Mahesh Gour

Experience

Apr 2021– till date **Machine Learning /AI Developer**, Alcyone Technologies Pvt.Ltd.

Developed various deep learning based methods for medical image segmentation and classification.

- Developed ResHist model for breast Cancer detection from histopathological images.
- Developed Stacked CNN and UA-ConvNet models for COVID-19 detection from X-ray and CT images.
- Developed U-net++ based model for nuclei segmentation from histopathological images.

July 2016–Mar 2021 **Research Associate**, IIT INDORE.

Worked on periocular recognition in a heterogeneous environment (cross-spectral Visible to NIR matching.

- Worked on various image processing techniques of image pre-processing and feature extraction.
- Developed cross-spectral Visible to NIR matching Algorithm based on image illumination normalization using DoG filter and HOG feature descriptor.
- Collected periocular images of visible and NIR of 200 subjects to build a VIS-NIR imagesdataset.
- Participated in the 2nd Cross-Spectrum Iris/Periocular Recognition competition 2017-IJCB and 7^{th} rank.

Feb 2013 - July 2016 **Assistant Professor**, LNCTS BHOPAL.

- Conducted the subject lectures regularly, keeping an eye on the students' understanding.
- Carried out practical sessions with an explanation about the purpose of the experiment and the procedures that follow to seek results
- Responsibilities: M.Tech. Supervisor and Major project coordinator.

Education

2017–Mar 2021 **Maulana Azad National Institute of Technology, Bhopal, India** ,
Computer Science and Engineering, Ph.D.
CGPA – 8.05/10

2010–2012 **AtalBihariVajpayee-IndianInstituteofInformationTechnologyandManagement(ABV-IIITM), Gwalior, India**,
Computer Science and Engineering (with specialization in Advanced Networks), M.Tech.
CGPA – 7.43/10

2006–2010 **University Institute of Technology RGPV (UIT-RGPV),Bhopal, India**,
Information Technology, BE.
Aggregate – 65.97%

Research Projects

July 2021– Ongoing **Nuclei Segmentation with Improved Encoder-Decoder Network**.

- Developed U-Net++ based Encoder-Decoder model for nuclei segmentation from the multi-organ histopathological images.
- Utilized the pre-trained EfficientNet model as Encoder and applied morphological operation based post processing.

Dec 2020– Nov 2021 **Uncertainty-Aware CNN model for COVID-19 detection**.

- Developed an uncertainty-aware CNN model for the automated detection of COVID-19 disease from CXR images, with an estimation of associated uncertainty in the model's predictions.
- Used EfficientNet-B3 model with MC dropout.

June 2020– Dec 2021 **Stacked CNN for Diagnosis of COVID-19 Disease** .

- Implemented ensemble-based model for COVID-19 detection from X-ray and CTimages.
- Different sub-models have been obtained from the VGG19 and the Xception models, and obtained sub-models have been stacked together using a softmax classifier.
- Collected CT images to build a CT image dataset and also generated an X-ray images dataset.

Dec 2020–
Dec 2021

Pulmonary Lung Nodule Segmentation from CT Scans using Two-stage CNN.

- A Two-stage CNN model has been proposed to segment and detect pulmonary lung nodules from CT scan images.
- Used U-net in the first stage for nodule segmentation, and in the second stage, a CNN model is used to reduce the false positives.

Aug 2020–
June 2021

Tomato Plant Disease Detection using Transfer Learning with C-GAN syntheticimages.

- Generated synthetic images of tomato plant leaves using Conditional Generative Adversarial Network (C-GAN).
- DenseNet121 model has trained on synthetic and real images using transfer learning to classify the tomato leaves images into ten categories of diseases.

Aug 2019–
Feb 2020

Residual Learning-based CNN for Breast Cancer Detection .

- Designed a residual learning-based 152-layered CNN (ResHist) model for breast cancer histopathological image classification.
- Proposed a data augmentation technique, based on stain normalization, image patches generation, and affine transformation.

May 2019–
Sep 2019

DeepRNNetSeg: Deep Residual Neural Network for Nuclei Segmentation on Breast Cancer Histopathological Images .

- Developed a deep residual neural network model for automatic nuclei segmentation on the breast cancer histopathological images.
- Annotated image mask is applied to the image in order to obtain the image patches, which are then fed to the DeepRNNetSeg model to classify them into nuclei or non-nuclei patches.

May 2011–
May 2012

M. Tech. Thesis, *(Under Guidance of Dr. P. K. Singh)*.

Detection and Avoidance of Worm Hole Attack in ALARM Protocol (MANETs)

- Developed an algorithm to enhance the security of ALARM protocol by detecting and avoiding Wormhole attacks.
- Analyzed the network performance on the basis of Network load, throughput, Packet Loss, and Packet Delivery Ratio.

June 2009–
June 2010

BE Major Project on Lexical Analyzer.

