# AI Model Evaluation Report

## Insulator Defect Detection System (RetinaNet)

Date: 2025-12-30 23:30
Model Architecture: RetinaNet (ResNet50-FPN-V2)
Evaluation Dataset: IDID V1.2 (Validation Split)
Total Parameters: 36,414,865.0

### Real-World Performance Metrics

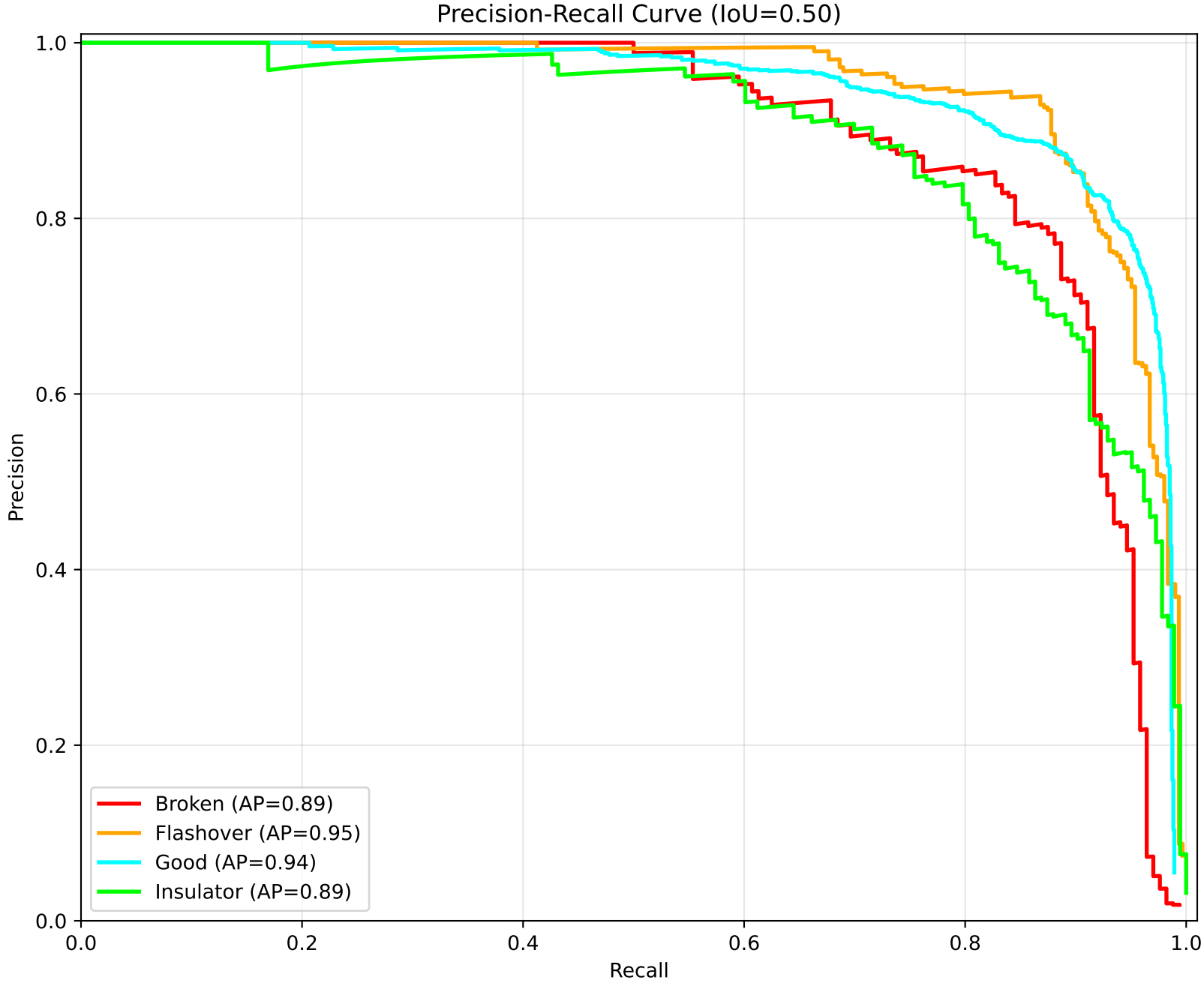
| | |
|---|---|
| Inference Latency: | 24.87 ms per image |
| Throughput (FPS): | 40.21 frames/sec |
| Computational Cost: | 129.12 GFLOPs (approx) |

