

Title of the Tutorial

ADVANCE ALGORITHMS AND APPLICATIONS IN VIDEO PROCESSING, HUMAN TRACKING, ARTIFICIAL NEURAL NETWORK AND DEEP LEARNING

Resource Person: PROF. DR. JHARNA MAJUMDAR



ABSTRACT

Emphasis in the present technology is given to the analysis and processing of multimedia signals (audio, images, and video). Video analysis is the capability of automatically analyzing video to detect and determine Transitions. The proposed tutorial introduces the fundamental concepts of Video Transition and Video Shot Detection followed by Modelling of Transitions (both hard and soft) in different domain.

Tutorial then proposes methods of Automatic Human Detection and Tracking from Video Stream, the applications of Human Tracking using Autonomous Mobile Robotic Platform for security and surveillance purpose.

Machine Learning and Deep Learning technologies are shaping the world we live in. The tutorial proposes the basic concepts of Artificial Neural Network (ANN), Deep Neural Network (DNN) and the Convolution Neural Network (CNN). Tutorial demonstrates applications of Neural Networks for Identification of Medicinal Leaf and Robot Control using ANN. Teaching a Child with Autism using DNN by building a network that can learn alphabets, numerals, compute simple arithmetic operations and learn color.

The tutorial concludes with the presentation of advanced applications of CNN for Tracking by a Mobile Robot and Facial Expression Detection by a Humanoid Robotic Head.

Proposed Contents:

Presentation and Code Demonstration

NOTE: Most of the topics addressed in the tutorial are part of the Funded Research Projects from DRDO and DST and hence use of libraries are avoided as much as possible and Software Codes are developed for each of the algorithms. Each topic of the tutorial will be associated with the Demonstration of Codes which is developed for the purpose.

Team:

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Mr. Sudip Gupta, Research Associates, Centre For Robotics Research, NMIT

Associates:

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Bio-Data

PROF. DR. JHARNA MAJUMDAR

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Dean R & D, Prof. & Head M Tech Computer Science and Engg.

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Biography: Dr. Jharna Majumdar is currently the Dean R & D, Prof. and Head Dept of M Tech Comp Sc & Engg. and Head, Centre for Robotics Research at the Nitte Meenakshi Institute of Technology, Bangalore. Dr. Majumdar served Defence Research and Development Organization, Min. of Defence, Govt. of India from 1990 to 2007 and retired as Scientist G and Head of Aerial Image Exploitation Division, Aeronautical Development Establishment, Bangalore, India. She has more than 40 years of research experience in India and abroad. She worked as a Research Scientist on 'Robotics and Automation' at the Institute of Real Time Computer Systems and Robotics, Karlsruhe, Germany from 1983 to 1989 and as Research Scientist at the Stanford Research International, California, USA in 2002. Dr. Majumdar has B Tech (Hons) in ECE, Post Graduate in Computer Technology from Indian Institute of Technology, Kharagpur and PhD in Electrical Engg. from NIT Durgapur.

Dr. Majumdar published more than 150 reviewed technical papers, has 4 Patents and received a large number of awards from DRDO and other organization. Some of her awards are: Award from President, Stanford Research International (SRI International), California, USA in 2002, Performance Excellence Award from the Prime Minister of India in 2004, Dr V M Ghatage award from Aeronautical Society of India in 2005, Dr. Suman Sharma Award from National Design and Research Forum (NDRF) in 2006, Dr. Kalpana Chawla Memorial Lecture Award in 2007, IEEE Award in 2011 and CESEM award from the Vision Group on Science and Technology (VGST), Karnataka in 2016. She is a Fellow of the Aeronautical Society of India, Fellow of the Institution of Engineers and Life Member of the Computer Society of India.

Her project with Indian Space Research Organization (ISRO) and the students from 7 Engineering Colleges to build the first Smallest Satellite in India of PICO Category has taken off to the orbit successfully on July 10 2010. Nitte Amateur Satellite Tracking Centre (NASTRAC) developed by a team of students from NMIT under her guidance is a patent and the First Tracking Station of Small Satellites in the country. The research team of Robotics under her guidance has received IEEE Award in 2011 and developed the First Robotic Exhibit at the Birla Science Centre Hyderabad on Jan 2012, which was inaugurated by Ex-President of India Dr. A P J Abdul Kalam. Her Research team of Robotics has developed Humanoid Robots capable of Mimicking Human Facial Expression.

Dr. Majumdar has brought large number of Funded Research Projects at NMIT from DRDO Laboratories, Dept. of Science & Technology, New Delhi, CESEM Award from Vision Group on Science and Technology (VGST), Karnataka, VTU, Belgaum, IEEE USA.

Current research of Dr. Majumdar include development of advance algorithms for Image and Video Processing with real time implementation on Embedded Boards, Control and Computer Vision for Robotics and other Autonomous Systems, Machine Learning and Data Mining. Artificial Neural Network, Deep and Convolutional Neural Network.

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