



# MULTIMEDIA FORENSICS: OVERVIEW AND PERSPECTIVE

(September 19-23, 2022)

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## Overview

The widespread adoption of digital content over traditional physical media such as film has given rise to a number of new information security challenges. Digital content can be altered, falsified, and redistributed with relative ease by adversaries. This has important consequences for governmental, commercial, and social institutions that rely on digital information. The pipeline which leads to ascertain whether an image has undergone to some kind of forgery leads through the following steps: determine whether the image is “original” and, in the case where the previous step has given negative results, try to understand the past history of the image. Although the field of information forensics is still young, many forensic techniques have been developed to detect forgeries, identify the origin, and trace the processing history of digital multimedia content.

During this course, we will discuss about the overview of information forensics research and related applications. Also, we examine the device-specific fingerprints left by digital image and video cameras along with forensic techniques used to identify the source of digital multimedia files. Topics like database mismatch, lack of training data, supervised and unsupervised methodologies, vulnerability assessment against attacks, tampering detection in the presence of unknown post-processing, deepfakes detection and so on, would all be themes of interests. Finally, an overview of the recent trends and evolution, just considering the updated literature in the field will be provided. Lectures will be supported with discussion sessions based on different problems associated with multimedia forensics.

In this program, efforts will be made to introduce various tools used in multimedia forensic system for commercial and scientific imaging applications such as forgery detection using active and passive methods, video forensic, social media forensic, adversarial forensics, etc. Furthermore, this program will also have sufficient practical sessions to support the lectures. It is expected that participants will attain sufficient knowledge in this area after attending this program.

## Objectives

The main objective of this course is to explain the basic and advanced concepts of forensic systems for commercial and scientific imaging system. This also explains how imaging data are processed and how proceed to detect forgeries. Another prime objective is also to list the specifications and requirements to select a specific algorithm for your imaging application in the forensics context and learns to recognize performance differences among imaging pipeline technologies. After successful completion of the program, participants will familiar with current and future multimedia forensics technologies and applications.

# Course Contents

1. Introduction of data science: motivation, problems to address, limitations and challenges, and applications
2. Multimedia forensics
3. Camera identification
4. Forgery detection through active methods
5. Forgery detection through passive methods
6. Double quantization
7. Video forensics
8. Social media forensics
9. Deep fake methods for generation and detection
10. Adversarial forensics
11. Case study analysis
12. Research status and current challenges

\* Practical Sessions on (a) image and video authentication, (b) deepfake and (c) case study analysis.

<b>Dates</b>	<b>September 19-23, 2022</b> (Number of participants for the course will be limited to fifty)								
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>▪ Students at all levels (B.Tech./M.Sc./M.Tech./Ph.D.) and aspiring researcher within the broad domain of signal, image, video processing, data science, machine learning, artificial intelligence.</li> <li>▪ Practicing engineers, computer scientists, physics, mathematicians, information technologists and data-processing specialists working in diverse areas such as telecommunications, seismic and geophysical, medical, and hospital information systems may find the course useful in their quest to learn advanced techniques for multimedia forensic.</li> <li>▪ Executives, researchers from artificial intelligence, image/video processing, and computer vision industry, service and government organization including R&amp;D laboratories.</li> <li>▪ Faculty members from academic and technical institutions.</li> </ul>								
<b>Fees</b>	<p>The participation fee per person for taking the course is as follows:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 5px;"><b>Participants from abroad:</b></td> <td style="text-align: right; padding: 5px;"><b>USD 150 / INR 11700</b></td> </tr> <tr> <td style="padding: 5px;"><b>Industry/ Research Organizations:</b></td> <td style="text-align: right; padding: 5px;"><b>INR 5900/-</b></td> </tr> <tr> <td style="padding: 5px;"><b>Academic Institutions (Faculty):</b></td> <td style="text-align: right; padding: 5px;"><b>INR 3540/-</b></td> </tr> <tr> <td style="padding: 5px;"><b>Academic Institutions (Student):</b></td> <td style="text-align: right; padding: 5px;"><b>INR 2360/-</b></td> </tr> </table> <p>Students have to submit a letter from their institution/Valid Identity card as proof of full-time student enrollment.</p> <p>The above fees include all instructional materials, computer use for practical sessions, internet facility. The course fee is inclusive of 18% GST as per institute norm. Registration fee should be paid through VNIT Payment gateway <a href="https://pay.vnit.ac.in/home">https://pay.vnit.ac.in/home</a>. For the complete process, you may visit <a href="https://ece.vnit.ac.in/people/deepgupta/gian/mf/">https://ece.vnit.ac.in/people/deepgupta/gian/mf/</a></p> <p>Boarding, lodging, and meal charges are not included in the fees. The participants will be provided single/shared accommodation in the Institute Guest house/Guest Rooms/ student hostel on payment basis.</p>	<b>Participants from abroad:</b>	<b>USD 150 / INR 11700</b>	<b>Industry/ Research Organizations:</b>	<b>INR 5900/-</b>	<b>Academic Institutions (Faculty):</b>	<b>INR 3540/-</b>	<b>Academic Institutions (Student):</b>	<b>INR 2360/-</b>
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<b>To Apply</b>	<p>For participants both within and outside VNIT Nagpur, a one-time fee of Rs. 500/- will be charged for registration at the GIAN portal for all future courses in subsequent years. Login and Apply at <a href="https://gian.iitkgp.ac.in/GREGN/index">https://gian.iitkgp.ac.in/GREGN/index</a> .</p> <p>For more details, Please follow the link <a href="https://ece.vnit.ac.in/people/deepgupta/gian/mf/">https://ece.vnit.ac.in/people/deepgupta/gian/mf/</a></p>								

