

Train Wheel Fault Detection Using Machine Learning

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Abstract: The development of the country is based on its economy and Railways play an important role for developing countries like India to boost the economy of the nation. Wheel Defects are of major concern in today's time as it may lead to poorer economy of the nation as well as it can be life threatening at moments. Hence it is very important to tackle the defects as early as possible. The main reason that these defects are not detected is due to the lateness in identifying them. Early detection can help save money, time and most importantly human being life. The paper proposes a Machine learning algorithm for detection of these Wheel defects at early stage and informing the same.

Keywords: Machine Learning, Defects, CNN-based classification, Image Processing, Image Acquisition, etc

I. INTRODUCTION

Railway wheel is assembly of two wheels fixed to the axle by interference fit and they rotate along with the axle, without any independent relative movement as in the case of other automobile wheels. A Defect is defined as a physical, functional, or aesthetic attribute of a product or service that exhibits that the product or service failed to meet one of the desired specifications. Various defects include Angular defects, Software defects, Crystallographic defect, Product defect etc. The process of identifying these defects is detection of the same. As known, the conventional method needs manual inspection of the wheels to find the defects. It is difficult because it is time consuming and cost inefficient.

In manually calculating, the problem that can be happen that some inspection can be wrongly made or maybe left out possessing serious danger. In the proposed method the various images of defects is fed to Machine Learning algorithm which in turn helps predict the type of defect. There are various datasets that is used to train the model which consists of various images of different kinds of images of Wheel defects. Major types of Defects that can be detected include Shelling, Non-Roundness, Flat-Spot etc. The model is trained accordingly and then testing data is provided for proper detection and classification of the defects

II. PROBLEM STATEMENT

Wheels of train wagons possess various wear and tear in them with time. If it is not maintained time to time they can hamper the performance very drastically. The current system is manual inspection which is time consuming and cost inefficient. The proposed system uses Machine Learning Algorithms to identify such defects more efficiently using Image Classification and processing of these defects and outputting the result.

III. GOALS & OBJECTIVES

- The main objective of this system is to fix the problems related to wheels and to solve the problem using CNN based machine learning algorithm.
- The process takes place in 3 major steps of Image Classification, Image Processing and Classification.

IV. PROPOSED SYSTEM

The detection of the error is mainly performed in 3 main steps

1. Image Acquisition: In Image Processing it is defined as the action of retrieving an image from some source, usually a hardware-based source for processing. It is the first step in the workflow sequence because without an image, no processing is possible. The image is completely unprocessed.

2. Image Processing: Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is signal processing in which input is an image and output maybe an image showing its properties and characteristics.

3. CNN Based Classification:

It is Machine Learning algorithm based on artificial neural network. A CNN can be trained to do image analysis tasks including classification, object detection, segmentation and processing.

Steps include:

1. Input Image
2. Process Image using OpenCV
3. Image Classification using ML. Here CNN based Classification.
4. Convey the result of the process.

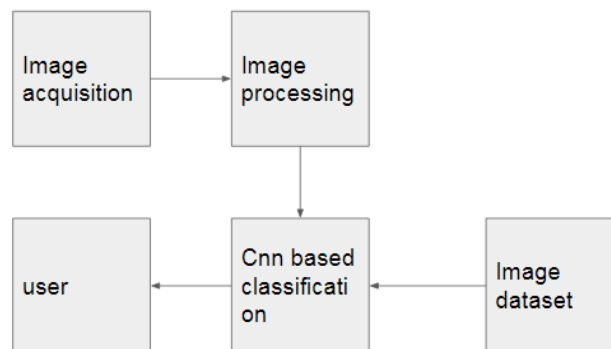


Fig: System Architecture

V. CONCLUSION

Hence, we have presented a Machine Learning algorithm for classification of wheel defects which identifies the faults and conveys the results to the specified person. The method used is non time consuming and is cost efficient which helps in boosting the economy and have the potential of saving many lives of humans which may be happened due to defects in these wheels.

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