

# AI Model Evaluation Report (Federated)

## Insulator Defect Detection System (Federated Learning)

Date: 2025-12-24 00:38

Model Architecture: RetinaNet (ResNet50-FPN-V2)

Evaluation Dataset: IDD-CPLID (Aerial)

Total Parameters: 36,148,031

### Real-World Performance Metrics

Inference Latency: 30.51 ms per image

Throughput (FPS): 32.78 frames/sec

Computational Cost: 128.57 GFLOPs (approx)

### Overall Accuracy Metrics (Validation Set)

Mean Average Precision (mAP@50): 0.9361

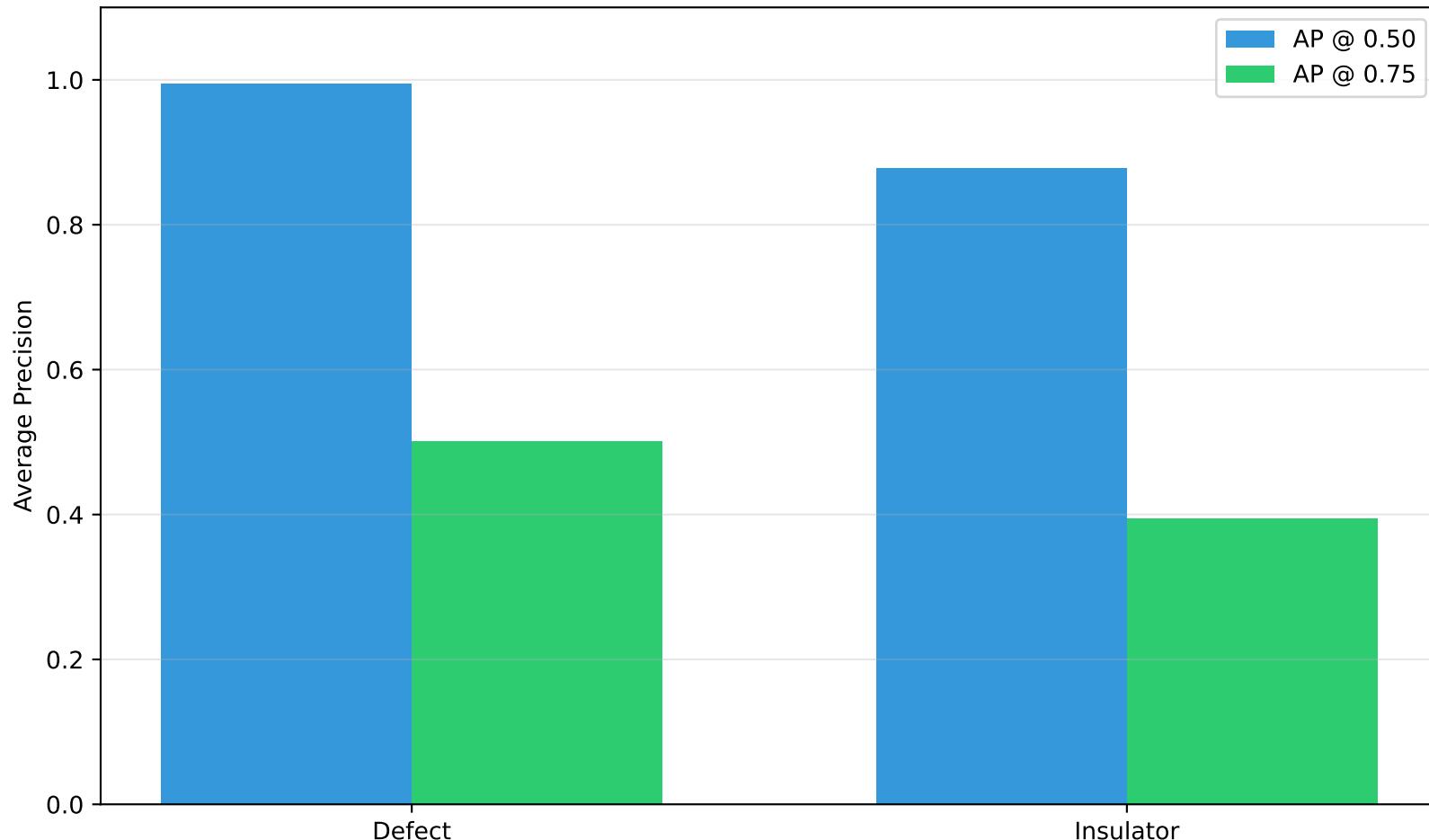
