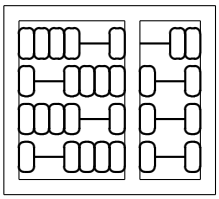

MO447 & MC919A
Digital Forensics
Topics in Digital Image Processing

Institute of Computing — UNICAMP
2nd Semester, 2013
Prof.: Anderson Rocha
anderson.rocha@ic.unicamp.br

Course Description

Days and Times

Class	Day	Time	Sala
All	Wednesdays	19 – 20:40	CB14
	Fridays	21 – 22:40	CB03

Extra-class aid

Student who need extra class help from the professor must send an e-mail with 24 hours in anticipation.

Evaluation

This class will be evaluated according to the following criteria:

1. **One written test**. **Weight**: 40% of the final grade.
2. **One practical assignment** solving one problem related to digital forensics (implementation and tests) documented with one article which may or may not be submitted to some related scientific event. The problem to be solved must be discussed a priori with the professor.
   - This assignment must be done in groups of either three or four people. The groups must be formed respecting the categories: undergrads, graduates, and special students (e.g., undergrad students must form groups with other undergrad students).
   - The programming language of choice is free (e.g., C, C++, Java, R, Python etc.).
   - The work must contain the resolution (implementation and tests) of one problem in the area of *Digital Forensics* documented by a technical report in the form of an article (model will be given later). The report and source code must be submitted.
   - At the end of the third week of class, a 1-page PDF document must be turned in (by e-mail) formalizing the problem to be solved and the team who will work on such problem. This document will serve as a "contract" about what will be done and what will be considered when grading.
   - A short 30/45-minute presentation must be delivered at the end of the semester describing the problem and its developed solution. **Weight**: 60% of the final grade.

Grading

For graduate students, the final grade G_f will be converted to letter grades according to the following criteria:

A $G_f \geq 85\%$ (Approved);

B $70\% \geq G_f < 85\%$ (Approved);

C $60\% \geq G_f < 70\%$ (Approved);

D $N_f < 60\%$ (Failed);

For undergrads, **there is no** conversion.

Deadlines

- Written test: November 22nd (Friday)
- Projects: November 27–29th (Wednesday–Friday)

Syllabus

The topics which will be discussed in this class include:

1. Introduction to Computational Forensics and to Document/Image Forensics
2. Historical Aspects in Image Forensics
3. Traditional and Modern Techniques for Image Manipulation
4. File Carving Techniques
5. Image and Video Phylogeny
6. Pornography and Violence Detection
7. Searching for Suspects through Mugshots and Image attributes
8. Digital Image Forensics
   (a) Fundamental Questions;
   (b) *Passive and Blind Analysis* versus *Watermarking*;
   (c) Taxonomy
      i. Source attribution techniques (model versus specific);
      ii. Identification of synthetic images
      iii. Format-Based Forensics
      iv. Camera-Based Forensics
      v. Pixel-Based Forensics
      vi. Geometric-Based Forensics
      vii. Physics-Based Forensics
      viii. Video Forensics
      ix. Printer Forensics
      x. Authentication techniques
      xi. Steganalysis
9. Spoofing Detection
10. Cloud Forensics
11. Counter-Forensic Techniques;
12. Open issues and Research Challenges

Webpage

http://www.ic.unicamp.br/~rocha/teaching/2013s2/mo447

Special Students Access to the Laboratories *Graduate students in the "Special Student" category must look for the graduate students secretariat for obtaining the credentials for accessing the laboratories.*

Bibliografia

Most of the course's materials will be in the form of scientific articles. However, some additional material may be found in:

Livros

1. *Adobe Photoshop Forensics – Sleuths, Truths, and Fauxtography.* Cynthia Baron. Thomson. (2008)
2. *Photo Fakery – The History and Techniques of Photographic Deception and Manipulation.* Dino Brugioni. Brassey's. (1999)
3. *Photoshop Artistry.* Barry Haynes, Wendy Crumpler e Seán Duggan. New Riders. (2007)
4. *Pattern Classification.* Richard O. Duda, Peter E. Hart e David G. Stork. Willey-Interscience. (2000)
5. *Machine Learning.* Tom Mitchell. McGraw-Hill. (1997)
6. *Pattern Recognition and Machine Learning.* Christopher M. Bishop. Springer. (2006)
7. *Artificial Intelligence – A Modern Approach.* Stuart Russell and Peter Norvig. Pearson. (2010)
8. *Digital Image Processing.* Rafael Gonzalez e Richard Woods. Prentice-Hall. (2007)

Book Chapters and Surveys

1. *Vision of the Unseen: Current Trends and Challenges in Digital Image and Video Forensics.* Anderson Rocha, Walter Scheirer, Terrance E. Boult e Siome Goldenstein. *ACM Computing Surveys (CSUR); v. 43, p. 26:1-26:42 (2011).*
2. *Digital Image Forensics.* Hany Farid. *Technical Report available at: http://www.cs.dartmouth.edu/farid/downloads/tutorials/digitalimageforensics.pdf; 1–199(2013).*
3. *Algorithms, Architectures, and Information Systems Security — Chapter: Overview of State-of-the-art in Digital Image Forensics.* Taha Sencar e Nasir Memon. World Scientific Publishing. (2008)
4. *Multimedia Security Technologies for Digital Rights Management — Chapter: Passive-blind Image Forensics.* Tian-Tsong Ng, Shih-Fu Chang, Ching-Yung Lin e Qibin Sun. Academic Press. (2006)
5. *Atualizações em Informática (2010) — Chapter: CSI: Análise Forense de Documentos Digitais.* Anderson Rocha e Siome Goldenstein. PUC-Rio. (2010)

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