Ankan Kumar Bhunia   *Curriculum vitae*

CONTACT
INFORMATION

86/2, South Baksara Road.
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RESEARCH
INTERESTS

Computer Vision, Deep Learning, Machine Learning, Reinforcement learning, Document Image Analysis.

EDUCATION

Jadavpur University, Kolkata, India
- B.E Electrical Engineering - Current Status: 4th year student   2020(Expected)
- Current CGPA 8.3

Sibpur S.S.P.S. Vidyalaya, Howrah, India
- Higher Secondary (12th Standard, WBCHSE) - Aggregate: 92.4%   2016
- Secondary (10th Standard, WBSE) - Aggregate: 90.5%   2014

JOURNAL
PUBLICATIONS

- Ayan Kumar Bhunia, **Ankan Kumar Bhunia**, Shuvozit Ghose, Partha Pratim Roy, Umapada Pal, "A Deep One-Shot Network for Query-based Logo Retrieval", **Pattern Recognition**, *2019, Elsevier.*(**I.F.-5.589**) (DOI: 10.1016/j.patcog.2019.106965)[PDF] [GitHub]

  Highlights: A scalable solution for the logo detection prob- lem is proposed by re-designing the traditional problem setting.

  (1) It's a query-based logo search and detection system that employs a simple, fully differentiable one-shot learning framework which can be used for new logo classes without further training the whole network. (2) Multi-scale conditioning is designed to learn the similarity between the query image and target image at different scale.

- **Ankan Kumar Bhunia**, Aishik Konwar, Abir Bhowmik, Ayan Kumar Bhunia, Partha Pratim Roy, "Script Identification in Natural Scene and Video Frame using Attention based Convolutional LSTM Network", **Pattern Recognition**, *2019, Elsevier.*(**I.F.-3.962**) (DOI: 10.1016/j.patcog.2018.07.034) [PDF] [GitHub]

  Highlights: Although attention-based framework is popular in Deep Learning, the most interesting part of our framework is **how we use patch-wise attention values twice inside an end-to-end trainable architecture** in order to

  (1) Combine local(patch-wise) and global(full-text line image) feature in a dynamic way. (2) Combine patch-wise classification instead of simple element wise-summation.

- **Ankan Kumar Bhunia**, Alireza Alaei, Partha Pratim Roy, "Signature Verification Approach using Fusion of Hybrid Texture Features", **Neural computing and Applications**, *Springer.* (**I.F.-4.213**) [arXiv]

  Highlights: One-class support vector machines (SVMs) are created to obtain two different authenticity scores for a given signature. Finally, a score level classifier fusion based on the average method is performed to integrate the scores that predicts the authenticity of the signature.

CONFERENCE
PUBLICATIONS

- Ayan Kumar Bhunia, Abhirup Das, **Ankan Kumar Bhunia**, Sairaj Kishore, Partha Pratim Roy, "Handwriting Recognition in Low-resource Scripts using Adver-sarial Learning", *Accepted in* (**CVPR**) 2019 [arXiv]

  Highlights: Word-retrieval is very difficult in low-resource scripts. To deal with the problem **Adversarial Feature Deformation Module** (AFDM) is proposed that learns ways to elastically warp extracted features in a scalable manner,boosting its capability to better learn highly informative features rather than trivial ones

- **Ankan Kumar Bhunia**, Ayan Kumar Bhunia, Aneeshan Sain, Partha Pratim Roy, "Improving Document Binarization via Adversarial Noise-Texture Augmentation", *International Conference on Image Processing* (**ICIP 2019**), *IEEE* [arXiv] [GitHub]

  Highlights: A two-stage network is proposed that first learns to augment the document images by using neural transfer technique. The most significant contribution of our framework is that it does **NOT** require any paired data.

- **Ankan Kumar Bhunia**, Ayan Kumar Bhunia, Prithaj Banerjee, Aishik Konwer, Abir Bhowmick, Partha Pratim Roy, Umapada Pal, "Word Level Font-to-Font Image Translation using Convolutional Recurrent Generative Adversarial Networks", *24th International Conference on Pattern Recognition* (**ICPR**)*, 2018.* [arXiv]

  Highlights: A word level image translation model inspired from pix2pix architecture, which is the first of its kind to handle images of varying widths.