Mean Average Precision (mAP@75): 0.4476

### Class-wise Breakdown (AP@50)

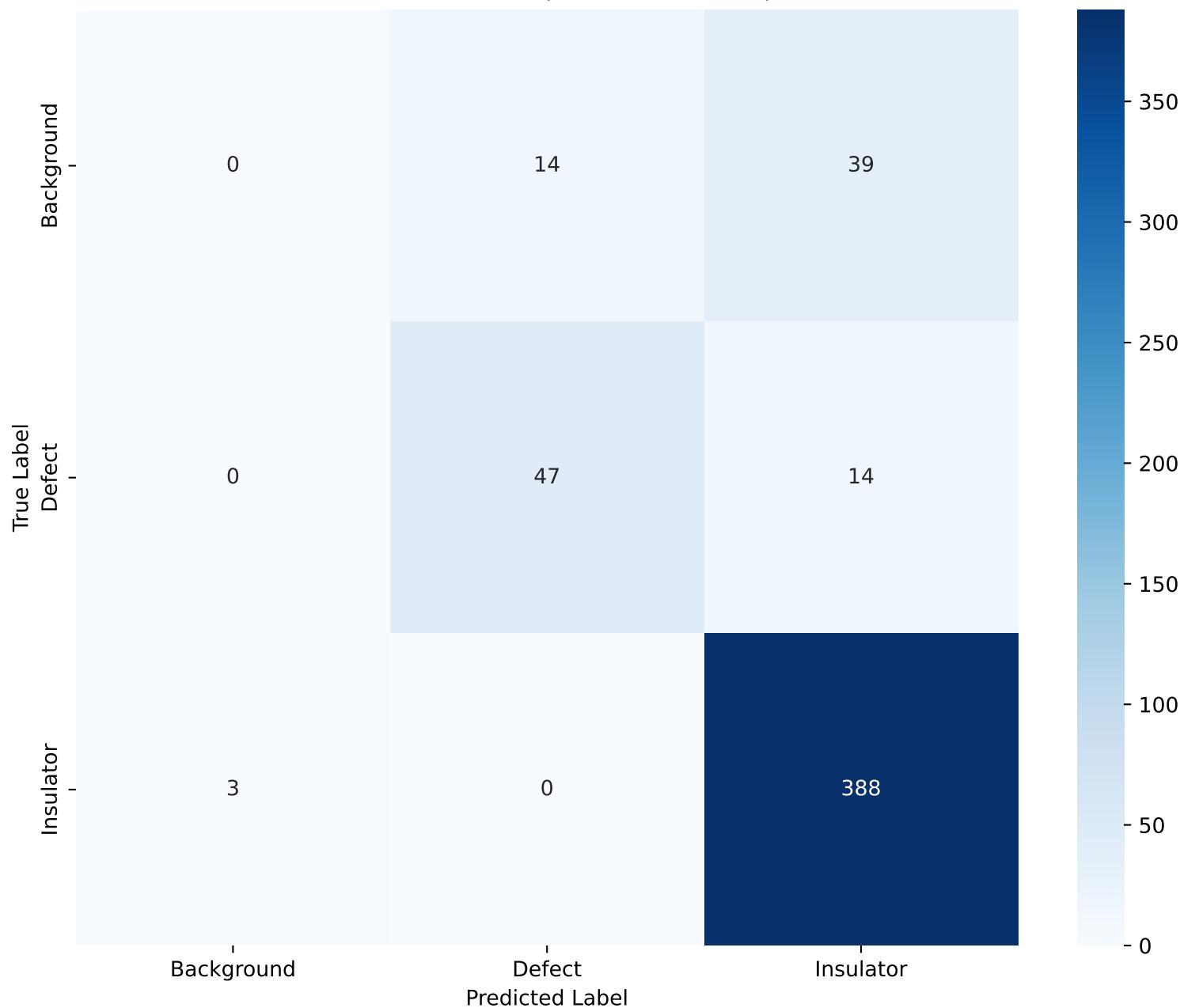
Defect : 0.9946

Insulator : 0.8776

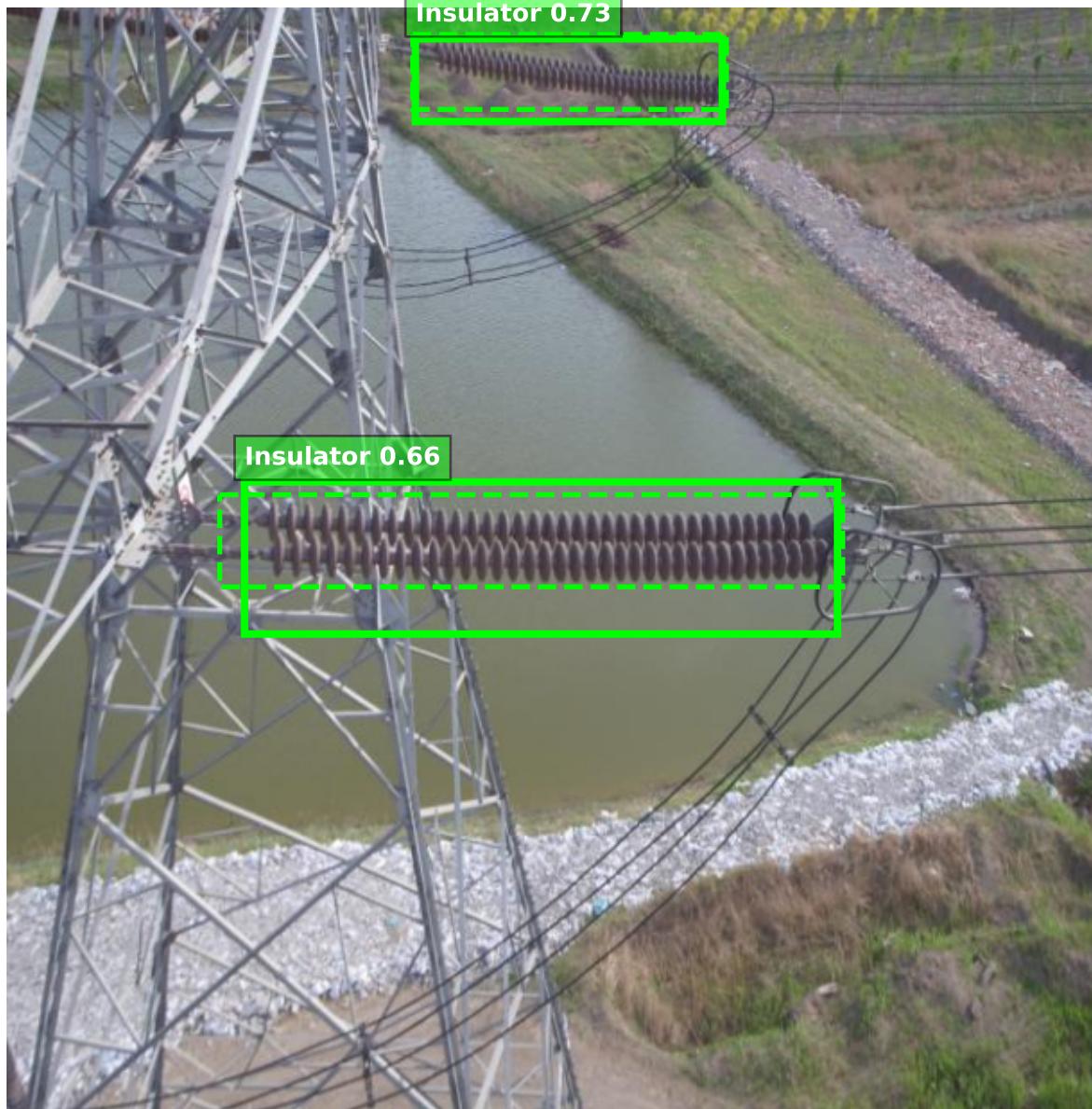
### Federated Model Performance per Class



