Electricity Distribution

Pole Defect Image Detection Model

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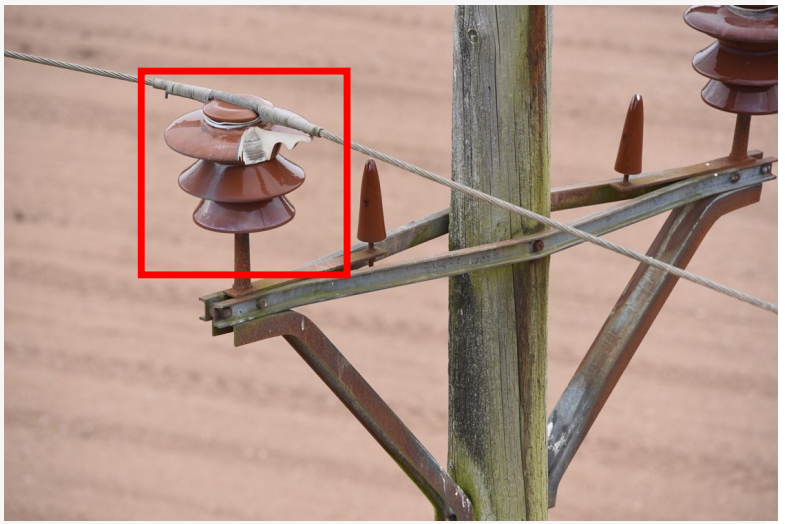
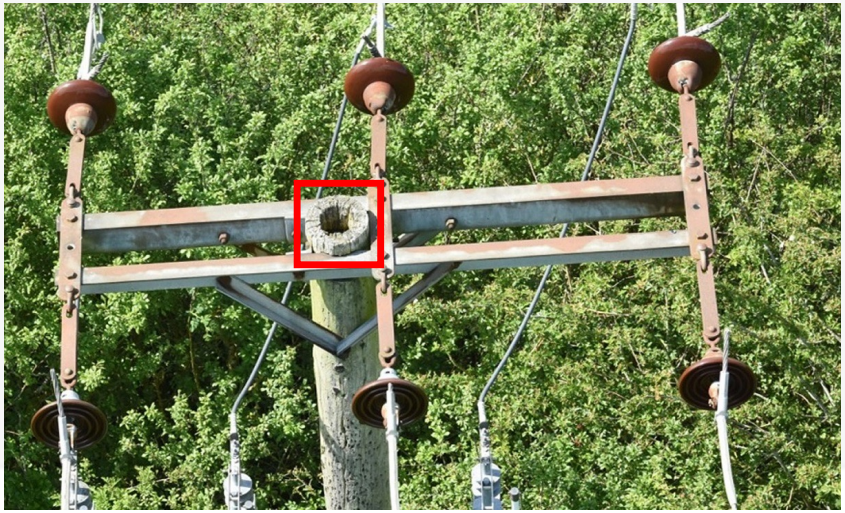
Project Benefits

- Pole defects could mean customers are off supply
- Helicopters patrol the network to identify defects
- Helicopters are more efficient for patrolling the network than foot patrols
- Defect detection model could improve workforce resilience and be more accurate than a human observer





Pole Image Requirements

- Images of pole defects are recorded
- Images of poles without defects are stored amongst images of overhead lines
- An image recognition model will be required to isolate images of poles for the defect detection model

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Proposed Solutions

	Local Python Development	Data Analytics Platforms	Google Cloud Platform (GCP)
Cost	None for development but potentially costly deployment	Subscription cost	Pay-as-you-go pricing model
Prebuilt Models	None	Inbuilt image recognition model	Prebuilt models
Processing Capabilities	Low	Medium	High
Scalability	Harder to scale up	Harder to scale up	Easy to scale up
Customisation and fine-tuning	Highly customisable	Less customisation	Moderate customisation

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Image Recognition Models on GCP

- AutoML Image Classification can be used for detecting poles in images
- Visual Inspection AI can be used for detecting defects

