B20 Image Attribution in Social Media

Nicholas K. Ng, BS, 448 S Oak Knoll, Unit 1, Pasadena, CA 91101*

After attending this presentation, attendees will understand how to determine the source of images posted to social media.

This presentation will impact the forensic science community by providing a tool for law enforcement to track social media images posted to Facebook®, MySpace®, and Google Plus® and methods for applying the same comparisons will any social media website. This presentation will seek to eliminate the mystery that has surrounded images uploaded to the internet.

Society has embraced social media that is rapidly becoming interwoven in our daily lives. Traditional eye witnesses of crimes are being replaced by video and image recordings. Today, almost everyone owns a cellphone and crimes are being increasingly captured on cellphone cameras. Unlike the traditional camera, people always carry their cellphones and they are becoming increasingly user friendly. Due to proliferation and ease of use, cellphones are becoming increasingly important to law enforcement investigations. The largest social media website, Facebook, reports 1.11 billion active users and 300 million picture uploads every day. The combination of cellphone camera technology and Social Media is making it easier than ever to capture images and publish them on the internet.

Investigators now have to determine how to deal with pictures posted to these social media websites that become evidence in crimes. Traditional methods of authenticating the origin of pictures are useless because the processing applied by the social media websites eliminates or obscures much of this information. This presentation will cover several methods of image attribution utilizing both simple data analysis as well as more advanced statistical comparison. This presentation will provide the novice with simple tools and the expert with more statistically precise tools to determine the source of pictures found in social media.

Image Attribution is the process of determining the origin or processing path that an image has gone through. Three Image Attribution methods will be discussed: Social Media Website Image Attribution, Camera Model Image Attribution, and Specific Image Attribution. Social Media Website Image Attribution determines which social media website processed an image, Camera Model Image Attribution determines which camera model an image originated from, and Specific Camera Image Attribution determines which specific camera an image originated from.

An image corpus was created to test the each of the three methods. 1,100 images were taken with 9 separate cellphone cameras and uploaded to three social networking websites. 1000 images from each camera were used to determine an image database and the remaining 100 images were used for comparison. This corpus will determine how accurate each method by determining Error Rates and Likelihood Ratios.

A combination of simple data analysis and Image Authentication techniques were used to determine signatures in the test images and match the comparison images to the database images. Simple data analysis methods include metadata analysis, structure analysis, and quantization table analysis. Image Authentication techniques used included Compression, Color Filter Array, and PRNU analysis.

The final results of this research prove that Image Attribution is possible for determining the social media website, camera model, and specific camera with a high degree of certainty.

Image Attribution, Image Authentication, Social Media

 ** Presenting Author*