Road Rutting Detection using Deep Learning on Images

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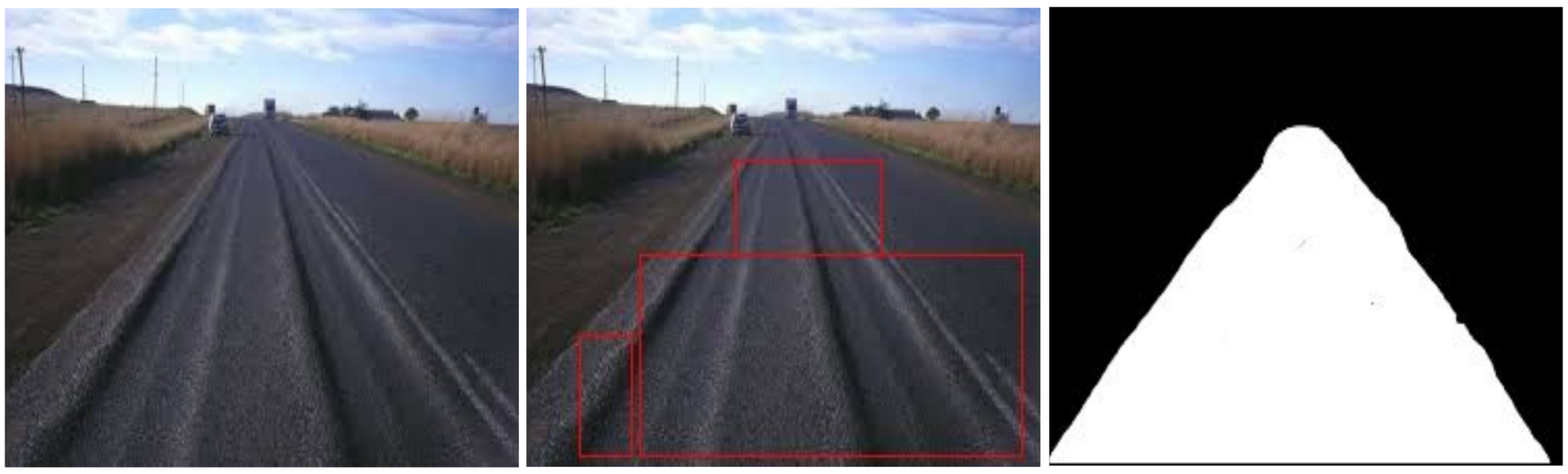
Background

Road Rutting is a severe road distress that can cause premature failure of road incurring early and costly maintenance costs. Research on road damage detection using image processing and deep learning are being actively conducted in the past few years. But these are mostly focused on detection of cracks, potholes, and their variants. Therefore, there is a similar need for an easy and efficient method to detect the instances of road rutting in order to assist prompt maintenance and early rehabilitation of damaged roads.

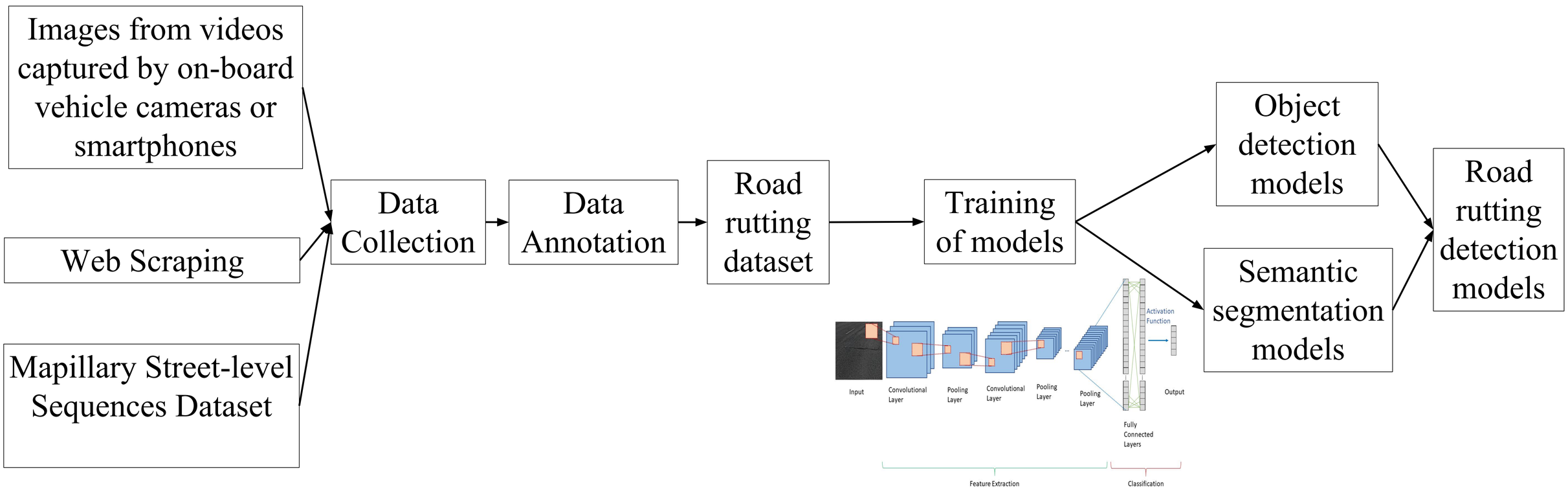
Road Rutting Dataset

Original images, which are captured using smartphones or dashboard cameras mounted on vehicles, have been annotated with object level and pixel level annotations for object detection and semantic segmentation respectively.



Original Image | Object level annotation | Pixel level annotation

Methodology



Object Detection & Semantic Segmentation

Object Detection Models	mAP @ IoU=0.5 (%)
YOLOv4	33.7
YOLOv5-l	34.4
YOLOv6-s (finetune)	26.9
YOLOv6-s	20.3
YOLOX-s	61.6

Semantic Segmentation Models	IoU	Acc
PSPNet (Resnet-50)	54.6	72.6
DeepLabV3+ (Resnet-101)	52.9	73.9