# Wind Turbine Damage Detection Using SatNet

This project focuses on detecting damage and damage types in wind turbines using the \*\*SatNet\*\* deep learning model. The implementation includes all necessary application files and was developed as part of a research study.

## Dataset

The dataset used in this project is publicly available and can be accessed at the following link:

[https://universe.roboflow.com/gtek/zeliha-t04](https://universe.roboflow.com/gtek/zeliha-t04)

## Model

The deep learning model, \*\*SatNet\*\*, was developed as part of a doctoral thesis. It has been specifically designed and optimized for damage detection tasks in wind turbines. The model and its implementation are included in this project.

## Dependencies

This project was implemented using the following software and hardware:

- \*\*Operating System:\*\* Windows 11 Pro

- \*\*Processor:\*\* Intel Core i9-14900

- \*\*RAM:\*\* 48 GB

- \*\*Storage:\*\* 3 TB SSD

- \*\*Graphics Card:\*\* NVIDIA RTX 4080 (16 GB VRAM)

- \*\*Software:\*\* MATLAB 2024a with Deep Learning Toolbox

## License

This project is licensed for research and educational purposes only. See the [LICENSE](./LICENSE) file for details.

## Author

This project was created and published by \*\*Ferdi DOĞAN\*\* as part of a research study on wind turbine damage detection.

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| 1 | [z\_5\_sinifli\_FasterRCNN\_alexnet\_02102024.m](https://peerj.com/manuscripts/113536/files/3153909/download/?rid=249832)  Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained AlexNet deep learning model. |  |
| 2 | [z\_5\_sinifli\_FasterRCNN\_GoogleNet\_02102024.m](https://peerj.com/manuscripts/113536/files/3153911/download/?rid=249832)  Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained GoogleNet deep learning model. |  |
| 3 | [z\_5\_sinifli\_FasterRCNN\_inceptionResnetV2\_02102024.m](https://peerj.com/manuscripts/113536/files/3153913/download/?rid=249832)  Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained InceptionResnetV2 deep learning model. |  |
| 4 | [z\_5\_sinifli\_FasterRCNN\_inceptionV3\_02102024.m](https://peerj.com/manuscripts/113536/files/3153915/download/?rid=249832)  Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained InceptionV3 deep learning model. |  |
| 5 | [z\_5\_sinifli\_FasterRCNN\_MobilNetV2\_02102024.m](https://peerj.com/manuscripts/113536/files/3153917/download/?rid=249832)  Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained MobilNetV2 deep learning model. |  |
| 6 | [z\_5\_sinifli\_FasterRCNN\_ResNet18\_02102024.m](https://peerj.com/manuscripts/113536/files/3153919/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained ResNet18 deep learning model. |  |
| 7 | [z\_5\_sinifli\_FasterRCNN\_ResNet101\_02102024.m](https://peerj.com/manuscripts/113536/files/3153921/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained ResNet101 deep learning model. |  |
| 8 | [z\_5\_sinifli\_FasterRCNN\_Vgg19\_02102024.m](https://peerj.com/manuscripts/113536/files/3153923/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained vgg19 deep learning model. |  |
| 9 | [z\_5\_sinifli\_FasterRCNN\_ResNet50\_02102024.m](https://peerj.com/manuscripts/113536/files/3153925/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained ResNet50 deep learning model. |  |
| 10 | [z\_5\_sinifli\_FasterRCNN\_SqueezeNet\_02102024.m](https://peerj.com/manuscripts/113536/files/3153927/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained SequeezeNet deep learning model. |  |
| 11 | [z\_5\_sinifli\_FasterRCNN\_Vgg16\_02102024.m](https://peerj.com/manuscripts/113536/files/3153929/download/?rid=249832)   Matlab code for training and testing processes for detecting objects in the dataset with the Faster RCNN object detection model using the trained Vgg16 deep learning model. |  |
| 12 | [z\_5\_sinifli\_FasterRCNN\_SatNET\_3v1.m](https://peerj.com/manuscripts/113536/files/3153931/download/?rid=249832)  Matlab code for the training and testing processes of the proposed SatNET deep learning model to detect objects in the dataset with the Faster RCNN object detection model. |  |
| 13 | [SatNET\_ruzgarturbini\_icin.mat](https://peerj.com/manuscripts/113536/files/3159916/download/?rid=249832)  Layered structure of the SatNET deep learning model. |  |

Determination of damage and types in wind turbines Deep learning models and Faster RCNN studies for detecting damage and types in wind turbines are included in the attached files. Also, Matlab codes used for data augmentation are included in the appendix. This study was prepared with the matlab application within the windows 11 operating system. The hardware we have is cpu: i9 14900 ram: 48gb, gpu: rtx 4080 graphics card.

Also the files have been added to github and the github link is: https://github.com/doganferdi/windturbinedefectdetection/tree/main