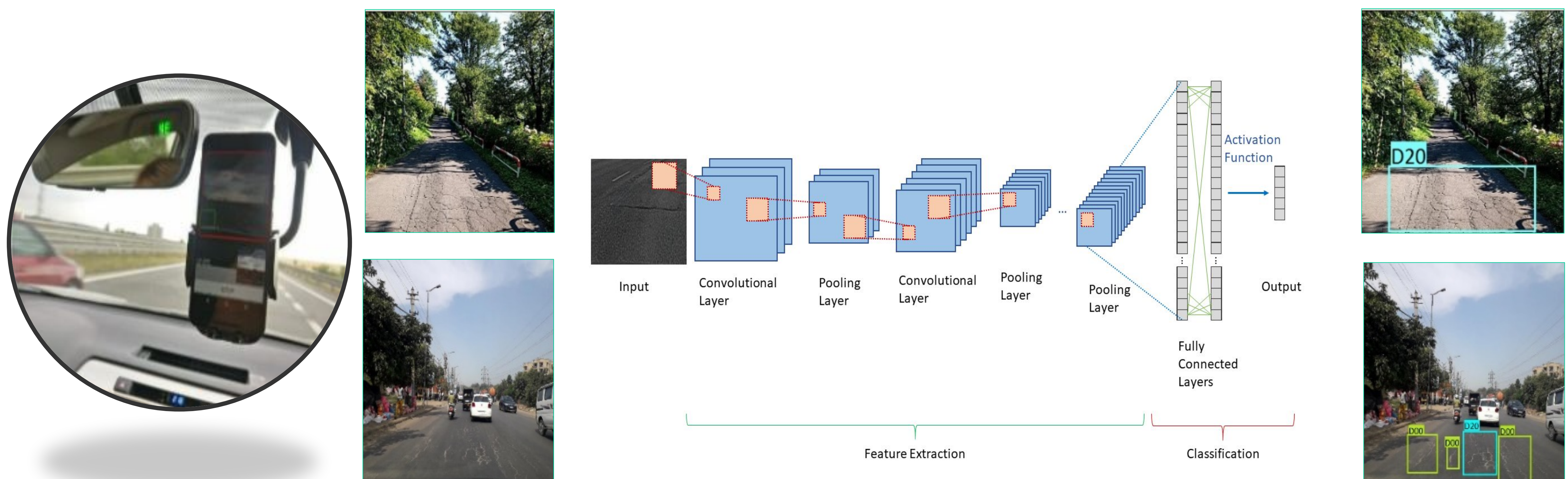
Deeksha Arya¹, Hiroya Maeda², Sanjay Kumar Ghosh³, Durga Toshniwal³,
Hiroshi Omata¹, Taekhiro Kashiya⁴, Yoshihide Sekimoto¹

¹The University of Tokyo, Japan, ²UrbanX Technologies, Inc., Japan, ³IIT Roorkee, India, ⁴Osaka University of Economics, Japan

Background

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-the-art equipment for data collection and analysis of road damages. Some countries have developed affordable Smartphone-based methods for automatic road condition monitoring, but others struggle to find efficient solutions. This study aims to provide globally applicable models by addressing the needs of such countries. In 2020, the first attempt proposed a model with approximately 67% F1-score for India, Japan, and Czech Republic. The latest attempt in 2022 achieved an F1-score of around 77% for six countries: India, Japan, Czech Republic, Norway, United States, and China.

