

Report on

IEEE Technical Talk Series 2021

Expert: Dr. Arnav Bhavsar

July 21, 2021

Title: Applications of Deep Learning in Medical  
Image Analysis




IEEE Signal Processing Society  
Gujarat Section

- CONTENTS

1. Poster for the talk
2. Expert Profile
3. Glimpses of the talk
4. Memento Format
5. Number of Participants

- POSTER FOR THE TALK



The poster features a green and blue background with abstract wave patterns. At the top, there are logos for GCET, IEEE Signal Processing Society Gujarat Chapter, IEEE Signal Processing Society GCET SBC, IEEE GCET Student Branch, and CVM University. The main text is centered and reads: 'IEEE Signal Processing Society Gujarat Chapter in collaboration with IEEE SPS GCET SBC presents Expert Talk Applications of Deep Learning in Medical Image Analysis'. A circular portrait of Dr. Arnav Bhavsar is on the left. Below the portrait is his name and title: 'Dr. Arnav Bhavsar Assistant Professor School of Computing and Electrical Engineering, IIT Mandi'. To the right of the portrait, the date and time are listed: '21 July 2021 | 10:00 AM IST'. Below this is a QR code with the text 'Scan to Register' above it. At the bottom right, a URL is provided: 'http://bit.ly/3j0IUa2' with a note '(WebEx link will be sent to registered participants)'. At the very bottom, there are icons for a website and Facebook, with the text 'ieeespsgs.org/' and 'ieeespsgs' respectively.

GCET  
A NATIONAL COLLEGE OF  
ENGINEERING & TECHNOLOGY

IEEE  
Signal  
Processing  
Society  
GUJARAT CHAPTER

IEEE  
Signal  
Processing  
Society  
GCET  
STUDENT BRANCH CHAPTER

IEEE  
GCET Student Branch


CVM  
UNIVERSITY

IEEE Signal Processing Society Gujarat Chapter  
in collaboration with  
IEEE SPS GCET SBC  
presents  
Expert Talk


Applications of Deep Learning in  
Medical Image Analysis

21 July 2021 | 10:00 AM IST  
Scan to Register

Dr. Arnav Bhavsar  
Assistant Professor  
School of Computing and Electrical  
Engineering, IIT Mandi



<http://bit.ly/3j0IUa2>  
(WebEx link will be sent to registered participants)

 [ieeespsgs.org/](http://ieeespsgs.org/)  [ieeespsgs](https://www.facebook.com/ieeespsgs)

- EXPERT PROFILE



Dr. Arnav Bhavsar  
Associate Professor, IIT Mandi

Dr. Arnav Bhavsar is currently working as an associate professor at the Indian Institute of Technology, Mandi, Himachal Pradesh. He received his B.E. Degree in Electronics and Communication Engg., from Sardar Patel University in 2004, and PhD in Electrical Engg. from Indian Institute of Technology Madras in 2011. He has worked as a postdoctoral fellow at GE Global Research, Bangalore, India, in the year 2011-2012 and a Postdoctoral research associate at University of North Carolina, Chapel Hill, USA, in the year 2012-2013.

His areas of interest are Computer vision, Medical image analysis, Machine learning, and Deep Learning. He serves as a reviewer for various journals and has published more than 100 research papers in various international journals and conferences of repute.

Dr. Arnav has received various project grants from DRDO and DST. He is also a recipient of Student travel grant from Microsoft Research India, for participating in BMVC 2010, UK, and from IIT Madras for participating in DAGM 2010, Germany. Sir holds two patents on his name on Method and system for generating a high resolution image and a method for medical screening and a system thereof.

• GLIMPSES OF THE TALK

Cisco Webex Meetings | Meeting Info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Arpan Desai Host Chirag Paunwala Cohost Amav (Cohost) 19BEC106 Rathod Pallav

## Deep Learning in Medical Image Analysis

Amav Bhavsar  
Multimedia Analytics Networks and Systems (MANAS)  
School of Computing and Electrical Engg.  
IIT Mandi  
arnav@iitmandi.ac.in

Participants (80)

Unmute Start video Share

Type here to search 10:12 21-07-2021

Cisco Webex Meetings | Meeting Info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Samridhhi Sud Cohost Arpan Desai Host Chirag Paunwala Cohost Amav Cohost 19BEC106 Rathod Pallav

Viewing Amav's screen

## CNN Overview

Figure : Example Convolutional Neural Network for classification of handwritten digits 9

[9] <https://www.pyimagesearch.com/2014/06/09/get-deep-learning-bandwagon-get-perspective/>

Participants (102)

Unmute Start video Share

Type here to search 10:27 21-07-2021



Cisco Webex Meetings | Meeting Info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Samridhhi Sud Cohost Arpan Desai Host Chirag Paunwala Cohost Arnav Cohost 19BEC106 Rathod Pallav

Participants (110)

RM Richa Mishra Me  
AD Arpan Desai Host  
AN Arnav Cohost  
CP Chirag Paunwala Cohost  
GS Giriraj Shah Cohost  
R rahul2777 Cohost  
SS Samridhhi Sud Cohost  
IP 19BEC106 Rathod Pallav  
2P 20BEC137 YASH PUROHIT  
AP Aarti Parekh  
AM Adarsh Mishra  
A Akshay  
AS Alpa Shah

