

**5-Days Course cum Workshop (Self-Financed) on**  
**“Effective Image Processing and Machine Learning Tools for Contemporary Applications”**  
**with an opportunity to pursue Ph.D. programme at IITA**

Scheduled Dates: 3<sup>rd</sup> –7<sup>th</sup> June 2019

**Reference:** 2-Days Certificate Programme (Self-Financed) on “Effective Image Processing Tools for Novice: Learn Image Processing for Contemporary Applications” successfully conducted on 1<sup>st</sup> & 2<sup>nd</sup> December 2017

### **Introduction**

Image processing is a prominent field of research and development nowadays. With the advancements in mobile technology and latest trends in social media, it is in more demand in the industry besides its traditional and contemporary applications in various fields. Image processing is also being used in forensics, security, medical science and data analytics with a lot of scope in other fields of research. Thus, it is the demand of present time to learn image processing effectively and efficiently to utilize the skills in robust manner for various applications. Machine learning is equally popular for various applications in present scenario which is very useful for image processing applications too. With the help of machine learning tools, large datasets may be processed effectively for extraction of useful information especially the large image datasets. The proposed program is for the beginners to learn image processing and machine learning tools in an effective way by providing the exposure to the tools and to discuss contemporary problems for future research.

### **Objectives**

- To provide an exposure of image processing to naïve users
- To teach the machine learning and image processing fundamentals to beginners
- To provide a hands on experience of machine learning and image processing tools
- To discuss research ideas and topics in machine learning and image processing
- Exploring for suitable candidates for PhD programme at IIT Allahabad in the fields of Machine Learning/Deep Learning and Image Processing

### **Methodology**

The program will be conducted in form of lectures followed by hands-on. Each session will have a dedicated section for discussion. An assessment session will be dedicated to the registered eligible candidates who are interested to pursue Ph.D. in the fields of Machine Learning/Deep Learning and Image Processing and one simultaneous dedicated session will be conducted for remaining candidates for the discussion of the problems raised by them followed by proposed solution by the experts.

### **Topics to be covered**

#### 1. Machine Learning

- a. Conditioning/Preprocessing
- b. Supervised Learning
- c. Unsupervised Learning
- d. Deep Learning Basics

## 2. Image Processing Fundamentals and Image Processing Toolbox

- a. Image Basics: Representation and Color Models
- b. Image Display and Basic Operations on Pixels
- c. Image Filtering & Enhancement
- d. Segmentation and Image Analysis
- e. Independent Component Analysis

## 3. Machine Learning Applications

- a. Pattern Recognition
- b. Modeling and Prediction
- c. Time Series Applications
- d. Open Problems

## 4. Applications of Image Processing in Research Topics

- a. General Imaging, Remote Sensing
- b. Medical Imaging, Biometrics
- c. ICA Applications in Cocktail Party Problem, Denoising
- d. Machine/Deep Learning for Image Processing Applications

### **Target Audience**

UG/PG/PhD students of Engineering/IT Institutions and Universities; Research Scholars/Fellows/Associates and working professionals interested in Image Processing/Police & Intelligence Departments etc.

*The candidates interested to pursue Ph.D. in the fields of Machine Learning/Deep Learning and Image Processing must have completed M. Tech. program in the relevant field and qualified GATE examination.*

### **Certification & Credit Award**

The participants will be given a certificate for successful completion of the course. Those who register at first day for the credit programme will be awarded two credits. The evaluation for the credits will be done by continuous assessment and final project/presentation by the candidates.

### **Registration Fee (GST Included)**

Rs. 1500/- for IIITA students/scholars/staff

**Rs. 2500/-** for all other candidates

### **Accommodation**

Accommodation will be available in the Guest House on individual and/or sharing basis. Charges for food and lodge will be applicable as per the Guest House rules.

### **Expected Participants**

Max. 30 participants will be allowed to register

## Course Coordinators & Resource Persons

Dr. Triloki Pant (Assistant Professor)

Dr. Vrijendra Singh (Associate Professor & Head)

Department of Information Technology, IIT Allahabad

## Contact Details

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## Program Schedule

3 <sup>rd</sup> June	4 <sup>th</sup> June	5 <sup>th</sup> June	6 <sup>th</sup> June	7 <sup>th</sup> June
Inauguration 9:30AM	Unsupervised Learning (VS) 9:30-11:00AM	Conditioning/ Preprocessing (VS) 9:30- 11:00AM	Deep Learning Basics (VS) 9:30-11:00AM	Assessment Session for PhD Candidates 10:00AM- 1:00PM
Supervised Learning (VS) 10:00-11:30AM				
Tea Break				
Image Processing Basics (TP) 12:00-1:30PM	Image Enhancement (TP) 11:30AM- 1:00PM	Image Filtering and Segmentation (TP) 11:30AM- 1:00PM	Image Analysis (TP) 11:30AM- 1:00PM	Research Problem Discussion Session 10:00AM- 1:00PM
Lunch Break				
Hands on: Image Processing Basics using Matlab (TP) 2:30-4:00PM	Hands on: Image Enhancement using Matlab (TP) 2:30- 4:00PM	Hands on: Image Filtering and Segmentation using Matlab (TP) 2:30- 4:00PM	Hands on: Image Analysis using Matlab (TP) 2:30-4:00PM	Valedictory Function and Certificate Distribution 2:30-4:00PM
Tea Break				High Tea
Hands on: Machine Learning Tools (VS) 4:30- 6:00PM	Hands on: Supervised and Unsupervised Learning (VS) 4:30-6:00PM	Hands on: Conditioning/ Preprocessing (VS) 4:30- 6:00PM	Hands on: Deep Learning Applications (VS) 4:30- 6:00PM	

Abbreviations:

VS: Dr. Vrijendra Singh

TP: Dr. Triloki Pant