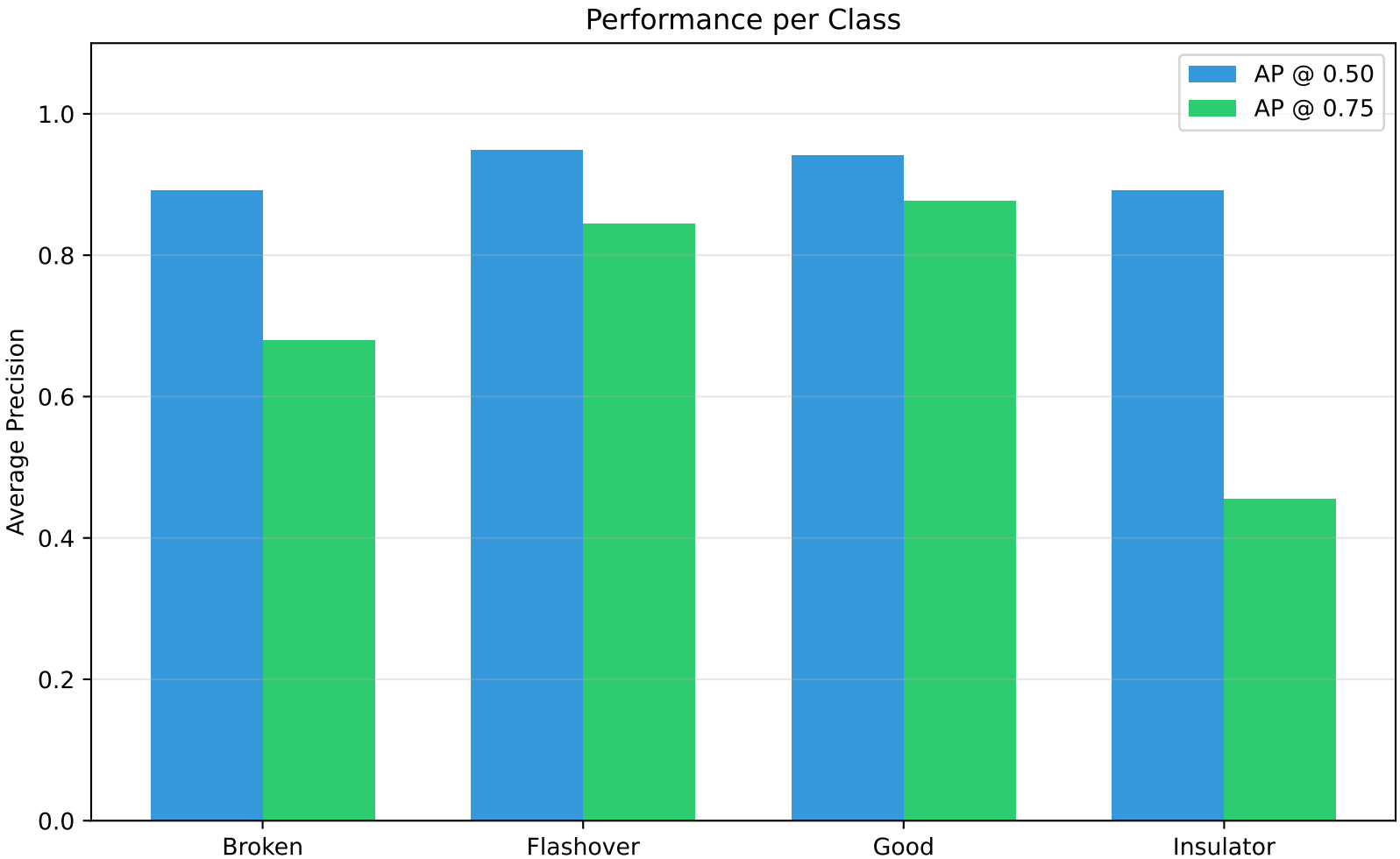
### Overall Accuracy Metrics (Validation Set)

