Yolo-based Partial Discharge Detector Using Acoustic Emission Data

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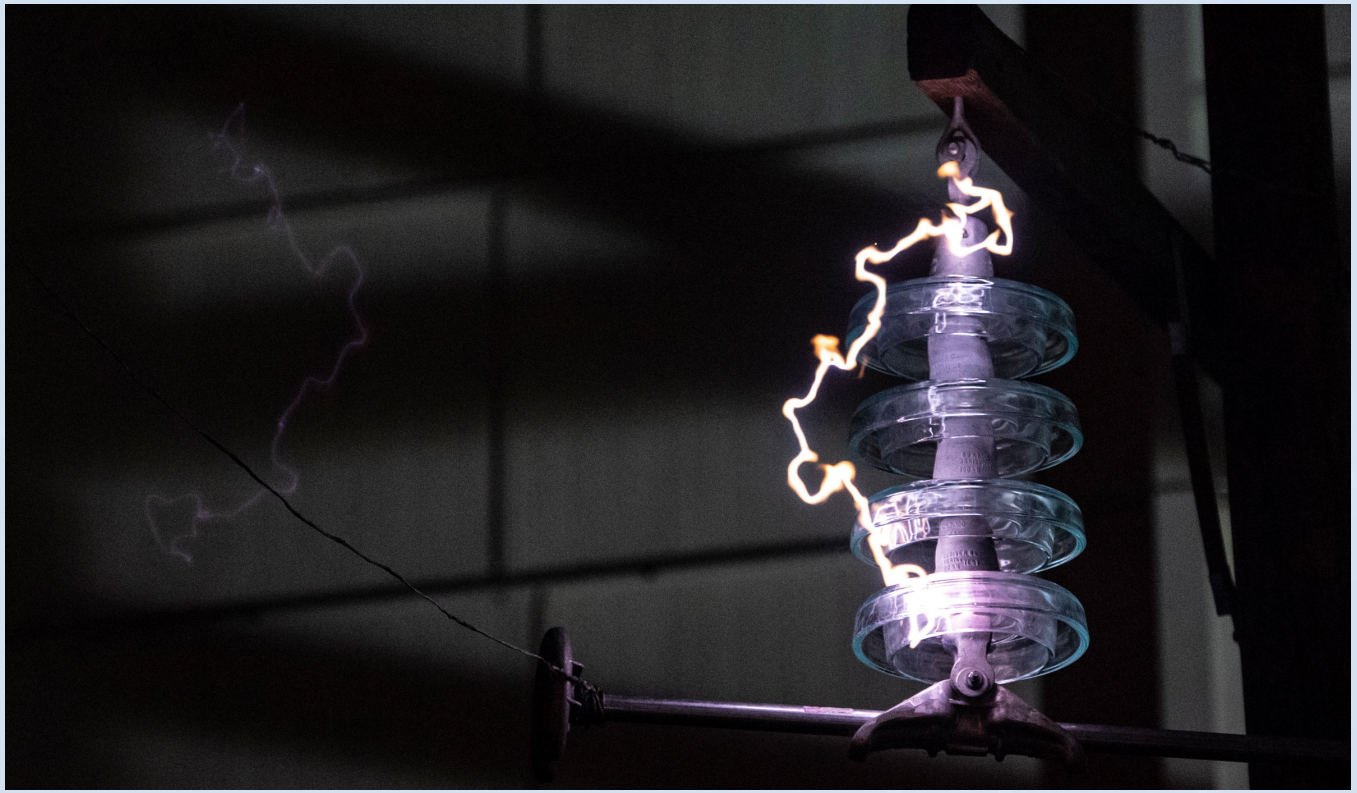
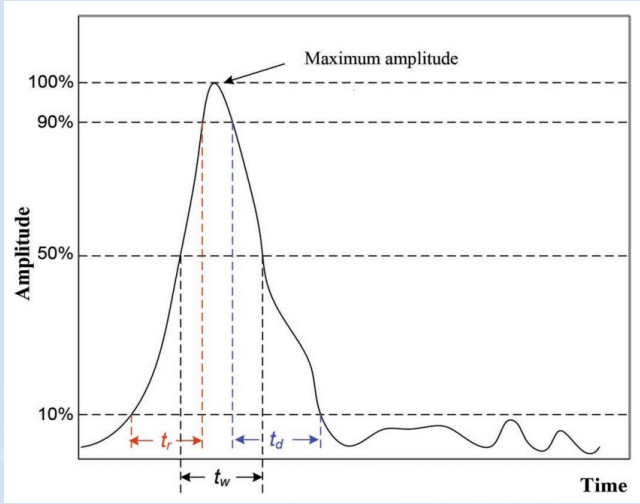
Scope