Cloud AutoML Vision

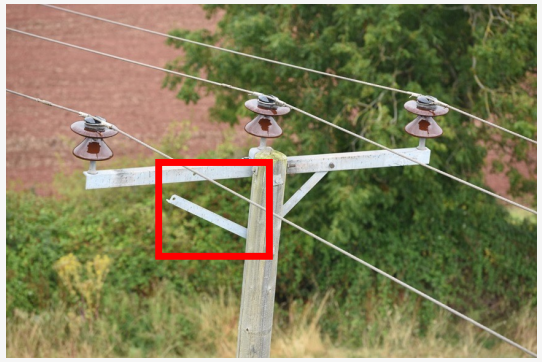
Training and Testing the Models

- Train, validation and test datasets required
- Change parameters iteratively to improve accuracy
- Training time, accuracy and cost will need to be considered

Model	Minimum Image Requirements	Target Image Requirements
AutoML Image Classification	100 images of poles, 100 without poles	1000 images of poles, 1000 without poles
Visual Inspection AI	10 images with defects and 10 without or 20 without defects	100 images with defects and 100 without or 1000 without defects

Defects to be Investigated

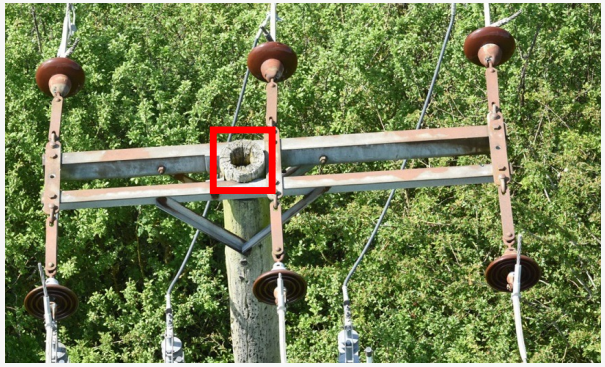
HPO (Pole/Tower damage)



IC (Insulator Damaged / Defective)

TI (ivy on pole)

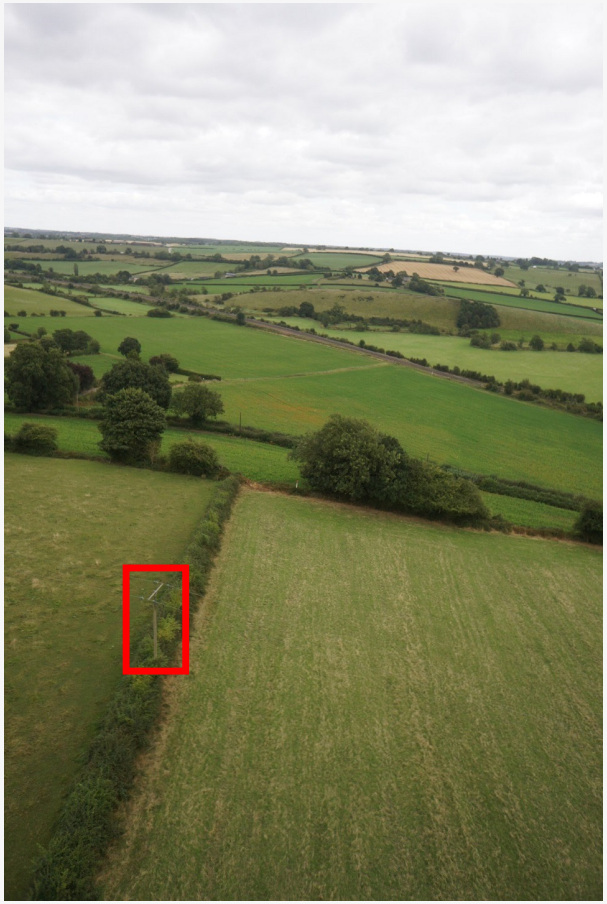
HPR (pole rotten at top)



