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EVALUATING THE CHI-SQUARE ATTACK FOR STEGANOGRAPHY USING ROC CURVES

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Abstract of Poster: Steganography is the science of hiding a message inside a file so that it is not apparent that the file is being used for covert message transmission. Steganalysis is analyzing a file to detect a hidden message. The chi-square attack is a steganalytic method developed by Westfeld and Pfitzmann (1999) in order to recognize some types of steganographic embedding in the least significant bits (LSBs) of an image's pixel values. When the chi-square attack is applied to a JPEG image, it produces a graph of the probability of steganographic embedding vs. the sample size of the image's quantized DCT coefficients. By examining this graph an analyst can determine whether or not an image contains steganographic embedding. Using Receiver Operating Characteristic (ROC) curves, we develop an automated method to objectively evaluate the results of the chi-square attack and determine whether or not a JPEG image contains a message embedded using the popular JSteg algorithm. Automated steganalysis values are more objective and can be converted to feature values, which may then be used in a general automated detection system. Although our research was performed on images embedded using Jsteg, the methods we developed could also be applied to other stego-algorithms with predictable embedding schemes.