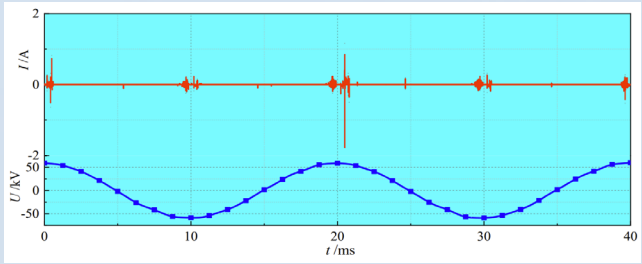
- Introduction
- Used approaches
- Experiments
- Results
- Conclusion

Introduction

Partial discharge (PD)

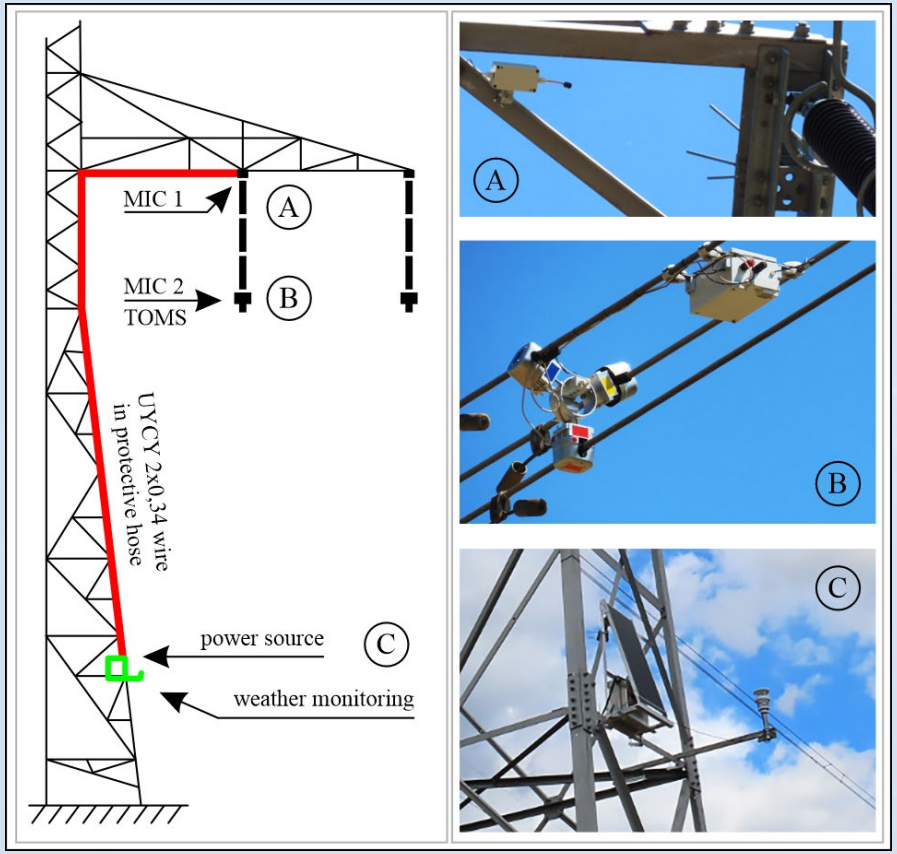


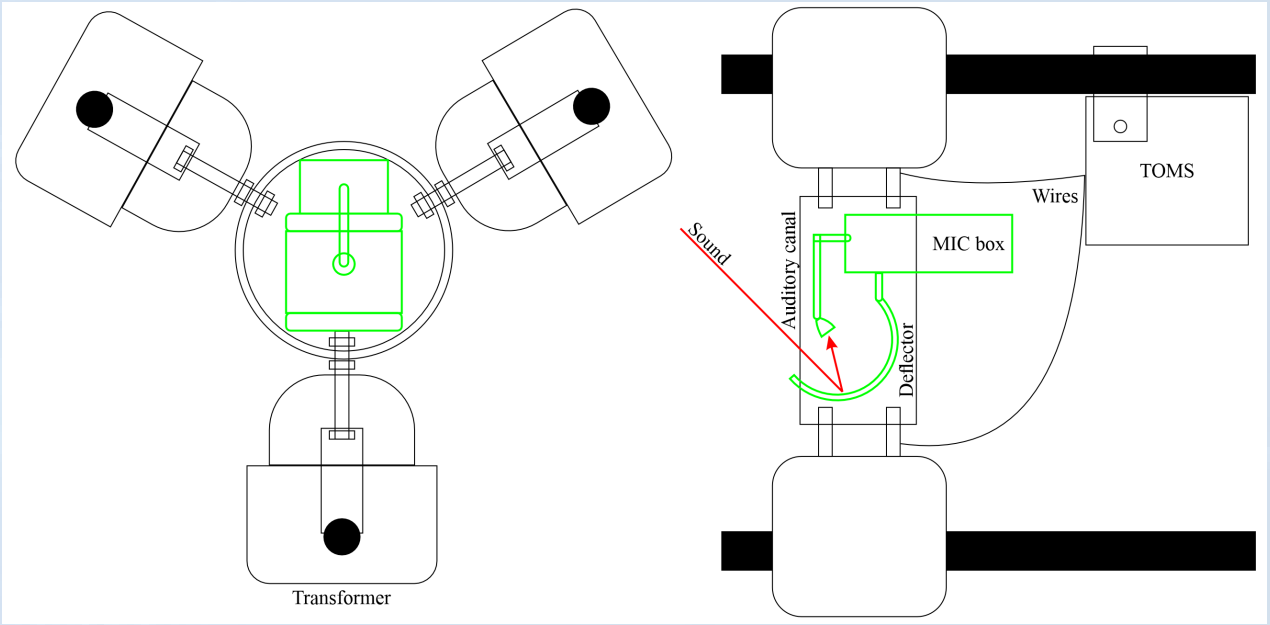




Used Approaches

Acoustic emissions (AE)

