Report

National Seminar

On

"New Trends in Signal Processing (NeTSiP-2019)"

IEEE Signal Processing Society Chapter, Gujarat Section

Gujarat Council of Science and Technology (GUJCOST)

Sarvajanik College of Engineering and Technology, Surat

Organizers:

IEEE Signal Processing Society, Chapter Gujarat Section

Gujarat Council of Science and Technology (GUJCOST)

R&D cell SCET (EC, IC, CO, IT and MCA Departments)

Date: 08/02/2019 and 09/02/2019

Venue: AV Room EC Dept. SCET

Participants: Around 90 enthusiastic UG/PG scholars and faculties from EC, IC, IT, MCA, CO department SCET and other colleges participated in the talk.

Speaker Details:

Sr. No.	Name	Designation	Title of talk
1	Dr. Suprava Patnaik	Professor, HoD Xavier's Institute of Engineering Mumbai	Generative and Discriminative Models in the paradigm of Deep Learning
2	Dr. Iven Jose	Professor and Associate Dean, Faculty of	MOLECULAR BIOMEDICAL IMAGING: An early detection of

		Engineering, Christ University, Bengaluru	carcinoma using Fluorescent-Diffused Optical Tomography
3	Dr. Srimanta Mandal	Assistant Professor, DAIICT Gandhinagar	Evolution of Super-resolution Imaging Techniques
4	Dr. Priyanka Sharma	Professor, Nirma University	Deep Learning for Computer Vision and Video Analytics
5	Dr. Arnav Bhavsar	Assistant Professor, IIT Mandi	Machine learning for ecology: A case of visual and acoustic bird id
6	Miss Hima Patel	Lead Researcher, IBM labs, Bengaluru	Challenges and Solutions for building Question Answering System for IT Documents
7	Mr. Siddhant Loya	Chief Technology Officer (CTO), Melzo	Recent Trends in VR

NeTSiP-2019 is the third edition of the flagship event of SPS Chapter, Gujarat Section. It provides forum for learning from leading researchers in signal processing that highlight these trends, spanning across the sub-fields of speech, image, audio, and video processing, biometrics, media security, bioinformatics, and communications. NeTSiP-2019 seeks to accelerate research and development in signal processing by creating opportunities for upcoming researchers to network and exchange ideas with established leaders and through panel discussions that highlight emerging challenges and opportunities.

Briefing of Inaugural Function:

Inaugural started with a prayer by seeking blessings from almighty. Dignitaries on the dais were welcomed with floral greetings. Honorable principal of SCET, Prof Vaishali Mungurwadi addressed the audience with welcome speech. The chief guest of the function Dr. Suman Mitra, chair SPS Chapter, GS motivated the audience with his words of inspiration. Prof. Neeta Chapatwala, Organizing Chair, NeTSiP-2019 provided vote of thanks to everyone who were directly or indirectly involved for the successful organization of this event. Some snapshots have been appended below as a glimpse of ceremony.

Briefing of Session 1:

Dr. Suprava Patnaik	Professor and Head, EC Department, Xavier's Institute of Engineering Mumbai	Generative and Discriminative Models in the paradigm of Deep Learning

Prof. Suprava Patnaik received B.Tech & M.Tech degree from NIT, Rourkela in 1988 and 1991 respectively. She was awarded PhD from IIT Kharagpur for her work on

"Image compression by using Sub-band coding and NN", in 2004. She has more than 29 years of teaching experience and served as faculty at various institutions of National repute, which includes NIT Rourkela and SVNIT, Surat. She was on deputation to University of Western Australia, Perth, during 2015-2017. She has nearly 100 publications to her name, published in various Journals and conferences. Her primary research interest includes machine learning and their applications in computer vision, speech processing, and bioinformatics. She has successfully guided nine PhDs. At present she is working as Professor and Head of Electronics and Telecommunication Engineering Department at Xavier Institute of Engineering, Mumbai.