## The Faculty



**Prof. Sebastiano Battiato** is a Full Professor, Scientific Coordinator of the PhD Program in Computer Science and Deputy Rector for Strategic Planning and Information Systems at the University of Catania, Italy. He has participated as principal investigator in several international and national research projects. His research interests include Computer Vision, Imaging technology and Multimedia Forensics. He is involved in research and directorship of the IPLab research lab (<http://iplab.dmi.unict.it>). Prof. Battiato has been appointed as principal investigator of a scientific collaboration between DMI/UniCT and Racis/RIS (Arma dei Carabinieri, Messina, Italy). He has supervised about 15 PhD students and 3 postdocs. Prof. Battiato has edited 6 books and co-authored about 300 papers in international journals, conference proceedings and book chapters. He is also co-inventor of 22 international patents, reviewer for several international journals, and has been Chair of several international events (MMFORwild 2020, IMPROVE 2021, INTELLYSIS 2020-2021, ICIAP 2017, VINEPA 2016, VISAPP 2012-2015, IWCV2012, ECCV2012, ICIAP 2011, etc.). He has worked as Director of ICVSS - International Computer Vision Summer School (2007-2019 and 2022), Director of Italian Ph.D. school “La Visione delle Macchine” - GIRPR – Catania November 2010. He is a IEEE senior member. He is member of the Centre of Excellence for the acceleration of Harm Reduction (CoHear) of the University of Catania. Prof. Battiato has been involved in the evaluation process of research projects on behalf of national and international institution (FTI-EU, MISE, MIUR, ANVUR, Invitalia, FinCalabria, FinPiemonte, Regione Friuli-Venezia Giulia, Regione Puglia, Research Promotion Foundation (RPF) of Cyprus, Netherlands Organisation for Scientific Research (NWO) - etc.) . He has worked as consultant on behalf of the Public Prosecutors of Bergamo, Milano, Livorno, Roma, Napoli, Siracusa, Catania and Reggio Calabria on issues related to Imaging in the forensic field. Since 2016 he is Founder and Scientific Advisor of iCTLab ([www.ictlab.srl](http://www.ictlab.srl)) - spin-off of the University of Catania that operates in the field of Digital Forensics.



**Dr. Deep Gupta** is an Assistant Professor in the Dept. of Electronics and Communication Engineering at Visvesvaraya National Institute of Technology Nagpur, Maharashtra (India). He received his Ph.D. and Master’s degree in Image Processing from Indian Institute of Technology Roorkee, India in 2015 and 2010, respectively. Dr. Gupta is an IEEE senior member and life member of Ultrasonic Society of India. He is also a recipient of Dr. T.K. Saksena Memorial and S. Parthasarathy awards from Ultrasonic Society of India in 2016 and 2013, respectively. His research interests include Image processing, Computer Vision, Medical Image Analysis, Multimodal Image Registration and Fusion, Food Image Analysis by end to end learning, Histopathological Image Analysis, Event Detection and Cognitive Analysis. He has authored several papers in the refereed journals and conferences of international repute. He acts as a regular reviewer for reputed journals such as IEEE Journal of Biomedical and Health Informatics, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Instrumentation and Measurement, IEEE Journal of Translational Engineering in Health and Medicine, IEEE Signal Processing Letters, IEEE Access, IEEE Sensor Journal, IET Image Processing, IET Computer Vision and Biomedical Signal Processing and Control.



**Dr. Saugata Sinha** is an Assistant Professor in the Department of Electronics and Communication Engineering, Visvesvaraya National Institute of Technology, Nagpur (India). He received his Ph.D. in Imaging Science from Rochester Institute of Technology, USA and Bachelor degree in B.Tech in Optics & Optoelectronics from Department of Applied Optics & Photonics, University of Calcutta, India, respectively. He has worked as a research scientist for applied microwave electronics engineering and research. He is a member of IEEE society. He has authored several papers in the journals and conferences of international repute. His research interests include Photoacoustic imaging, Image and Video Processing, Medical imaging, Computer vision and Pattern recognition.

## About VNIT Nagpur



Visvesvaraya National Institute of Technology, Nagpur is one of the thirty-one National Institutes of Technology in the country. The Govt. of India conferred on the Institute, the Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956)) with effect from 26th June 2002. Subsequently, the Central Govt. by Act of Parliament (National Institutes of Technology Act, 2007 (29 of 2007)) declared VNIT Nagpur as an Institute of National Importance along with all former regional engineering colleges. The Act was brought into force from 15th August 2007. Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Govt. of India and Govt. of Maharashtra. The college was started in June 1960 by amalgamating the State Govt. Engineering College functioning at Nagpur since July 1956. In the meeting held in October 1962, the Governing Board of the College resolved to name it after the eminent engineer, planner, and statesman of the country Sir M. Visvesvaraya.

## About Department of ECE



The department of Electronics and Computer Science was created in 1994 from the department of Electrical Engineering. Later, the Department of Electronics and Communication Engineering has been created in May 2014. Department of ECE offers B.Tech. in Electronics and Communication Engineering, M.Tech. in Communication System Engineering, and Ph.D. The department has well qualified and well-motivated faculty members and support staff. There are more than 30 full time Ph.D. students enrolled in the different areas of signal and image processing, medical image analysis, embedded system design, communication system, etc. Department has Centre of Excellence in Combedded Systems and Centre for Artificial Intelligence. The department is actively involved in R&D as well as consultancy projects and has collaborations with several industries, academic institutions and R&D organizations in the country and outside.



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For registration

<https://gian.iitkgp.ac.in/GREGN/index>

For more details:

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