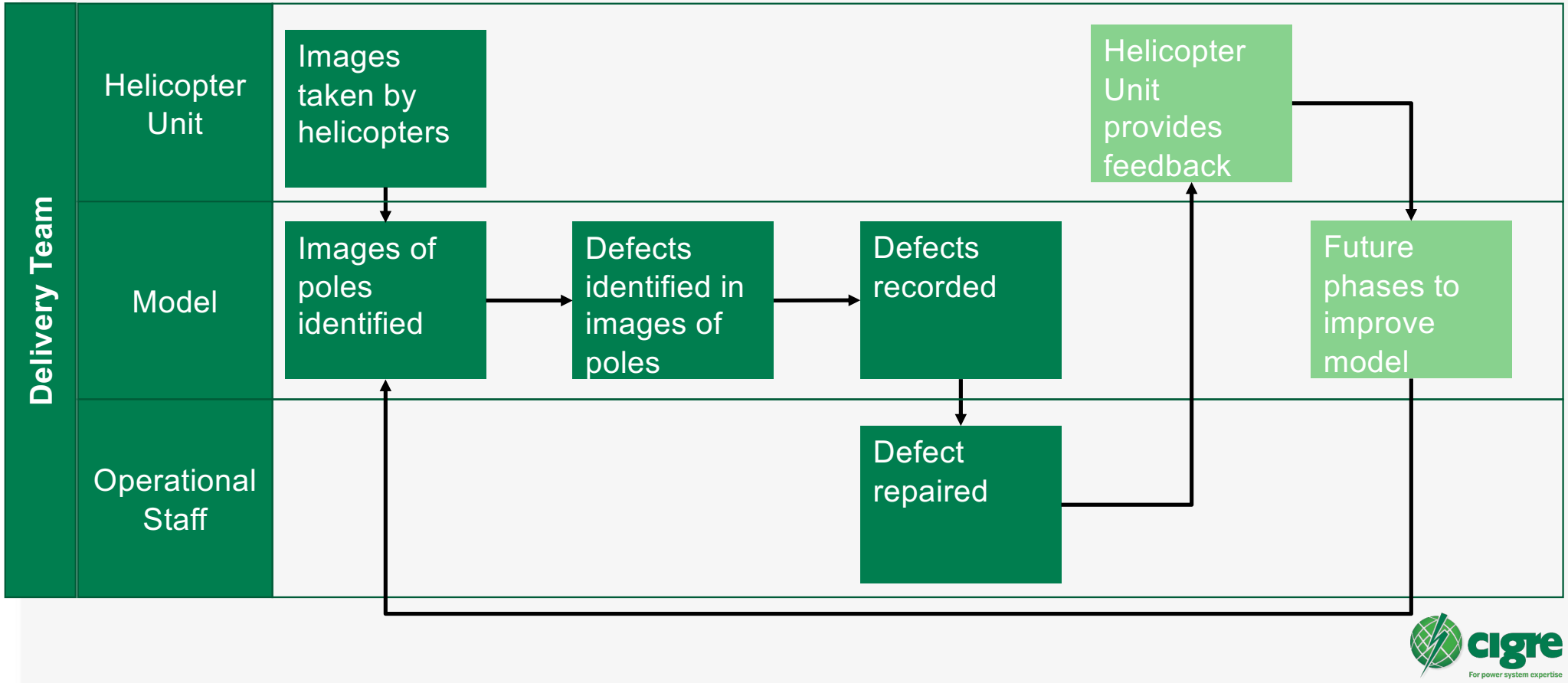
IB (Defective Binder/ Stirrup/ Suspension Clamp/ Preform)

Potential Challenges and Limitations

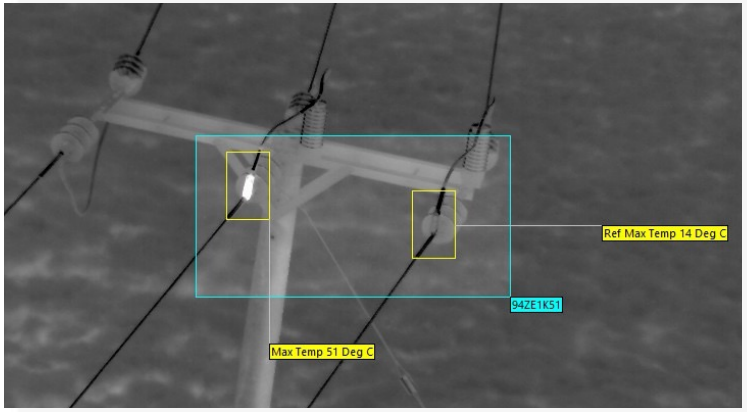
- Image quality
- Some defects may be too small or unclear
- Rarity of some defects
- Perspective of images



Business Integration



Other Uses of Image Recognition Models at National Grid



Thermal Image of a Pole

The Inside of a Link Box

Labelled Image of a Meter

Acknowledgments

- Paul Hartshorne (Head of Data)
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