

Railway Track Fault Detection

Mathematical Modeling Practice

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1 Introduction

Analyzing images and processing the information stored within is a key field of machine learning. Classification of different images, identifying and localizing different objects are basic problems. Several real-life cases prove the usability of such approach such as traffic sign recognition, object detection or face recognition. The target of current research is to endeavour to create an algorithm that is able to classify images taken from parts of the rail track to classify whether the rail is defect or not.

2 Dataset description

The dataset used for this study is taken from Kaggle webpage [1] and can be downloaded directly from <https://www.kaggle.com/datasets/salmaneunus/railway-track-fault-detection> [2]. The dataset is stored in different directories related to their purpose: Train, Validation, or Test dataset. Inside each directory the classes also splitted to separate directories: Defective or Non defective. The directory structure along with the number of images can be seen in Table 1 The images are taken from different perspectives (side, top), from different distances (close, distant) and from different parts (single rail, complete rail track, etc.) of the railway track. Some examples are shown in Figure 1.

Figure 1: Example images of the track

Folder	Number of images
./Train/Defective	150
./Train/Non defective	150
./Validation/Defective	31
./Validation/Non defective	31
./Test/Defective	11
./Test/Non defective	11

Table 1: Dataset directory structure

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References

[1] *Kaggle: Your Home for Data Science*. URL: <https://www.kaggle.com/> (visited on 12/22/2022).

[2] *Railway Track Fault Detection | Kaggle*. URL: <https://www.kaggle.com/datasets/salmaneunus/railway-track-fault-detection> (visited on 12/22/2022).