

A Novel Approach for JPEG Image Steganalysis using Transfer Learning

Maddumage Avishka Thushan Padmasiri

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Department of Computing

Informatics Institute of Technology, Sri Lanka

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Abstract

In a growing world of social media where platforms completely rely on images to share content, image steganography is a convenient candidate for criminals to do secret communications. So it is important that detecting these images through image steganalysis so that the illegal activities could be monitored and resolved. In the domain, the conventional approaches relied on manual feature extraction techniques but with Convolutional Neural Network (CNN) it was automated making CNN the trending topic. In this work, approaches that aren't widely explored in the image steganalysis domain were analyzed which is Transfer Learning(TL). Also considering the domain, JPEG steganalysis was scarce so it was scoped into this research. The concept of Transfer Learning using recent ImageNet models such as EfficientNet, MobileNetV3, DenseNet and MixNet and attempts on developing ensemble models using the above architectures were experimented. From these multiple experiments, EfficientNet showed better results than the rest. Ensembling these models also showed positive results but a higher computational cost was required. JPEG Image steganalysis tool was developed where a cybersecurity forensic user can upload a JPEG image and get a detection for their work. This document will show how these above decisions and conclusions were made and finally as a major contribution how Transfer Learning impacts JPEG image steganalysis would be conveyed to the research community.

Keywords: Security and Privacy, Image Steganography, Image Steganalysis, Transfer Learning