- Implemented Lexical Analyzer that accepts the source code from the user and reads the code character by character.
- Checked the validity of the characters (keyword, Identifier, Header-files, Operators, Special characters, etc.) if it is valid, then generates the tokens for the syntax Analyzer. Otherwise, it generates an error.
- The language used: C and C++

Skills

LanguagesPython(A), C/C++(B)
FrameworksKeras, Tensorflow, Matlab, NS-2 (Network Simulator) UtilitiesAnaconda,
Jupyter Notebook, Google Colab, Kaggle, Overleaf (latex)

Research & Publications

Journals:

- **Mahesh Gour** and Sweta Jain, "Automated COVID-19 Detection from X-ray and CT Images with Stacked Ensemble Convolutional Neural Network," Biocybernetics and Biomedical Engineering, 42 (1), p. 27-41, 2022.
- **Mahesh Gour** and Sweta Jain, "Uncertainty-Aware Convolutional Neural Network for COVID-19 Disease Detection using X-ray Images," Computers in Biology and Medicine, 140 (2022), p. 105047, 2021.
- Amreen Abbas, Sweta Jain **Mahesh Gour** and Swetha Vankudothu, "Tomato plant disease detection using transfer learning with C-GAN synthetic images," Computers and Electronics in Agriculture, 187, p.106279, 2021
- Pruthviraj Choudhari, Sweta Jain and **Mahesh Gour**, "Pulmonary Lung Nodule Segmentation from CT Scans using Two-stage CNN," The Computers Journal (accepted), 2021.
- **Mahesh Gour**, Sweta Jain, and T. Sunil Kumar, "Residual learning-based CNN for breast cancer histopathological image classification," International Journal of Imaging Systems and Technology, 30(3), 621-635, (2020).
- **Mahesh Gour**, Amrit Suman, and Ankur Kulhari, "Detection and Prevention of Wormhole Attack in ALARM Protocol (MANETs)," HCTL Open IJTIR, 2013, Volume 4, Pages 82-101.

Conferences:

- **Mahesh Gour**, Sweta Jain, and Uma Shankar Bollampally, "Application of Deep Learning techniques for Prostate Cancer Grading using Histopathological Images," In International Conference on Computer Vision and Image Processing (CVIP2021) (accepted), 2021.
- **Mahesh Gour**, Sweta Jain, and Raghav Agrawal, "DeepRNNetSeg: Deep Residual Neural Network for Nuclei Segmentation on Breast Cancer Histopathological Images," In International Conference on Computer Vision and Image Processing (CVIP2019), pp. 243-253. Springer, Singapore, 2019.
- Sushree Sangeeta, **Mahesh Gour**, Vivek Kanhangad, and Niladri Puhan. "Periocular recognition in a cross-spectral scenario," In 2017 IEEE International Joint Conference on Biometrics (IJCB), pp. 681-687. IEEE, 2017.
- Sequeira, Ana F., Lulu Chen, James Ferryman, Peter Wild, SS Behera, **Mahesh Gour**, Vivek Kanhangad, et al. "Cross-eyed 2017: cross-spectral iris/periocular recognition competition," In 2017 IEEE International Joint Conference on Biometrics (IJCB), pp. 725-732. IEEE, 2017.

Areas of Interest

Machine Learning, Deep Learning, Convolutional Neural Networks Biomedical Image Segmentation and Classification, Image processing, Biometrics System, and Pattern Recognition, Data Structure, ADA, Theory of Computation (TOC), Computer Network.

Extra Curriculars

- Delivered an invited talk on "Deep Learning" during the Data Science workshop at LNCT Bhopal, 22 February 2020.
- Delivered an invited talk on "Machine Learning and Deep Learning" during the Machine Learning workshop at LNCT Bhopal, 2 September 2019.
- Student Coordinator in SCML 2018 and SCML 2021 Workshop.
- Reviewer for Wiley, International Journal of Imaging system and technology.
- Reviewer for Elsevier, Biocybernetics and Biomedical Engineering.
- Reviewer for Elsevier, Computers in Biology and Medicine.
- Reviewer for Oxford University Press, The Computer Journal.
- Participating in the 2nd Cross-Spectrum Iris/Periocular Recognition competition 2017-IJCB.
- Participated in cricket competitions at the college level.

Workshop & Seminars

- Participated in a 5-day workshop on "Applications of Artificial Intelligence in Digital Histopathology 2021" at NITK Surathka, Karnataka, India.
- Presented paper in an International Conference on "Computer Vision and Image Processing (CVIP 2019) and CVIP 2021".
- Participated in an International Conference on "Computer Vision and Image Processing (CVIP 2018)" at IIITDM, Jabalpur, India.
- Participated in a 5-day workshop on "A.I. and Deep Learning on September 2019" at IIITDM, Jabalpur, India.
- Participated in a 5-day GIAN course on the "Advanced Pattern Recognition Techniques for Biometrics 2018" at IIT Indore, India.
- Participated in a three-day short-term Course on "Network Security-A Practical Perspective" held at ABV-IIITM Gwalior in association with Cisco Networking Academy, India.

Achievements/Awards

- Qualified Gate Examination five times (in the year 2010, 2012, 2015, 2016, and 2021).
- Best Paper Award in Research Scholar Day 2021, MANIT Bhopal.
- Best Faculty Award 2015 (awarded by Srijan-2015) for the best result in the subject: Computer Networks.
- Best Faculty Award 2014 (awarded by Srijan-2014) for best results in the subject: Principle of programming language.
- Qualified UGC-NET in June 2012.
- CCNA certification in 2012.