SNEHA SHUKLA

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EDUCATION

Indian Institute of Technology Indore *May 2021 - Present*
Ph.D. in Computer Science and Engineering *CPI: 8.91/10*

National Institute of Technology Raipur *Jul 2016 - Jul 2018*
M.Tech. in Information Technology *CPI: 8.32/10*

Chhattisgarh Swami Vivekananda Technical University, Bhilai *Aug 2011 - Jun 2015*
B.E. in Electronics and Telecommunication *CPI: 8.66/10*

RESEARCH

Enhancing Adversarial Robustness of Medical Image Segmentation *Apr 2024 - Present*

- Proposed a novel adversarial defence method that leverages contrastive and multitask learning.
- The proposed method effectively mitigates the impact of adversarial attacks on the medical image segmentation model by reducing the attack success rate up to less than 10%.

Detection of anomaly samples in Medical Image Segmentation *Apr 2023 - Mar 2024*

- Designed a novel detection method that distinguishes adversarial and OOD samples from clean samples by employing the consistency analysis between input and input variants.
- This marks the first unified method devised for medical image segmentation tasks, delivering a significant detection success rate.

Trustworthy Medical Image Segmentation Models *Apr 2022 - Mar 2023*

- Devised an innovative approach to assess and improve the trustworthiness of medical image segmentation models, enhancing their overall effectiveness.
- The method outperforms the state-of-the-art medical image segmentation models by providing improved segmentation outcomes.

Adversarial Attacks on Medical Image Segmentation Models *Sep 2021 - Mar 2022*

- Proposed a novel attack architecture that selects the best surrogate loss function to perform attacks on medical image segmentation models while adding minimum adversarial perturbations.
- The architecture was able to fool the state-of-the-art medical image segmentation models with an attack success rate of more than 99%.

Heart rate monitoring from face videos using deep learning *Jan 2021 - Jul 2023*

- Developed a healthcare framework for heart rate monitoring using remote photoplethysmography (rPPG) from non-contact face videos captured by camera sensors.
- The experimental results demonstrate that the proposed method outperforms state-of-the-art rPPG-based methods on publicly available datasets.

PUBLICATIONS

– **Sneha Shukla**, Anup Kumar Gupta, Puneet Gupta, "Exploring the feasibility of Adversarial Attacks on Medical Image Segmentation", *Multimedia Tools and Applications, Springer, (2024)*, DOI: https://link.springer.com/article/10.1007/s11042-023-15575-8.

– **Sneha Shukla**, Lokendra Birla, Anup Kumar Gupta, Puneet Gupta, "Trustworthy Medical Image Segmentation with improved performance for in-distribution samples", *Neural Networks, Elsevier, (2023)*, DOI: https://doi.org/10.1016/j.neunet.2023.06.047.

– **Sneha Shukla**, Puneet Gupta, "EVADE: A Novel Method to Detect Adversarial and OOD Samples in Medical Image Segmentation", *Expert Systems With Applications, Elsevier.* (Under Review)

– **Sneha Shukla**, Puneet Gupta "CEASE : Contrastive Multitasking Defence elevates Adversarial Robustness of Medical Image Segmentation", *Neural Networks, Elsevier.* (Under Review)

– **Sneha Shukla**, Puneet Gupta, Esa Rahtu "A Comprehensive Survey of Advanced Transformer-based Attentions for Computer Vision Applications", *ACM Computing Surveys, ACM.* (Submitted)

– Lokendra Birla, **Sneha Shukla**, Trishna Saikia, Puneet Gupta, "HR-TRACK: An rPPG method for heartrate monitoring using Temporal Convolution Networks", *International Conference on Pattern Recognition (ICPR), (2024).* DOI: https://doi.org/10.1007/978-3-031-78201-5_24

– Lokendra Birla, **Sneha Shukla**, Anup Kumar Gupta, Puneet Gupta "ALPINE: Improving Remote Heart Rate Estimation using Contrastive Learning", *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), (2023)*, DOI: https://doi.org/10.1109/WACV56688.2023.00500.

