Computer Vision 2024

The Tyre Guardian

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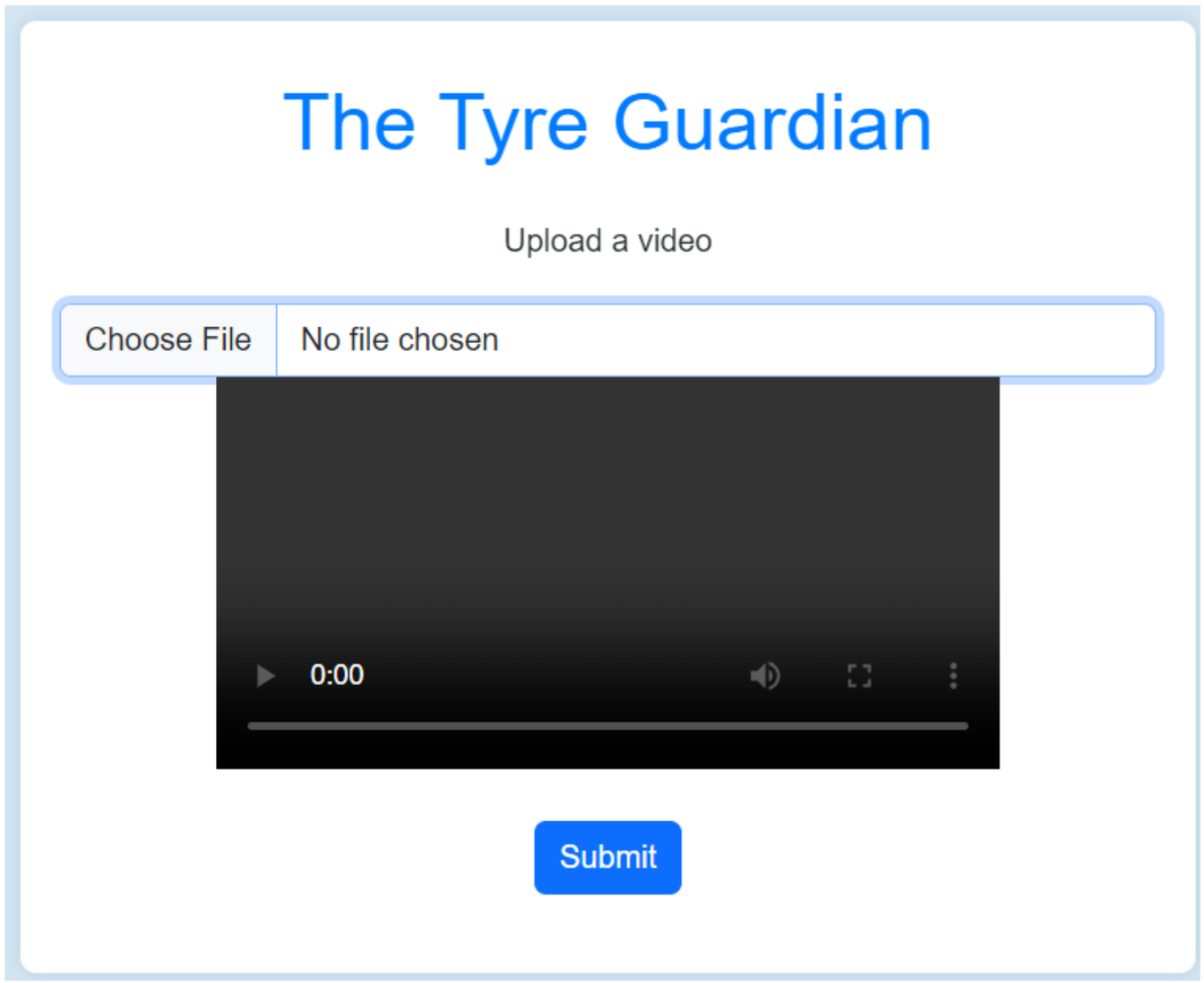


Problem Statement

To develop a sophisticated tire classification system using Convolutional Neural Networks (CNNs) to accurately categorize tires based on visual attributes, along with contributing to advancements in Automation and Computer Vision practices.

Motivation

Ensuring precise and consistent tire classification addresses risks linked to human error, bolstering quality standards and customer satisfaction. CV not only optimizes resource allocation but also fortifies workflow management for sustained performance excellence.

Leveraging CNN technology for tire classification promises to streamline operations, reducing manual effort and enhancing efficiency. This automation empowers organizations to meet demands swiftly and maintain competitiveness.