- Ayan Kumar Bhunia, Abir Bhowmick, **Ankan Kumar Bhunia**, Aishik Konwer, Prithaj Banerjee, Partha Pratim Roy, Umapada Pal, "Handwriting Trajectory Recovery using End-to-End Deep Encoder-Decoder Network", *24th International Conference on Pattern Recognition* (**ICPR**)*, 2018.* [arXiv]

  Highlights: Our proposed framework employs sequence to sequence model in designing an end-to-end network for a decade old popular problem in document analysis community.

- Aishik Konwer, Ayan Kumar Bhunia, Abir Bhowmick, **Ankan Kumar Bhunia**, Prithaj Banerjee, Partha Pratim Roy, Umapada Pal, "Staff line Removal using Generative Adversarial Networks", *24th International Conference on Pattern Recognition* (**ICPR**)*, 2018.* (Oral) [arXiv]

  Highlights: A new framework for staff-line removal in music-score documents using **GANs** which achieved superior performance in comparison to other conventional approaches on the ICDAR/GREC 2013 dataset.

RESEARCH
PROJECTS

- **Crowd Estimation by Transfer Learning the Depth Information**: The model captures the homogeneous density variations of crowd scenes in spatial domain by acquiring the depth information through Transfer learning (Ongoing) [PDF]

- **3D handwriting recognition through adversarial domain adaptation**: I focus on taking the help of online 2D handwriting data to recognize the words from 3D handwriting using adversarial domain adaptation algorithms. (Ongoing) [PDF]

  [CODE]

SCIENTIFIC RESEARCH EXPERIENCE	MAY, 2019 to AUGUST, 2019

SCIENTIFIC RESEARCH EXPERIENCE

MAY, 2019 to AUGUST, 2019

Mitacs Globalink Internship [Certificate]
Research Intern at University of Manitoba, Canada [GitHub]
- **Title**: "Flexible deep learning models in computer vision "
- **Advisor**: Dr. Yang Wang , Associate Professor.
- **Description**: I worked on one-shot scene-specific crowd counting that learns to adapt already trained model to a specific test-scene based on a single example. During finetuning different layers are freezed based on the decision of a Policy network.

JUNE, 2018 to JULY, 2018

Robert Bosch, Bangalore, India
Research Intern at Computer Vision Lab, RTC Department [Certificate]
- **Title**: "Synthetic to Photo-realistic Image Generation" [GitHub]
- **Advisor**: Dr. Amit Arvind Kale, Principal Senior Expert
- **Description**: I worked on various domain adaptation techniques to improve the performance of state-of-the-art semantic segmentation methods by leveraging large synthetic datasets.

MAY, 2017 to PRESENT

- **Advisor**: Prof. Partha Pratim Roy, Ph.D.
  Dept. of Computer science, IIT Roorkee, India.
- **Research Directions**: Machine learning, computer vision, pattern recognition, document analysis, visual Scene understanding etc
- **Collaborated with**: Prof. Umapada Pal, CVPR Unit, ISI-Kolkata, Dr. Alireza Alaei, Research Fellow, Griffith University, Australia.

RELEVANT COURSEWORK

∗ Statistics & Probability	∗ Linear Algebra	∗ Signal Processing
∗ ML & DL Algorithms	∗ Computer Vision	∗ Reinforcement learning

FAMILIARITY WITH DL

∗ CNN/RNN/LSTM	∗ Auto-encoder	∗ Transfer Learning
∗ Semantic Segmentation	∗ Object Detection	∗ Attention Mechanism
∗ Siamese Network	∗ Triplet Network	∗ Generative Models
∗ Domain Adaptation	∗ Style Transfer	∗ Image Trans. Models

TECHNICAL SKILLS

- Programming Languages: **Python**, C, MATLAB.
- Deep Learning Framework: **PyTorch, Tensorflow**, Keras.
- Mathematics: Linear-algebra, Probability, Statistics, Signal Processing.
- Miscellaneous: OpenCV, OpenAI gym, Numpy, Matplolib, Pandas, Scikit-Learn.

REFERENCES

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