Shreshth Saini

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Education

Bachelor of Technology, Electrical Engineering *8.09/10 CGPA*
IIT Jodhpur, India *2020*

Major in Science and Mathematics, High School *89.80/100*
M.B. Public School, India *2015*

Sophomore - 10th Grade *91.33/100*
Modern Defence School, India *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)

- **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:

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

Book Chapters:

- **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

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

Selected Coursework

Computer Science & Electrical	*Mathematics*	*Others*
- Machine Learning	- Probability Statistics and Random Processes	- Principles of Management
- Artificial Intelligence	- Linear Algebra and Calculus	- Professional Ethics
- Introduction to Data Science	- Complex Analysis and Differential Equations	- Basic of Leadership
- Information Theory and Coding		- IP Management and Exploitation
- Digital Image Processing		- Technology Management
- Computational Imaging		
- Digital Logic and Design		

Technical Skills

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

Position of Responsibilities

Student Leader   **Jodhpur, India**
LAMBDA, IIT Jodhpur   *August 2018–August 2020*
- Formally established and led undergraduate search group of 30+ students
  "*Learning Approaches For Medical Big Data(LAMBDA)*"

Overall Student Head   **Jodhpur, India**
Entrepreneurship Cell, IIT Jodhpur   *May 2018–May 2019*
- Led, Managed and Promoted entrepreneurial activities in and around the institute
- Organised IdeaSpark which witnessed the participation from across the state, and national personalities as guests

Assistant Head   **Jodhpur, India**
Counselling Services, IIT Jodhpur   *May 2018–May 2019*
- Organized events and workshops for maintaining positive atmosphere in college and mentored student guides
- I was given the responsibility to guide freshmen in their personal, professional and academic life

Volunteer   **Mandi, India**
International Workshop on Deep Learning(IWDL), IIT Mandi   *Summer 2018*
- Prepared the study material and took hands-on session for participants

References

- 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*
- Proposed a variational autoencoder(VAE) based multi-task network for classification
- Embeddings from VAE were fed to LSTM for prediction of porgnosis
- 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*
- Proposed an unique multi-decoder attention based segmentation model for sliced cardiac image segmentation
- Used contour and distance transform(novel Expand and See block) for attention to boundary and background pixels
- 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*
- Proposed a novel multi-branched CNN for challenging skin lesion identification and segmentation task
- Branches emerging from main encoder served different purpose like localizing the lesion, focusing on lesion boundaries
- 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*
- Proposed a 3D CNN to localize cavity in MRI data to produce tightly fit 3D volumetric samples
- Faster-RCNN based architecture was developed for the localization and producing cubic samples
- 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*
- Explored deep neural networks for hand based (palm, finger, and knuckle) biometric image quality assessment
- Network pipeline consisted of two parts:(i) Image-Re-constructor and (ii) The Quality Score Regressor
- 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*
- Developed a multipath deep neural network for aggration of global and fine local features for super resolution
- Incorporated sub-pixel shuffling along with the novel weighted pixel-perceptual loss for sharp image reconstruction
- 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*
- A rigorous study of edge preserving image de-noising techniques was performed
- Several denoising techniques were implemented from scratch in MATLAB
- A comparative study showed that with high computation cost Non-Local-Means(NLM) gives the best results