

Mobile Application Development: Graduate Assignment Report

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Abstract:

In the pursuit of technological innovation within the railway industry, our application leverages Apple's Core ML to revolutionize how the condition of railroad boxcars is assessed. This section of the report delves into the integration of Core ML into our Railroad Boxcar Condition Classifier app, elucidating how machine learning is applied to classify the condition of boxcars with unprecedented accuracy and efficiency.

Introduction to Core ML:

Core ML is Apple's machine learning framework designed for optimal performance on iOS devices. With a focus on user privacy and real-time processing, Core ML empowers our app to process complex machine learning tasks on-device, without the need for internet connectivity or cloud processing.

Model Training and Integration:

Our machine learning model was meticulously trained using thousands of labeled images, encompassing a wide spectrum of boxcar conditions. The model was then converted into Core ML format, allowing for seamless integration into the iOS app environment. This process ensures that the app is equipped with the cognitive capability to assess and classify boxcar conditions effectively.

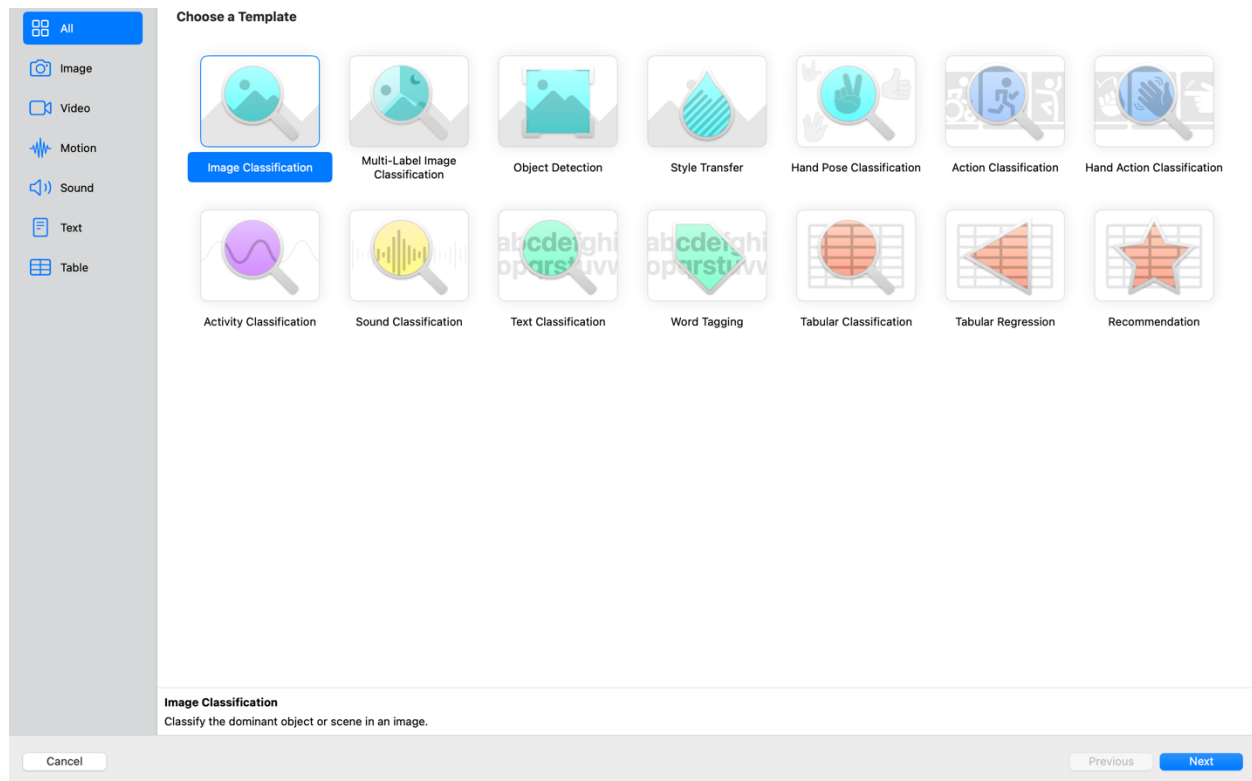


Fig 1.1

On-Device Processing:

Utilizing the robust processing capabilities of iOS devices, Core ML conducts image analysis directly on the user's device. This on-device processing methodology serves two primary purposes: safeguarding user privacy by eliminating data transmission to external servers and significantly reducing classification response times

App Workflow with Core ML:

The user experience is simple and intuitive: upon capturing or selecting an image of a boxcar, Core ML instantaneously evaluates the visual data, categorizing the condition of the boxcar into predefined levels of wear and tear. The results, presented in the form of labels and confidence percentages, are both informative and easily interpretable.

Benefits and Advancements:

The integration of Core ML into our app brings multiple user benefits:

Privacy: Complete data privacy as images are not uploaded or stored externally.

Speed: Swift processing for instant classification results.

Convenience: Easy-to-use interface with no technical expertise required for operation.

Accuracy: Continuously improving accuracy through model updates.

Conclusion:

The Railroad Boxcar Condition Classifier app exemplifies the innovative use of Core ML to address real-world problems in the railway industry. By providing a tool that is not only powerful and efficient but also user-friendly and privacy-centric, we are setting a new standard for boxcar maintenance and assessment protocols.

Please refer application guide for more information.

References:

1. Apple documentation
[<https://developer.apple.com/documentation/coreml>]
2. [<https://machinethink.net/blog/new-in-coreml3/>]
3. [<https://medium.com/swlh/k-nearest-neighbor-ca2593d7a3c4>]
4. Fig 1.1 is referenced from CreateML Xcode