

Shreshth Saini

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Education

Bachelor of Technology, Electrical Engineering <i>IIT Jodhpur, India</i>	8.09/10 CGPA 2020
Major in Science and Mathematics, High School <i>M.B. Public School, India</i>	89.80/100 2015
Sophomore - 10th Grade <i>Modern Defence School, India</i>	91.33/100 2013

Research Interests

Computer Vision, Medical Image Analysis, Healthcare Informatics, Deep Learning, Machine Learning

Employment and Research Appointments

Research Engineer-AI **Pune, India**
Arkray, Inc. *August 2020–Present*

- o Developing efficient and state-of-the-art AI solutions for healthcare
- o Developing deep learning models for urine sediment analyzer(**Aution EYE**)
- o Working on automating the bodyfluid analysis using **Aution EYE**

Research Assistant **Singapore**
Saw Swee Hock School of Public Health, NUS-Singapore *May 2019–July 2019*

Supervisor: Dr. Mengling 'Mornin' Feng

- o Extensive research and hands-on for novel applications of deep learning on large scale public health datasets
- o Helped in conducting **NUS-MIT Datathon**, also participated and won medical imaging track
- o Worked on skin lesion analysis, produced low computational cost state-of-the-art results

Undergraduate Researcher **Jodhpur, India**
Image Processing and Computer Vision Lab, IIT Jodhpur *August 2018–August 2020*

Supervisor: Dr. Anil Kumar Tiwari

- o Worked on developing machine learning methods aimed for AI based diagnosis and treatment support
- o Developed novel deep learning based models for retinal vessel, and skin lesion -segmentation tasks
- o Worked on developing reliable ML methods for diagnosis of left atrium in 3D Gadolinium-Enhanced MRI

Research Intern **Mandi, India**
The Multimedia Analytics, Networks and Systems Lab, IIT Mandi *May 2018–July 2018*

Supervisor: Dr. Aditya Nigam

- o Initiated research work in the field of Biometrics, Image Processing, Computer Vision, and Machine learning
- o Helped in conducting and teaching CNN in international workshop on applied deep learning(**IWADL**)
- o Worked on No-reference image quality assessment, Ear segmentation in unconstrained environment, and Robust iris segmentation for biometrics systems

Publications

Conferences:

- o **M2SLAe-Net:Multi-Scale Multi-Level Attention Embedded Network for Retinal Vessel Segmentation**
S. Saini, G. Agrawal.
The IEEE International Symposium on Biomedical Imaging (IEEE ISBI), 2021
(Abstract Presentation) Nice, Acropolis-France
- o **(M)SLAe-Net:Multi-Scale Multi-Level Attention Embedded Network for Retinal Vessel Segmentation**[Paper]
S. Saini, G. Agrawal.
9th IEEE International Conference On Healthcare Informatics (IEEE ICHI), 2021
(full Oral Presentation) Victoria, British Columbia, Canada
- o **B-SegNet Branched SegMentor Network for Skin Leison Segmentation**[Paper]
S Saini, YS Jeon, M Feng.
Association for Computing Machinery Conference on Health, Inference, and Learning(ACM CHIL), 2021
(full Oral Presentation)

- o **Detector-SegMentor Network for Skin Lesion Localization and Segmentation**[\[Paper\]](#)
S Saini, D Gupta, AK Tiwari.
National Conference on Computer Vision, Pattern Recognition, Image Processing, & Graphics(NCVPRIPG), 2019
(full Oral Presentation), Top National conference, twin of ICVGIP

Journals:

- o **PixISegNet:pixel-level iris segmentation network using convolutional encoder–decoder with stacked hour-glass bottleneck**[\[Paper\]](#)
RR Jha[†], G Jaswal[†], D Gupta[‡], S Saini[‡], A Nigam.
The Institution of Engineering and Technology (IET Biometrics, 2019)

Book Chapters:

- o **Iris Segmentation in the Wild using Encoder-Decoder based Deep Learning Techniques**[\[Paper\]](#)
S Saini, D Gupta, RR Jha, G Jaswal, A Nigam.
AI and Deep Learning in Biometric Security: Trends, Potential and Challenge
CRC Press (Taylor Francis Group), 2020

Selected Talks and Achievements

- o Oral presentation at *IEEE-ICHI, 2021*
- o Oral and Poster presentation at *ACM-CHIL, 2021*
- o Poster presentation at *IEEE-ISBI, 2021*
- o Poster presentation at *NCVPRIPG, 2019*
- o Skin Lesion Analysis, *NUS-Singapore, 2019*
- o Cardiac Image Segmentation(3D Data), *IIT Jodhpur, 2019*
- o Won medical imaging track at **NUS-MIT datathon**, led a team of 10 data scientists and clinicians, **2019**
- o Initiated undergraduate research group(**LAMBDA**), group publishes in international conferences, **2018**
- o Ranked in National Top 1(percent)(amongst 1.3million) in **JEE Mains 2016** and Top 5(percent)(amongst 0.2million) in **IIT-JEE Advanced 2016**
- o Letter of Appreciation from District Collector(Sirohi) for Academic Excellence, **2013**