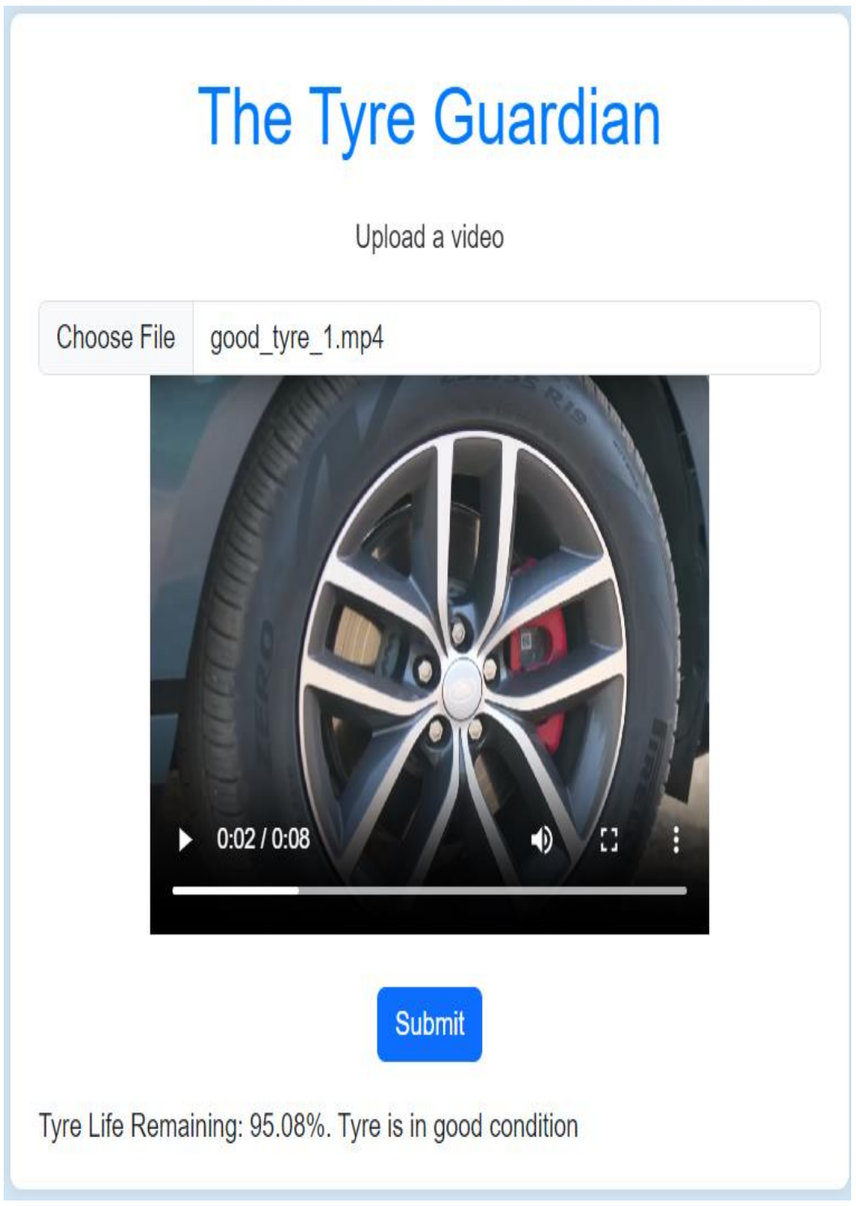
Description

We aim to develop an automated tire classification system using CNNs, enhancing efficiency and accuracy in industrial processes. Using advanced deep learning techniques, we aspire to revolutionize tire classification contributing to the forefront of industrial automation and quality control practices.

Challenges faced

- Dataset Acquisition and Quality:

Obtaining a diverse and comprehensive dataset for training the CNN posed a significant challenge. Ensuring the dataset's quality, including sufficient representation of different tires and addressing potential biases, was crucial for model performance.



- Model Optimization and Real-world Variability:

Tuning hyperparameters and optimizing CNN to achieve high accuracy and generalization were complex tasks. Accounting for real-world variability in tire images was essential to enhance the robustness and applicability in practical settings.

Features and Output

- High Accuracy Prediction:

The CNN model achieves 98% accuracy, ensuring precise tire classification for efficient decision making and quality inspection.

- Tire Condition Estimation:

Additionally, the system predicts tire condition, aiding in proactive maintenance scheduling and optimizing efficiency.

• Description of Dataset

The dataset comprises nearly 3000 images of tires, including multiple types and variations, as well as different tread patterns and sizes. In addition to synthetic images taken for model training, the dataset also incorporates real-life tire images. The inclusion of various tire types ensures a comprehensive representation, enabling robust training and evaluation of the convolutional neural network model for accurate tire classification.

Good Tire

Bad Tire

References

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