Chat

First Part: Calculation of patient scores for each magnification

Second Part: Estimates multiplying weights ( $w_1, w_2, w_3, w_4$ ) using least square method and calculate

Final scores

Basic unit

Fig 6. Multi-scale model

38

Unmute Start video Share

Type here to search

11:01 21-07-2021

Cisco Webex Meetings | Meeting Info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Arnav Cohost 189999913008\_DHEERA-I-K... 19BEC106 Rathod Pallav 20BEC137 YASH PUROHIT Aarti Parekh Adarsh Mishra Akshay

Results: Qualitative (Voxel level)

Patient 1

(a) Ground-truth and Predicted for CC (b) Ground-truth and Predicted for CST

Patient 2

(c) Ground-truth and Predicted for CC (d) Ground-truth and Predicted for CST

Voxel level visualization of SH coefficients of Corpus Callosum and Cortico-Spinal Tracts at  $b = 2000$

65

Unmute Start video Share

Type here to search

11:16 21-07-2021

Cisco Webex Meetings | Meeting info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Arnav (Cohost) Samridhii Sud (Cohost) 189999913008\_DHEERAJ-K... 19BEC106 Rathod Pallav 20BEC137 YASH PUROHIT

Chat

ieeespsgs.org  
from Arpan Desai to everyone: 11:19 AM  
The video recording of talk will be available later on:  
[https://www.youtube.com/channel/UC\\_3XZ9a3rmmjPwL...](https://www.youtube.com/channel/UC_3XZ9a3rmmjPwL...)  
from Dr. Mayuri Mehta to everyone: 11:20 AM  
Several GAN frameworks are available to generate synthetic data for different types of data like text data, voice data and image data. Can you suggest which among those frameworks available in literature are most suitable for medical image synthesis?  
from chetana c to everyone: 11:20 AM  
not able to open feedback link sir  
from Neel Patel to everyone: 11:21 AM  
yes  
not able  
from parekh Rajavi to everyone: 11:21 AM  
feedback link  
from Arpan Desai to everyone: 11:21 AM  
Feedback link: <https://forms.gle/29m5B98WAPu4KQ26>  
from Poojan Dalal to everyone: 11:26 AM  
very interesting session, thank you sir  
from mathil tandel to everyone: 11:27 AM  
what are the cnn parameter Or hyperparameters used?!!  
from Dr. Mayuri Mehta to everyone: 11:31 AM  
Okay,thank you very much  
from sidhi pandya to everyone: 11:31 AM  
I didn't get how Deep learning will apply on eeg input signal  
from mathil tandel to everyone: 11:31 AM  
max pooling and stuff will do?!

To: --- Please Select ---  
Enter chat message here

### Proposed Framework: Architec

- The MSR-NET is an Encoder-Decoder network, along with two additional modules feature module as bottleneck layer.

The diagram illustrates the MSR-NET architecture. It consists of an **Encoder** and a **Decoder**. The **Encoder** starts with an **INPUT (1497x143x43)** and processes it through four stages of residual blocks with 64, 96, 128, and 160 filters. A **Residual Connector** links the encoder to the decoder. The **Decoder** processes the input through four stages of residual blocks with 48, 64, 96, and 128 filters. A **Feature Module** and an **Attention Network** are connected to the decoder's output. The final **OUTPUT (1497x143x43)** is generated. Dimensions of 128\*128\*160 are indicated at various points in the network.

[11] R. R. Jha, A. Nigam, A. Bhavsar, S. K. Pathak, W. Schneider and K. Rathish, "Multi-Shell D-MRI Reconstruction via Residual Learning u Decoder Network with Attention (MSR-Net)," 2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Soc QC, Canada, 2020, pp. 1709-1713, doi: 10.1109/EMBC44109.2020.9175455

Unmute Start video Share Chat Q & A

Type here to search 11:32 21-07-2021

Cisco Webex Meetings | Meeting Info | Hide Menu Bar

File Edit Share View Audio & Video Participant Meeting Help

Richa Mishra Me Samridhii Sud (Cohost) Arnav (Cohost) Arpan Desai (Host) rahul2777 (Cohost)

Aarti Parekh Brijeshkumar Y. P... Darshil Gabani Dhruv Gohil Girira... (Cohost)

HariPriya Chiv... Himanshu Praj... Janvi Garg Krishi Patel maharshi trivedi

mathil tandel Meet Makwana PARMAR SHANKA... Sakshi Satish Bhati

Shyam Patel 189999913008\_DHEERAJ-KJ... 19BEC106 Rathod Pallav Anurag Sen Bhargav Dhruv

Unmute Start video Share Chat Q & A

Type here to search 11:40 21-07-2021



- MOMENTO FORMAT



IEEE SPS, Gujarat Chapter

## Technical Talk Series 2021

IEEE SPS GS and  
IEEE SPS GCET SB thank

**Dr. Arnav Bhavsar**

for delivering an expert talk on

"Applications of Deep Learning in Medical Image  
Analysis "

- NUMBER OF PARTICIPANTS

Total: 615

IEEE Members: 154

Non IEEE Members: 461

Report Prepared by: Richa Mishra

Vice-Chairperson | IEEE SPS GCET Chapter