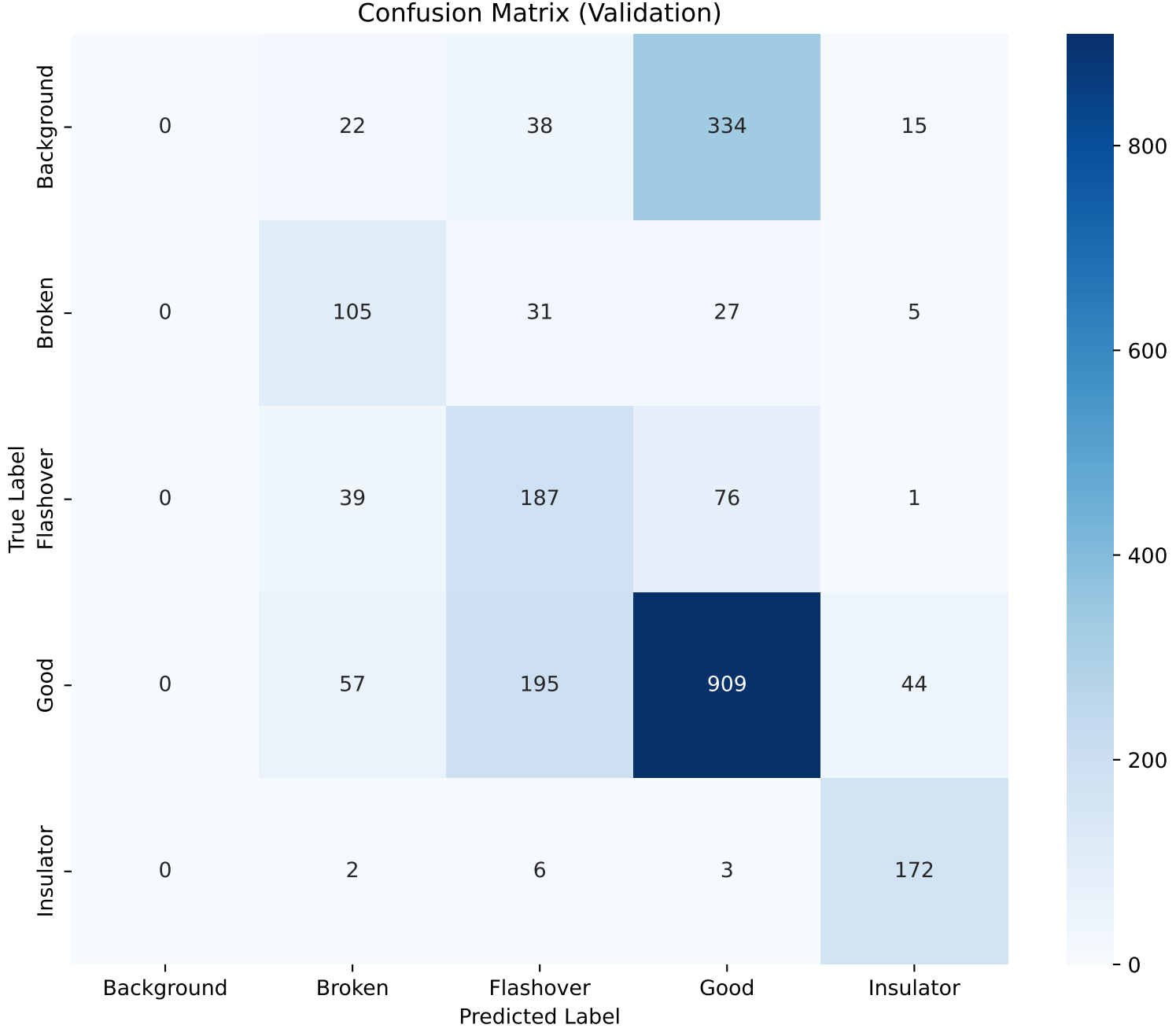
| | |
|---|---|
| Mean Average Precision (mAP @50): | 0.9186 |
| Mean Average Precision (mAP @75): | 0.7139 |

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

| | |
|---|---|
| Broken | 0.8919 |
| Flashover | 0.9491 |
| Good | 0.9417 |
| Insulator | 0.8916 |


Precision-Recall Curve (IoU=0.50)
Precision
Recall
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Broken (AP=0.89)
Flashover (AP=0.95)
Good (AP=0.94)
Insulator (AP=0.89)