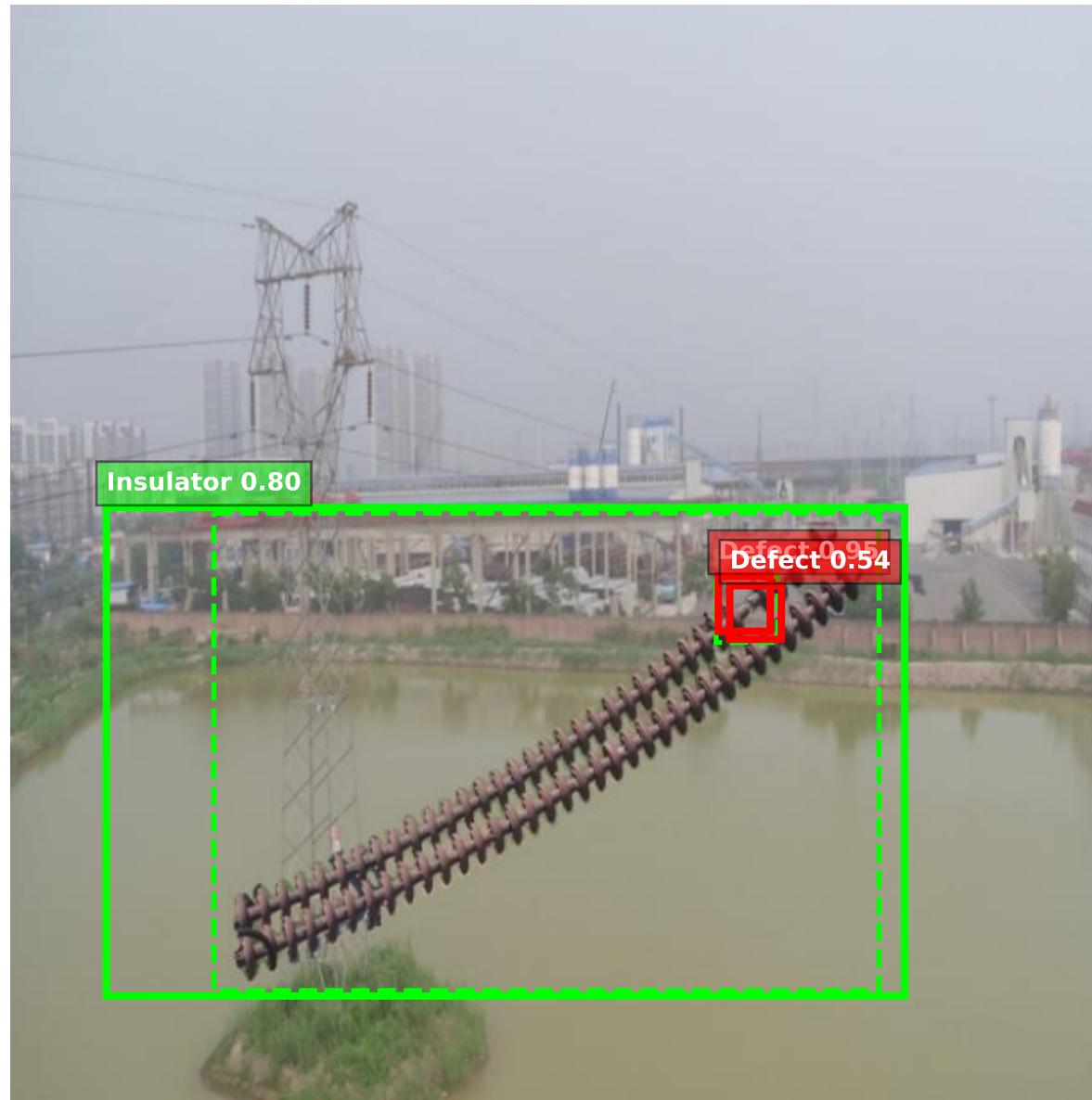
Confusion Matrix (Federated Model)