Deep learning involves enormous processing. Selection of correct model and right structure plays crucial task in every deep-learning based application. Even though there is no magic answer to those questions, there are several ideas that could guide our decision-making process. A simple classification problem can be handled either by identifying discriminative features or by looking at similarity between an input and features regenerated by samples belonging to a class. Over the last decades CNN and LSTM have proven themselves to be useful and reliable in wide range of applications. The presentation will focus on how to select core deep architecture, CNN or RNN, and supplement it by other discriminative or regenerative models. The two applications considered for this demonstration are speech emotion detection by using LSTM and constrained free face recognition by using CNN. It was truly an effective session with thorough teaching, learning and understanding qualities. Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 2:

Dr. Iven Jose	Professor and Associate Dean, Faculty of Engineering, Christ University, Bengaluru	MOLECULAR BIOMEDICAL IMAGING: An early detection of carcinoma using Fluorescent-Diffused Optical Tomography

Dr. Iven Jose is a Professor and Associate Dean of Faculty of Engineering, CHRIST UNIVERSITY-BANGALORE. Dr. Iven was conferred Ph.D. from IIT–Bombay, School of Biosciences and Bioengineering. He has also served at Siemens, R&D, Medical Division, Goa Works and institutions like PCCE-Goa, BITS-Pilani– Goa Campus, during his early carrier days. He has been instrumental in acquiring several tie-up with Multi-National corporation companies and International Institutions. He has to his credit a US-Patent granted and has authored and presented many scientific papers in varied National and international platforms. He was awarded the "Microsoft Research India outstanding young faculty award, 2008", for the project titled "Optical Imaging for detection of Cancer".

His talk focussed on the Importance of Conjugate in Early detection of Cancer: An Optical Imaging Technique: The Diffused Optical tomography and f-DOT (fluorescence diffused optical tomography) are gaining profound attention in molecular imaging which can spatially resolve the fluorophore concentration and lifetime parameters and aid in detecting malignant lesions at the early stage. The early diagnosis available today uses instruments which can only go down to the level of few tens of cms. But using the conjugate contrast agent we could touch the molecular level imaging using light as source. Several instruments are tested using the principle of light through DOT and f-DOT to capture images at the molecular level. The major challenge being the reconstruction of ill poised problem. The well separated excitation and emission wavelengths of the synthesized conjugate, would help select very precise laser didoes to excite the fluorophores and detect them using highly sophisticated detectors ranging the NIR region. Going forward this conjugate can ease

this uncertainty of reconstruction by exploring the efficacy of localization into nucleus through functional dyes. This opens up newer areas of imaging using nano tubes in tracking and deploying the functional contrast agent insitu. Embedding the a priori, both on the functional and structural information, a better reconstruction of lesion could be made possible invivo.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 3:

Dr. Srimanta Mandal	Assistant Professor, DAIICT Gandhinagar	Evolution of Super-resolution Imaging Techniques

Dr. Srimanta Mandal is currently working as an Assistant Professor in DAIICT, Gandhinagar. He received PhD from IIT Mandi and has been a postdoctoral fellow with the Department of Electrical Engineering, IIT Madras from 2017 to 2018. His research interests include image processing and computer vision.

His topic of discussion included Super Resolution Techniques. Super-resolution (SR) is a problem of achieving a high resolution (HR) image from low resolution (LR) image(s). This problem has been attempted in different ways, starting from multiple images SR to SR from single image. There could be different HR images that can map

to same LR image. Further, the presence of blur and noise makes the problem of achieving HR image ill-posed. The ill-posed problem is generally addressed by including prior knowledge about the solution. Sparsity inducing norm can be used to address the SR problem. However, it may smear the perceptually important edges in the SR result. To mitigate this concern, an edge-preserving constraint can be used to preserve the edges of the input image in the SR result. Dictionary plays an important role in sparsity-based SR. Multiple sub-dictionaries have been shown to perform better than a single over-complete dictionary. The performance can be improved by employing structural information (dominant edge orientation) as well as statistical information (mean of intensity values) of patches, extracted from example images. If the example patches are unavailable, an image pyramid can be constructed by up/down-sampling the given LR image, and patches from the pyramids can be used to learn dictionary. Further, focusing on image patch details can improve performance, as it contains perceptually significant information. If the given LR image is contaminated by noise, considering patch detail for SR will emphasize the noise also. To mitigate this issue, some parameters that reflect the power of noise are derived. These parameters are used in the optimization steps to suppress the effect of noise. Nuclear norm minimization has also been explored to take care off noise while super-resolving an image. Noise statistics often vary across RGB channels. In order to address the issue, different weights to the data cost have been assigned based on the noise statistics along with weighted nuclear norm minimization.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 4:

Mr. Siddhant Loya	Chief Technology Officer (CTO), Melzo	Recent Trends in VR

Mr. Siddhant Loya is currently the Chief Technology Officer at Melzo. He has been part of the team since it's beginning. He graduated from SVNIT in Electronics Engineering.

