

CSI 660 Image Forensics, Spring 2012, University at Albany

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(Presented at New Trends in Computing and Informatics Research 2012)¹

Problem:

The advent of image editing tools has made it quite common to see manipulated signs, billboards and advertisements in print, media and internet. The presence of numerous tools and plug-ins in image editors like *Adobe Photoshop*© has made aforementioned manipulation easier even for someone not having a technical training in these fields. Apart from ease of creation, the manipulation is often convincing. When text is on a planar surface and imaged under perspective projection, the text undergoes a specific distortion. When text is manipulated, it is unlikely to precisely satisfy this geometric mapping, which can be detected.

Research Technique:

Our program is written using MATLAB, and uses image forensics techniques to determine if images containing text, such as fake writings on a billboard, are authentic or forged. This analyzes variations in perspective projections of the text and font. When text is inserted into an image, the precise rules of perspective projection are violated, and these violations are not perceptually obvious. However, these violations can be detected by comparing the text field for deviations in planar homography and fonts; making it possible to determine if the text was forged. These techniques form the main subject of research paper titled **DETECTING PHOTO MANIPULATION ON SIGNS AND BILLBOARDS** by Valentina Conotter & Hany Farid (2012)²

Steps Taken By Program:

To detect if the text on the image is a forgery or not, the program tests if the text in the supposedly edited part of the textual area is in the same plane as the entire text or not. For considering this, we select the points on the text. The program then draws lines showing the consistency of the plane in which text is placed. For consistent text and fonts, the lines drawn are usually parallel to each other.

Tools:

- MATLAB was used to implement the algorithm and relevant techniques listed in the paper

Success Criteria and Milestones:

- Implements the Planar Homography method mentioned in the paper.
- Analyzes its performance in different conditions.

Limitations:

- Works only if the edited text has been placed in inconsistent Projection.

Achievements:

- A Demo of the functionality and related slides were presented by the students at the Annual NTCIR Conference (*New Trends in Computing and Informatics Research*) at University at Albany on April 27th 2012.

The program for the said conference can be viewed [here](http://www.albany.edu/cci/ntir/ntir2012/program.html) (pdf format) or <http://www.albany.edu/cci/ntir/ntir2012/program.html>

Presenter/Student Bio:

Matt Frey is a senior at University at Albany in the Computer Science B.S. program. He is originally from Syracuse, NY. He has been programming and working with computers for over 12 years. He first got into programming and software development working with modifications for 3D games. His current interests mainly concern mobile integrated applications and cloud-driven software solutions. He will be graduating this year and plans to relocate to Denver, CO.

Darshan Shinde is currently a M.S. student studying Computer Science at the University at Albany. Starting his Undergraduate studies in Instrumentation Engineering at University of Mumbai, India, he transferred to US completing his BA in Computer Sciences with a minor in Physics in May 2010. He has worked as a Graduate Assistant at NYS Center for Information Forensics & Research and as a Webmaster for Department of Chemistry. His research interests include Factors involving Failure and Collapse of Self- Organized Systems, Android platform Development & Web Development.

Bibliography:

- 1.) *New Trends in Computing and Informatics Research 2012*, University at Albany,
- 2.) Conotter, V., Boato, G., & Farid, H. (2010). 'Detecting Photo Manipulation on Signs and Billboards', IEEE International Conference on Image Processing, (pp. 1741-1744). Hong Kong.