

Shyam Nandan Rai

[E-Mail](#) | [Website](#) | [Github](#) | [Google scholar](#)

EDUCATION

Politecnico di Torino, Turin

PhD in Artificial Intelligence

CGPA: -/-

Nov. 2021 – Present

International Institute of Information Technology, Hyderabad

CGPA: 8.83/10

M.S. (Research) in Computer Science

Aug. 2017 – Dec. 2020

Indian Institute of Information Technology, Sri City

CGPA: 8.71/10

B.Tech (Hons.) in Electronics and Communication Engineering

Aug. 2013 – May 2017

PUBLICATIONS

1. **Removing Atmospheric Turbulence via Deep Adversarial Learning.** *Shyam Nandan Rai*, C. V. Jawahar. TIP 2022. (Forthcoming)
2. **FLUID: Few-Shot Self-Supervised Image Deraining.** *Shyam Nandan Rai*, Rohit Saluja, Vineeth N Balasubramanian, Chetan Arora, Anbumani Subramanian, C. V. Jawahar. WACV 2022. [\[Paper\]](#)
3. **ORDER: Open World Object Detection on Road Scenes.** *Shyam Nandan Rai**, Deepak Kumar Singh*, K J Joseph, Rohit Saluja, Vineeth N Balasubramanian, Chetan Arora, Anbumani Subramanian, C. V. Jawahar. NurIPSW 2021. [\[Paper\]](#)
4. **Spatial Feedback Learning to Improve Semantic Segmentation in Hot Weather.** *Shyam Nandan Rai*, Vineeth N Balasubramanian, Anbumani Subramanian, C. V. Jawahar. BMVC 2020. [\[Paper\]](#) [\[Code\]](#)
5. **Munich to Dubai: How far is it for Semantic Segmentation? (Oral).** *Shyam Nandan Rai*, Vineeth N Balasubramanian, Anbumani Subramanian, C. V. Jawahar. WACV 2020. [\[Project Page\]](#) [\[Paper\]](#)
6. **Learning To Generate Atmospheric Turbulent Images.** *Shyam Nandan Rai*, C. V. Jawahar. NCVPRIPG 2019. [\[Paper\]](#)
7. **IIITCFW: A Benchmark Database of Cartoon Faces in the Wild (Oral).** Ashutosh Mishra, *Shyam Nandan Rai*, Anand Mishra, C. V. Jawahar. ECCVW 2016. [\[Project Page\]](#) [\[Paper\]](#)

RESEARCH PROJECTS

Vision for Road Mobility and Safety

Aug. 2020 – Aug. 2021

- We are currently developing few shot image de-raining methods that could be used to improve computer vision tasks such as semantic segmentation and pedestrian detection that are critical for autonomous navigation systems.

Atmospheric Turbulence Restoration & Application

Jan 2018 - July 2020

- We developed restoration models for restoring images in hot weather conditions. We show that our proposed DTD-GAN+ performs best over the general image-to-image translation methods in removing distortions caused by hot weather. Our method's restored images were further used to show improvement in computer vision tasks such as key-point estimation and depth estimation. All the results were submitted to TIP (under revision).
- We improve the performance of semantic segmentation models in hot weather. We proposed Channel Attentive Multi-Scale Residual Block that was particularly designed for removing geometrical distortions caused in hot weather. The results of this work has been accepted in WACV 2020.
- We further improved the semantic segmentation model's adaptability in hot weather by proposing a feedback framework. Additionally, we also proposed a novel iterative Focal Loss(iFL) that complemented the current feedback framework and further improved the semantic segmentation model's performance in the hot environment. We published this work in BMVC 2020.
- We proposed a deep network that efficiently generates atmospheric turbulent images from clean images. We trained the network on a combination of multi-scale SSIM Loss, adversarial loss, and content loss. We published the results of this work at NCVPRIPG 2019.

Cartoon Image Understanding

Jan. 2016 - Apr. 2017

- We created a cartoon image dataset (IIIT-CFW) for understanding the problem spectrum in cartoon domain. The dataset paper was published at ECCVW.
- Further, we addressed the problem of photo2cartoon retrieval using different fusion methods.

WORK EXPERIENCE

CVIT, IIIT-Hyderabad

Aug. 2017 – Present

Research Student

- Worked on developing restoration methods that improved the performance of computer vision algorithms in hot weather. Published papers in BMVC'20, WACV'20, and NCVPIRIPG'19.
- Currently, working on developing image de-raining method in few-shot setting.

MLL Lab-IIITH & Talentsprint

Oct. 2018 – Present

AI/ML Mentor

- Mentoring of industrial professionals during the lab sessions on the concepts of machine learning & deep learning.

RTC, Robert Bosch, Bangalore, India

May 2016 – July 2016

Computer Vision Intern

- Benchmarking of person detection and tracking algorithm.
- Implementation of KLT tracker on PNNL and Pizza sequences.

CV/ML PROJECTS

LRR Network for Semantic Segmentation [\[Project Page\]](#)

Spring'18

Used multi-scale architecture based on a laplacian pyramid approach to improve semantic segmentation. The approach gave better results over fully convolutional network.

Relationship between Music & Personality [\[Report\]](#)

Monsoon'18

The main objective of this project is to find a strong correlation between personality of an individual and their music preferences. By using this correlation, we predict the personality of person by his/her preferred genre or recommend personalised music with the help of machine learning techniques.

Reading Comprehension [\[Project Page\]](#)

Monsoon'17

Posed reading comprehension as a sentence classification task which consists of two classes: entailment and contradictory. Instead of sequential models, we used CNN models for classification and extended to a siamese variation using contrastive loss.

Gender Identification from Facial Images [\[Project Page\]](#)

Monsoon'17

Implemented different feature based methods to identify gender from facial images. We used PCA for dimensionality reduction followed by KNN, Logistic Regression and SVM as classifiers to classify the features. Extended the method to cross modal gender identification between the real face and its cartoon and caricature modalities.

Detecting misalignment in CAD images [\[Project Page\]](#)

Monsoon'17

Developed an interactive computer vision application using Qt and Opencv, to detect misalignment in CAD Images. Internally the application uses RANSAC (for image alignment) along with the handcrafted thresholding techniques.

Facial Expression Recognition [\[Project Page\]](#)

Spring'17

We used pre-trained model VGG Face for extracting features and used SVM for classification with different kernels. In addition, we used a unified model which fuses the CNN features and HOG feature giving higher accuracy than other models. All the experiments were conducted on FER-2013 dataset.

Personal Projects

- Pytorch tutorial for Multi Agent Diverse GAN. [\[Project Page\]](#)
- Implementation of Twin Auxiliary Classifier GAN. [\[Project Page\]](#)
- Image quality assessment. [\[Project Page\]](#)

ACADEMIC ACTIVITIES AND ACHIEVEMENTS

Achievements: Dean's List - Monsoon '15, Dean's Research Award - Spring '17

Organizing Committee: Delivered tutorials on GANs basics and MAD-GAN at CV/ML Summer School, 2019, IIIT-H.

Teaching Assistance: Deep Learning, Monsoon'20

Selection Committee: Summer School on Computer Vision and Machine learning 2018, 2019, IIIT Hyderabad

Reviewer: BMVC 2020

ML FRAMEWORK

Deep Learning: PyTorch, Keras and Matconvnet

Small Experiments: OpenCV, SciPy, and Scikit-Learn

Languages: Python, MATLAB, and Lua

Development: Qt