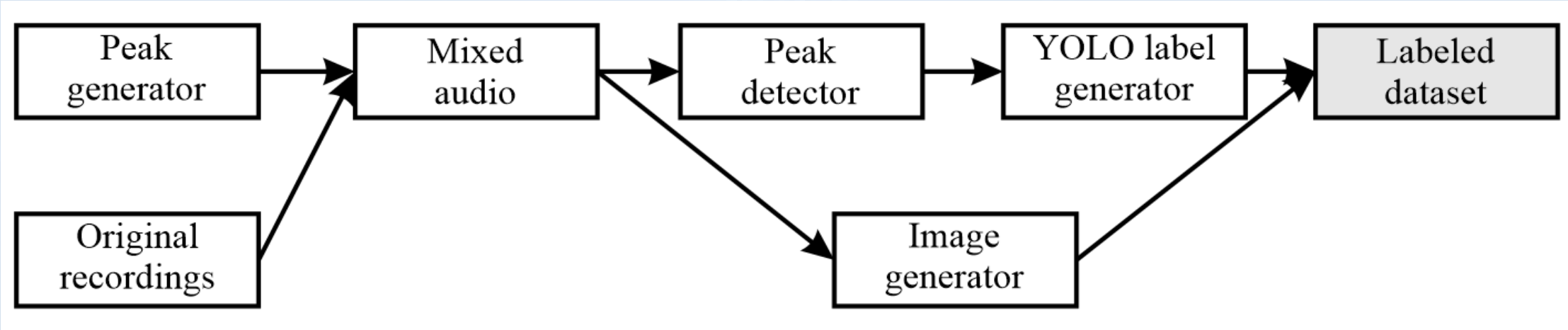




- 5 locations
- Uncompressed audio dataset

Used Approaches

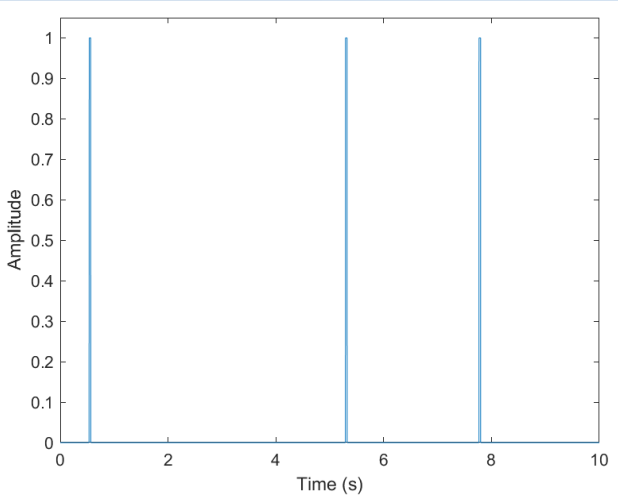
YOLO detector



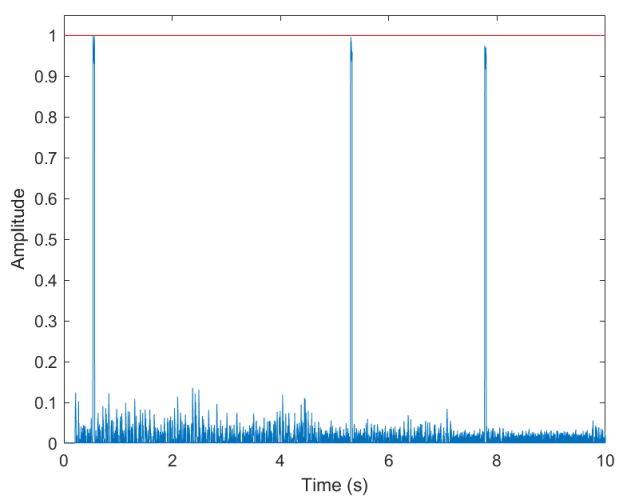
Used Approaches

YOLO training data

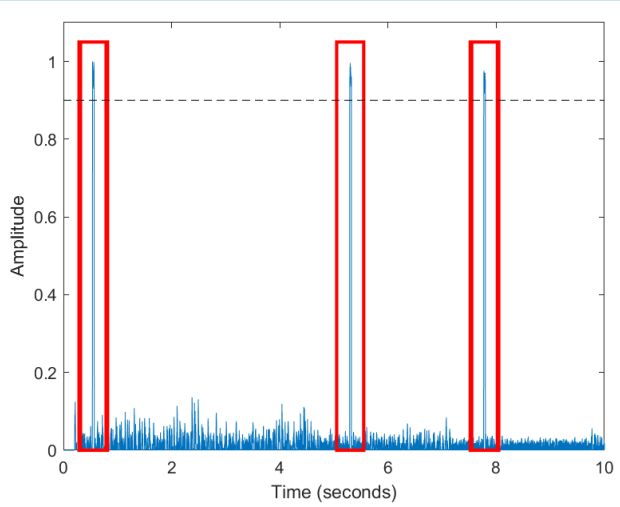
Peak generator



Mixed audio



Label generator



Experiments

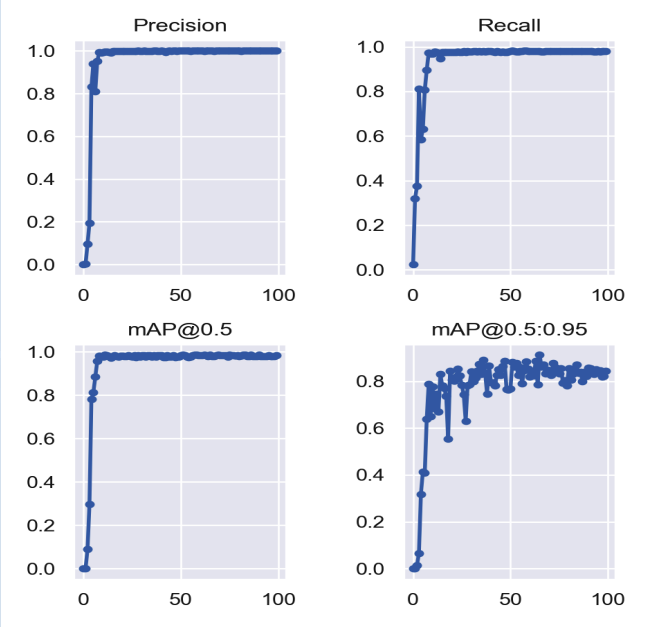
YOLO parameters

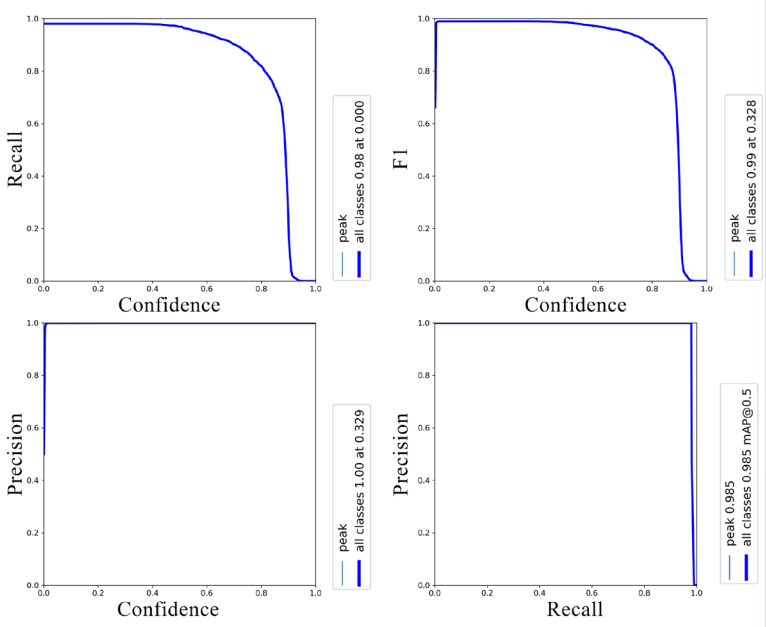
GPU-enabled hardware was used for the training. Software implementation is based on the Python programming language and Pytorch framework. The model was trained on a custom dataset. The creation and labeling of which were described in the previous section. The