Selected Coursework

Computer Science & Electrical Mathematics

- Machine Learning
- Artificial Intelligence
- Introduction to Data Science
- Information Theory and Coding
- Digital Image Processing
- Computational Imaging
- Digital Logic and Design

- Probability Statistics and Random Processes
- Linear Algebra and Calculus
- Complex Analysis and Differential Equations

Others

- Principles of Management
- Professional Ethics
- Basic of Leadership
- IP Management and Exploitation
- Technology Management

Technical Skills

- o **Programming Languages:** Python, Matlab, Octave, C++
- o **Tools and Libraries:** Tensorflow, Pytorch, Keras, Scikit-Learn, OpenCV, git, Tex, Docker

Position of Responsibilities

Student Leader

LAMBDA, IIT Jodhpur

- o Formally established and led undergraduate search group of 30+ students
"Learning Approaches For Medical Big Data(LAMBDA)"

Jodhpur, India
August 2018–August 2020

Overall Student Head

Entrepreneurship Cell, IIT Jodhpur

- o Lead, Managed and Promoted entrepreneurial activities in and around the institute
- o Organised IdeaSpark which witnessed the participation from across the state, and national personalities as guests

Jodhpur, India
May 2018–May 2019

Assistant Head

Counselling Services, IIT Jodhpur

Jodhpur, India

May 2018–May 2019

- o Organized events and workshops for maintaining positive atmosphere in college and mentored student guides
- o I was given the responsibility to guide freshmen in their personal, professional and academic life

Volunteer

International Workshop on Deep Learning(IWDL), IIT Mandi

Mandi, India

Summer 2018

- o Prepared the study material and took hands-on session for participants

References

- o Up to 4 references available on request

Additional Projects

Healthcare

Prognosis of Pneumonia and COVID-19[Compiling for Publication]

Jodhpur, India

Supervisor: **Dr. Rajendra Nagar, Dr. Deepak Mishra, IIT Jodhpur**

Mar 2020–August 2020

- o Proposed a variational autoencoder(VAE) based multi-task network for classification
- o Embeddings from VAE were fed to LSTM for prediction of prognosis
- o Network was pretrained on MIMIC-III dataset and fine tuned on COVID-19 datasets

Cardiac Image Segmentation[Paper Under Review]

Jodhpur, India

Supervisor: **Dr. Himanshu Kumar, IIT Jodhpur**

Jan 2020–June 2020

- o Proposed an unique multi-decoder attention based segmentation model for sliced cardiac image segmentation
- o Used contour and distance transform(novel Expand and See block) for attention to boundary and background pixels
- o Optimized model with a compound loss for multi decoder network

Skin Lesion analysis for Melanoma Detection[Paper]

Singapore, India

Supervisor: **Dr. Mengling 'Mornin' Feng, NUS-Singapore**

May 2019–July 2019

- o Proposed a novel multi-branched CNN for challenging skin lesion identification and segmentation task
- o Branches emerging from main encoder served different purpose like localizing the lesion, focusing on lesion boundaries
- o Achieved state of the art results on ISIC-2018/2017 and PH2 datasets

Segmentation of the left Atrial Cavity from 3D Gadolinium-Enhanced MRI Data

Jodhpur, India

Supervisor: **Dr. Anil Kumar Tiwari, IIT Jodhpur**

Aug 2018–Dec 2018

- o Proposed a 3D CNN to localize cavity in MRI data to produce tightly fit 3D volumetric samples
- o Faster-RCNN based architecture was developed for the localization and producing cubic samples
- o The cubes were then fed to a 3D UNet comprising of task specific hourglass network for generating 3D masks

Biometrics

No Reference Biometric Image Quality Assessment

Mandi, India

Supervisor: **Dr. Aditya Nigam, IIT Mandi**

May 2018–July 2018

- o Explored deep neural networks for hand based (palm, finger, and knuckle) biometric image quality assessment
- o Network pipeline consisted of two parts:(i) Image-Re-constructor and (ii) The Quality Score Regressor
- o The proposed Network on outperformed the practical classical methods

General

Multipath Super Resolution Network with Novel loss

Jodhpur, India

Supervisor: **Dr. Rajendra Nagar, IIT Jodhpur**

Jan 2020–June 2020

- o Developed a multipath deep neural network for aggregation of global and fine local features for super resolution
- o Incorporated sub-pixel shuffling along with the novel weighted pixel-perceptual loss for sharp image reconstruction
- o Model was trained in end-to-end manner from scratch on T91 and evaluated on BSDS100, Set14, and Set5

Edge-preserving image denoising techniques

Jodhpur, India

Supervisor: **Dr. Rajlaxmi Chouhan, IIT Jodhpur**

Jan 2018–April 2018

- o A rigorous study of edge preserving image de-noising techniques was performed
- o Several denoising techniques were implemented from scratch in MATLAB
- o A comparative study showed that with high computation cost Non-Local-Means(NLM) gives the best results