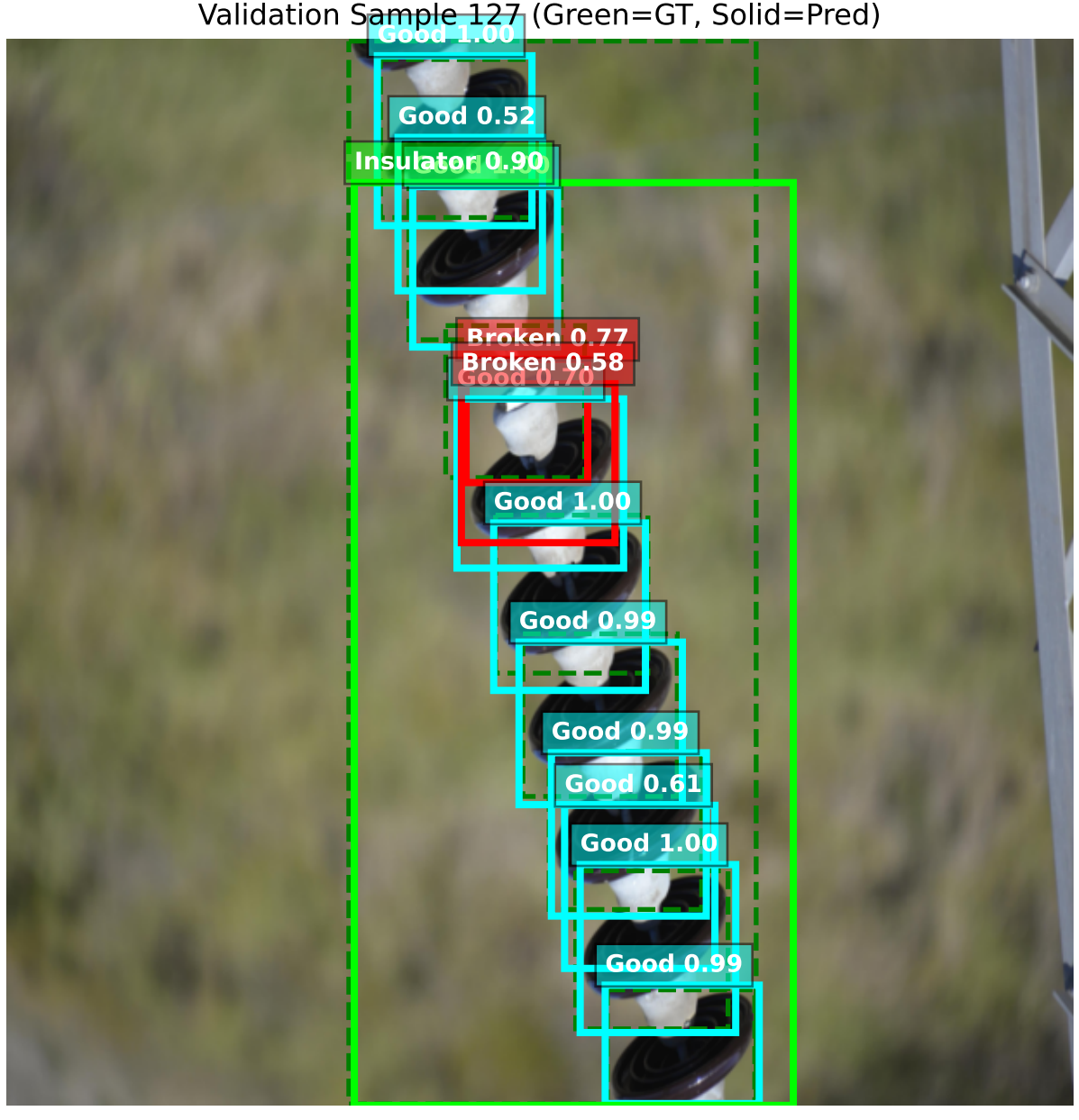

Performance per Class
AP @ 0.50
AP @ 0.75
Average Precision
1.0
0.8
0.6
0.4
0.2
0.0
Broken
Flashover
Good
Insulator


Confusion Matrix (Validation)
True Label
Background
Broken
Flashover
Good
Insulator
0
22
38
334
15
0
105
31
27
5
0
39
187
76
1
0
57
195
909
44
0
2
6
3
172
Background
Broken
Flashover
Good
Insulator
Predicted Label
800
600
400
200
0

Validation Sample 83 (Green=GT, Solid=Pred)

Validation Sample 30 (Green=GT, Solid=Pred)

Validation Sample 1 (Green=GT, Solid=Pred)


Validation Sample 127 (Green=GT, Solid=Pred)
Good 1.00
Good 0.52
Insulator 0.90
Broken 0.77
Broken 0.58
Good 1.00
Good 0.99
Good 0.99
Good 0.61
Good 1.00
Good 0.99


Validation Sample 110 (Green=GT, Solid=Pred)
Insulator 0.95
Flashover 0.51
Good 0.99
Good 0.99
Good 0.99
Good 0.99
Broken 0.76
Good 0.99
Good 0.71
Good 0.99