– Anirban Nath, **Sneha Shukla**, Puneet Gupta "MTMedFormer : Multi-Task Vision Transformer for Medical Imaging with Federated Learning", *Medical & Biological Engineering & Computing, Springer.* (Submitted)

– Mridu Sahu, Saumya Vishwal, S Usha Srivalli, **Sneha Shukla**, Sanjivani Shantaiya, "Feature extraction and analysis of overt and covert EEG signals with speller devices", *International Journal of Advanced Intelligence Paradigms, (2023)*, DOI: https://doi.org/10.1504/IJAIP.2023.135026.

– Mridu Sahu, Shrish Verma, Naresh K Nagwani, **Sneha Shukla**, "EEG signal analysis and classification on P300 speller-based BCI performance in ALS patients", *International Journal of Medical Engineering and Informatics, (2020)*, DOI: https://doi.org/10.1504/IJMEI.2020.108240.

– Mridu Sahu, **Sneha Shukla**, "Impact of Feature Selection on EEG Based Motor Imagery", *Information and Communication Technology for Competitive Strategies, Springer (2019)*, DOI: https://doi.org/10.1007/978-981-13-0586-3_73.

– Mridu Sahu, Saumya Vishwal, Srungaram Usha Srivalli, Naresh Kumar Nagwani, Shrish Verma, **Sneha Shukla**,"Applying Auto-Regressive Model's Yule-Walker Approach to Amyotrophic Lateral Sclerosis (ALS) patients' Data", *Current Medical Imaging, (2019)*, DOI: https://doi.org/10.2174/1573405614666180322143503.

WORK EXPERIENCE

Indian Institute of Technology, Indore Indore, Madhya Pradesh, India

Teaching Assistant, Department of Computer Science and Engineering *May 2021 - Present*

– Machine Learning (CS 403/603)

– Computer Vision (CS 419/619)

– Computer Programming (IC 151)
– Cryptography and Network Security (CS 417/617)

Indian Institute of Technology, Indore Indore, Madhya Pradesh, India
Project Research Scholar *Jan 2021 - Jul 2023*

– Worked on the CPS-Drishti sponsored project titled *"Designing remote PPG based Heart rate estimation system for face mask videos."*

– Worked on the SERB-DST sponsored project titled *"Heart rate monitoring from non-contact face videos using deep learning."*

National Informatics Centre (NIC) Raipur, Chhattisgarh, India
Research Programmer, Department of School Education *Jul 2018 - Dec 2019*

– Designed a deep learning-based speech recognition system to tackle the pronunciation problem in the English language under the state education research and development project.

POSITION OF RESPONSIBILITIES

– **Mentorship:** Supervised 2 undergraduate and 3 post-graduate students in their projects.

– **Coordinator:** Symposium 2.0, a 3-day annual technology event organised by the Department of CSE, IIT Indore.

– **Coordinator:** SERB-sponsored Karyashala event, a 7-day high-end workshop organised by the Deep Intelligence Lab, Department of CSE, IIT Indore.

– **Affiliate Member:** Cyber-Physical System Drishti Club, a Technology Innovation Hub at IIT Indore.

REFERENCES

– **Dr. Puneet Gupta** +91-9559754489, puneet@iiti.ac.in
Associate Professor, Indian Institute of Technology Indore, India

– **Dr. Lokendra Birla** +91-8617027461, lokendra.birla@accenture.com
Technology R & D Principle, Accenture Technology Labs, Bangalore, India

EXTRACURRICULAR ACTIVITIES

– Actively participated in IIT Indore's computer education awareness program, providing government school students with insights into recent technologies and career guidance.

– Designed the departmental logo and t-shirts for the Department of CSE at IIT Indore.

– Contributed to the paper-bag distribution program to raise awareness against the use of polythene bags, organised by the AVANA club (a social welfare initiative) at IIT Indore.

– Participated in the workshop on *Medical Signal and Image Processing* organised by the Department of CSE, NIT Raipur.

– Achieved pre-senior and senior general knowledge test certificates with a score of 90% in both.

– Awarded running shields for achieving the highest grades in mathematics.