His topic focussed on virtual reality. The history, applications and future prospects of VR was encompassed in his talk. He also focussed on the vision / Role of Melzo in the VR community.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 5:

Dr. Priyanka Sharma	Professor, Nirma University	Deep Learning for Computer Vision and Video Analytics

Dr Priyanka Sharma is working as a Professor at Department of Computer Science and Engineering, Nirma University. She is a Certified NVIDIA DLI Ambassador and specializes in Deep Learning for Computer Vision and Multiple Data Types. An academician by passion and a researcher in the domain of AI and Deep Learning. She has jointly received the CCI Technology Award (2015) (State Level) and FICCI Award for Best University in the Use of technology (2015) (National Level), on behalf of Nirma University. One of her research project also received Best Project Award at CSI Project Innovations at National Level.

Deep Neural Networks (DNN), is typically inspired by our brain and uses strategies inspired by human learning to achieve complex goals by harnessing the power of parallel computing. Deep Learning automates the creation of feature extractors using large amount of data to train complex DNN. His talk focused towards the art of model training and tuning of hyper-parameters to use the concepts of Deep Learning for implementation of major Computer Vision (CV) tasks like Object Detection, Image Segmentation and Image Captioning. These concepts are focused at achieving complex CV tasks using Deep Learning for multiple data types. The concept can further be extended to be used for video data. Generating summaries of lengthy videos using a combination of deep learning and traditional machine learning algorithms was also covered as a case study during the presentation.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 6:

Dr. Arnav Bhavsar	Assistant Professor, IIT Mandi	Machine learning for ecology: A case of visual and acoustic bird id

Dr. Arnav is currently working as an Assistant Prof. at IIT Mandi and is a part of the Multimedia Analytics Networks and Systems (MANAS) Lab at IIT Mandi, focusing on various academic and some industry research projects. He pursued his PhD form IIT Madras and was also a Postdoctoral fellow at GE Global research, Bangalore 2011-2012 and Postdoctoral research associate, Univ. North Carolina, Chapel Hill, 2012-2013.His areas of interest include Biomedical Image and Signal Analysis, Computer Vision, Machine learning. He has also received 5-year DST Inspire Research Grant in 2014. He has several publication s in reputed International Journals and conferences and has also served as a reviewer in well-reputed Int. conferences / journals on image analysis, machine learning and medimage.

This talk covered some machine learning (including deep learning) approaches to identify birds from images and sounds. Some salient aspects in the overall bird id pipeline was also discussed, which can include bird localization or bird-part detection in images and, enhancement and detection of bird acoustic activity. The content was largely based on the bird id project at IIT Mandi.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Session 7:

Miss Hima Patel	Lead Researcher, IBM labs, Bengaluru	Challenges and Solutions for building Question Answering System for IT Documents

Miss Hima Patel is a lead researcher at IBM Research Labs, Bangalore and works on problems at the intersection of NLP, machine learning with an aim to build scalable systems that can be deployed into IBM products. She holds a B.E. in Computer Science from GCET and M Tech in Information and Communication Technology from DA-IICT. In her 12.5 years of experience spanning Visa, Shell Research and GE, she has worked on several research problems spanning from object detection in medical images to anomaly detection from sensor data collected from machines like

compressors and turbines. She is also actively involved with the organization of Grace Hopper India conference for last three years and is also an executive committee member for IEEE Computer Society, Bangalore Section.

This talk covered an overview of deep learning systems for natural language processing applications. It focussed on problem question answering system from documents for a niche domain like IT documents and further looked at a specific example of building a deep learning system in the absence of large labeled datasets and discuss the performance of such a system over rule based system.

Some snapshots have been appended below as a glimpse of talk.

Briefing of Valedictory ceremony:

Some snapshots have been appended below as a glimpse of ceremony.

*******End of the event********