data was divided into the training and validation sets with a split ratio of 80-20%. The training set includes 2172 images containing 6516 labeled peaks. The validation set is comprised of 544 images with 1632 labeled peaks.

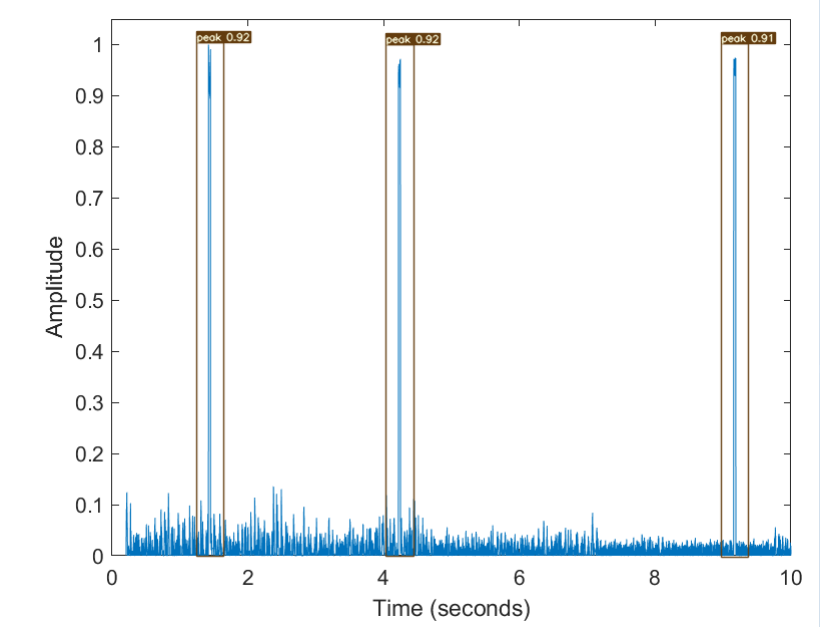
Parameter	Value
Input size (fixed)	676x656 pixels
Batch size	8
Learning rate	0.001
Number of epochs	100

Results

YOLO trained model







Conclusion

- further development will show its application to the real occurrence of PD and its ability to detect this phenomenon in the acquired AE

- further evaluation is required to determine if the peaks are actually PD-related

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- in the case of positive detection of PD, our future goal is to collect as many recordings as possible until the contaminated insulator is replaced.

- real-world PD dataset on which the system will be retrained

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- peak characteristics and amplitude threshold values are also key factors for future research.

Thank you

Acknowledgements

This work was supported by the Slovak Scientific Grant Agency VEGA No. 2/0131/23, by the Slovak Research and Development Agency APVV-20-0548 and by the Operational Programme Integrated Infrastructure (OPII), funded by the European Regional Development Fund (ERDF), in the project HYSPED implementation, ITMS: NFP313011BWC9.