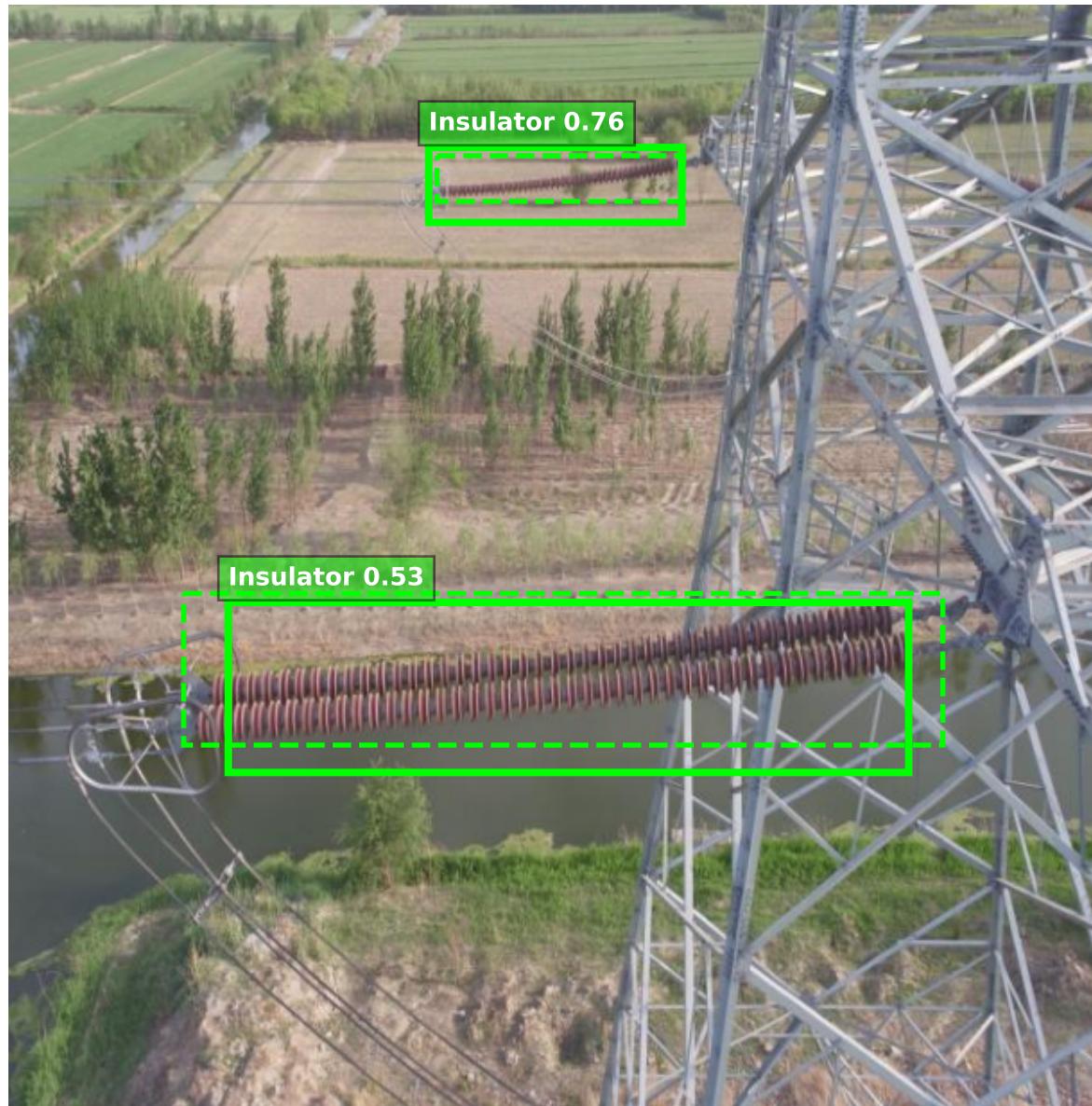
Federated Validation Sample 74



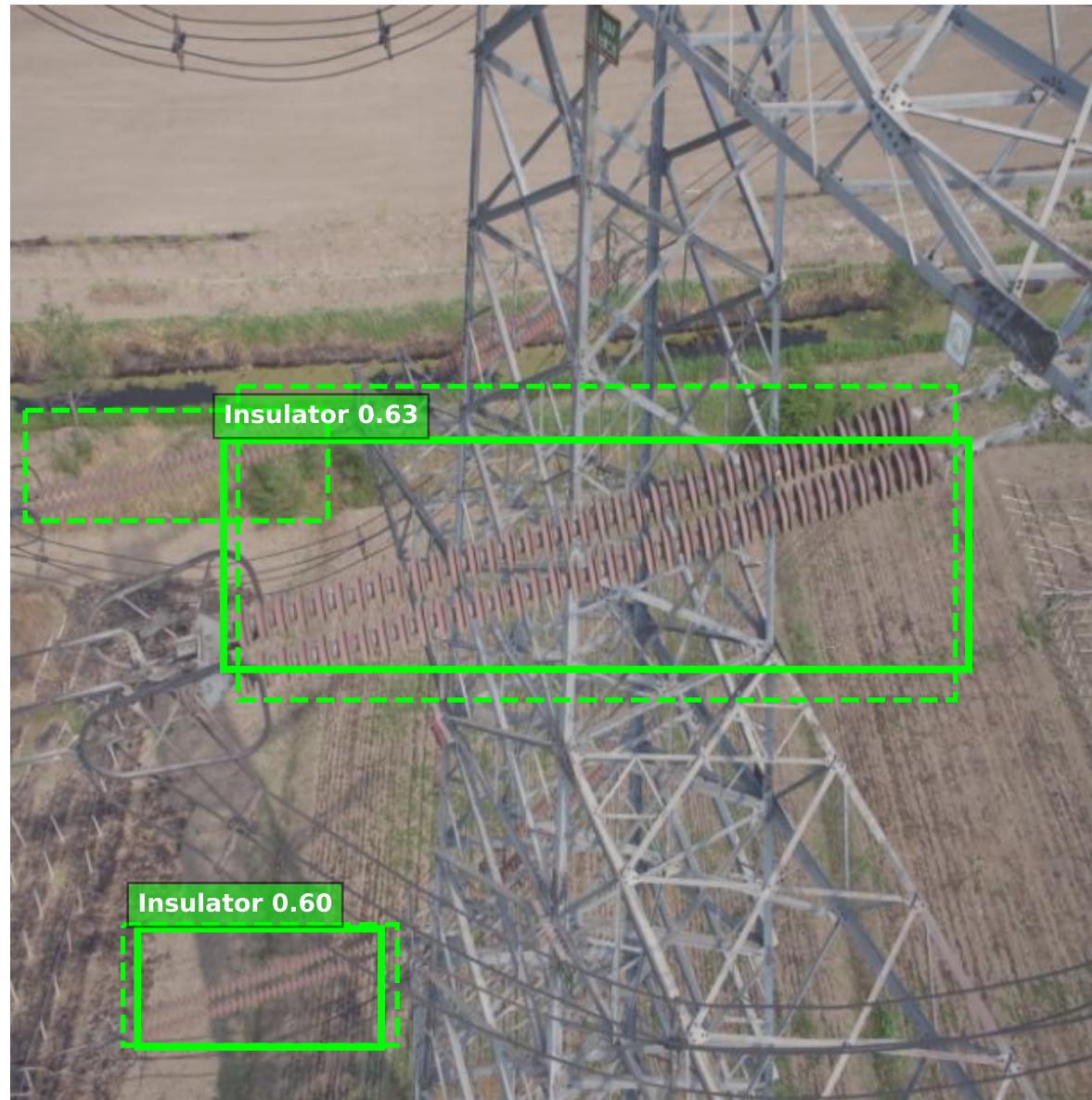
Federated Validation Sample 171



Federated Validation Sample 108



Federated Validation Sample 128



Federated Validation Sample 196

