Cityscale Road Audit System Using Deep Learning

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

MOTIVATION

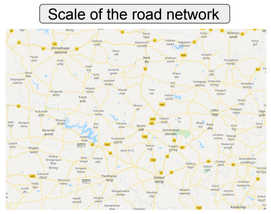

Pothole


Water-log


Muddy-area

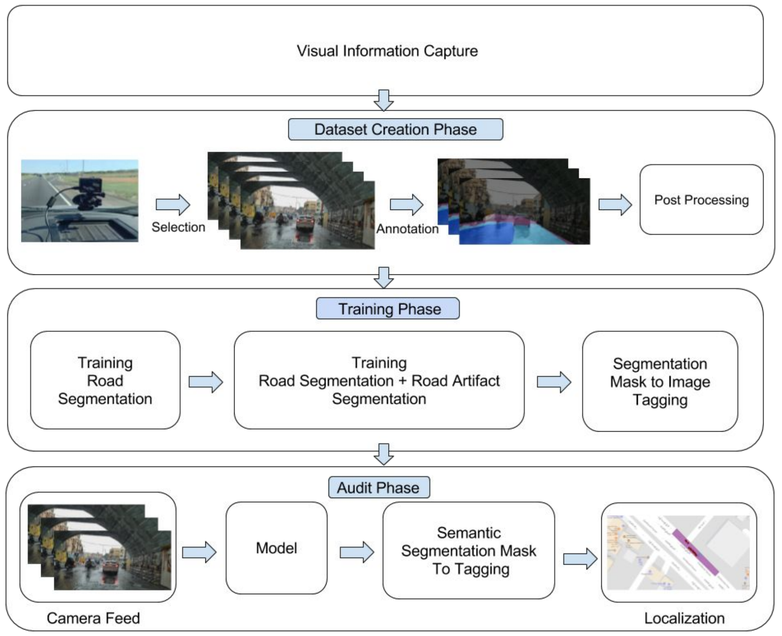

Rough Road

Scale of the road network



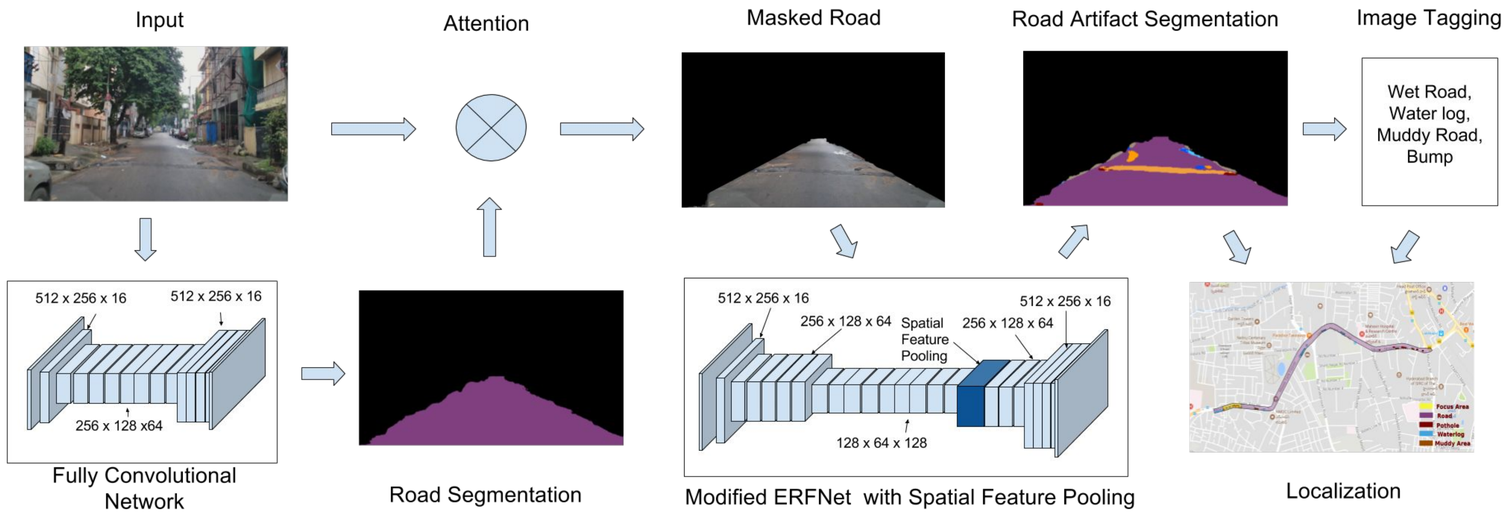
Quick response to disasters

Costly existing systems



METHOD

- We first segment the road, use it for an attention mechanism for obtaining the road pixels.
- Then use a powerful semantic segmentation model to segment multiple road defects.
- Finally, we tag the image frame for the defects and localize it in the map using GPS.



QUALITATIVE RESULTS

RESULTS

Method (Category Level)	IoU (%)	wIoU (%)	fps (1024 × 512)
ERFNet (Fine-tuned)	41.8	59.8	41.7
ERFNet (Scratch)	42.1	59.8	41.7
Our refined ERFnet	45.7	60.7	26.2
Method (Class Level)	**IoU (%)**	**wIoU (%)**	**fps (1024 × 512)**
ERFNet (Fine-tuned)	24.1	55.2	41.7
ERFNet (Scratch)	24.4	57.2	41.7
Our refined ERFnet	28.1	59.0	26.2

(a)

Hierarchy(Our Method)	IoU(%)
Road-defects	65.1
Category level	45.7
Class Level(-cat4)	38.0
Class Level	28.1

(b)

Our Method(Class)	IoU (%)
Tar Road	72.5
Pot hole	23.5
Rough Road	34.5
Cement Road	13.8
Obstruction	10.7
Wet Road	32.3
Water log	28.8
Muddy Road	33.4
Bumps	03.3
Shoulder	28.1

Our Method (Image Tagging)	Precision (%)	Recall (%)
Pot hole	59.3	83.3
Rough Road	67.7	61.7
Cement Road	6.2	25.0
Obstruction	6.6	100.0
Wet Road	81.3	53.3
Water log	56.2	54.5
Muddy Road	74.1	76.6
Bumps	28.5	50.0
Shoulder	16.0	25.0

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