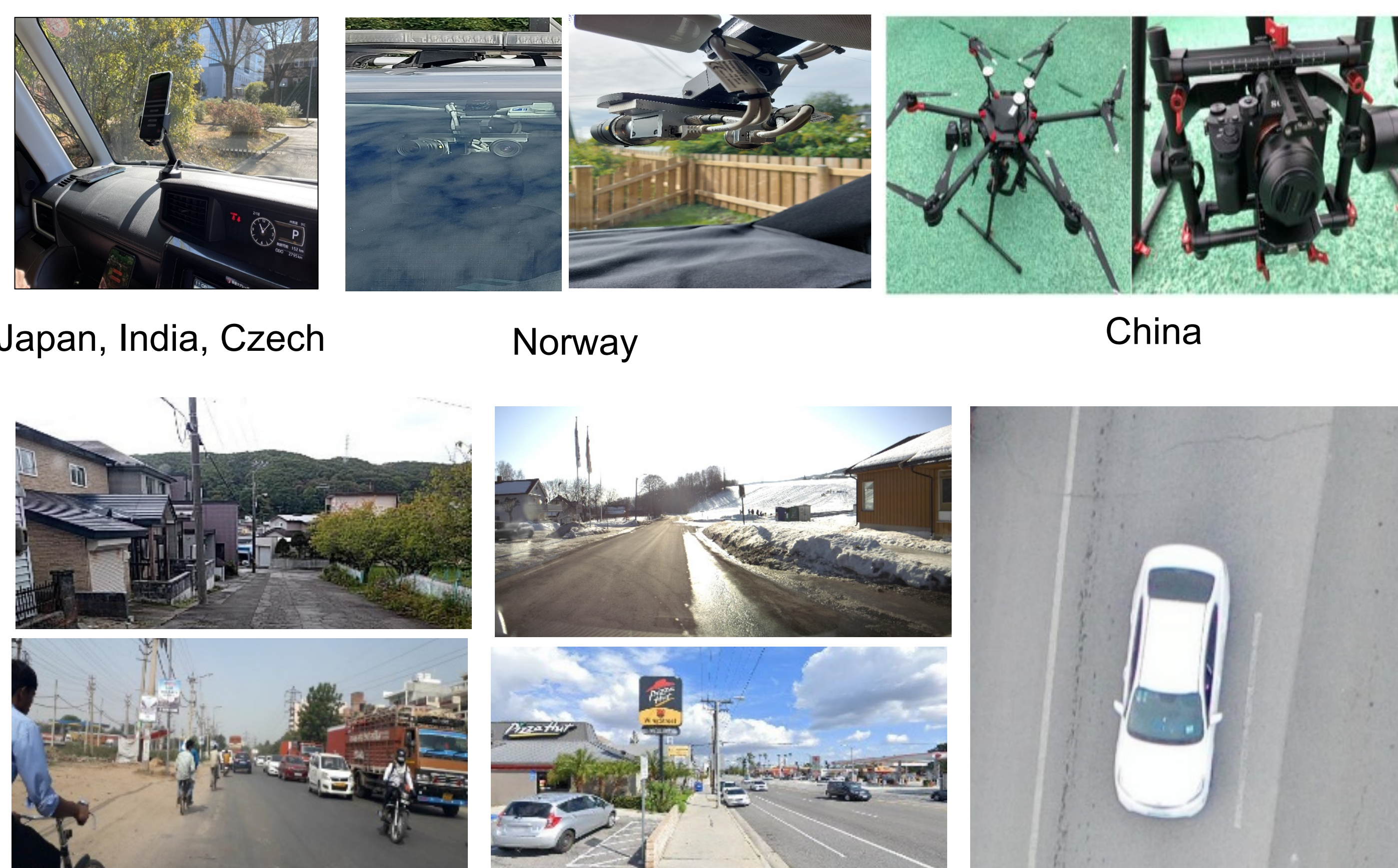
Methodology



Road image collection using Smartphones/Cameras etc.

Road Damage Detection and Classification using Deep Learning


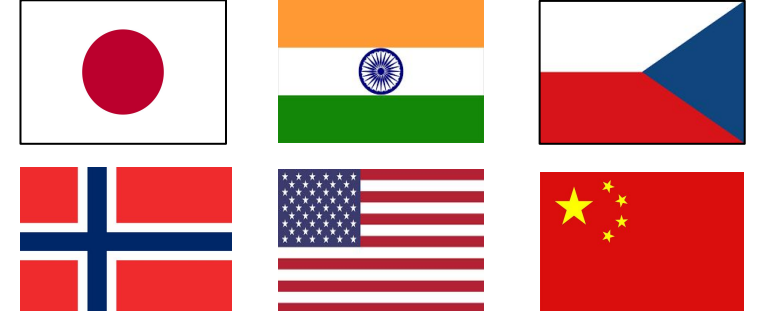
Proposed Dataset



Sample images and mode of capturing

- 47,420 road images from 6 countries
- ~55,000 labeled cracks and potholes

Experiments and Results

Multinational experiments	Global Road Damage Detection Challenge GRDDC'2020	Crowdsensing-based Road Damage Detection Challenge CRDDC'2022
Countries targeted	3 	6 
Participation	121 teams	92 teams
Max. F1-Score Achieved	~67%	~77%
Best performing model	YOLOv5-based ensemble model	Ensemble model based on YOLO-series and Faster RCNN-series models