Aneeshan Sain *Curriculum vitae*

CONTACT INFORMATION

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RESEARCH INTERESTS

Computer Vision, Pattern Recognition, Image Processing, Machine Learning, Deep Learning.

EDUCATION

University of Surrey, UK since Oct 2019

- Centre for Vision, Speech and Signal Processing (CVSSP)
- Department of Electrical and Electronic Engineering
- Faculty of Engineering and Physical Sciences
- Current Status: Postgraduate Research Student

Institute of Engineering & Management, Kolkata (India) 2017
University: Maulana Abul Kalam Azad University of Technology
Formerly known as West Bengal University of Technology

- Department of Electrical Engineering
- DGPA: 8.14/10 (Including all 8 Semesters)
- Current Status: Graduated with Bachelor of Technology in Electrical Engineering
- B.Tech Thesis: *'Intelligent Battery Management System'*

St. Xaviers Collegiate School, Kolkata (India) 2013
- Indian School Certificate(12^{th} Standard)
- Aggregrate: 94.3%

St. Xaviers Collegiate School, Kolkata (India) 2011
- Indian Certificate for Secondary Education (10^{th} Standard)
- Aggregrate: 95.2%

REFEREED JOURNAL PUBLICATIONS

1. **Aneeshan Sain**, Ayan Kumar Bhunia, Partha Pratim Roy, Umapada Pal, "Multi-Oriented Text Detection and Verification in Video Frames and Scene Images", **Neurocomputing**, Elsevier**(I.F. - 3.317).** (DOI:10.1016/j.neucom.2017.09.089) [PDF]

   Highlights:

   - An efficient approach is proposed which is able to detect horizontal, non-horizontal and curved oriented texts in video frames and scene images.
   - The concept of skeletonization is proposed that improves the detection process of text region.
   - HMM verification is applied to improve the accuracy of results.
   - Finally, the framework has been tested with 4 different scripts(English, Chinese, Hindi and Bengali) to demonstrate its efficiency.

2. Chenqiu Zhao, **Aneeshan Sain**, Ying Qu, Yongxin Ge, Haibo Hu "Background Subtraction based on Integration of Alternative Cues in Freely Moving Camera", **IEEE Transactions on Circuits and Systems for Video Technology(CSVT) (I.F. - 3.558).** (DOI:10.1109/TCSVT.2018.2854273) [PDF]
   Highlights:

- An efficient approach is proposed to separate the foreground pixels from the background image in video frames obtained from a freely moving camera.
- A novel background subtraction framework has been applied to increase robustness of the proposed method.
- Finally the framework has been tested with FBMS dataset, and the results have been compared with other existing methods to demonstrate its efficiency.

3. Ayan Kumar Bhunia, Subham Mukherjee, **Aneeshan Sain**, Ankan Kumar Bhunia, Partha Pratim Roy, Umapada Pal, "Indic handwritten script identification using offline-online multi-modal deep network", **Information Fusion**, Elsevier**(I.F. - 10.716).** (Arxiv link) [PDF] (DOI:10.1016/j.inffus.2019.10.010)
Highlights:
   - A fresh approach towards word-level Indic script identification has been proposed here, that uses only character-level data in training stage.
   - A novel multi-modal deep network has been constructed that inputs both offline as well as online modalities of the data, for joint exploration of information.
   - Finally the framework has been tested against seven scripts, namely, Devanagari, Bangla, Odia, Gurumukhi, Tamil, Telegu and English, and compared the results with existing methods to demonstrate its efficiency.
   - Competitive results on both word and character levels using only character training.

Conference Publications

1. Ankan Kumar Bhunia, Ayan Kumar Bhunia, **Aneeshan Sain**, Partha Pratim Roy, "Improving Document Binarization via Adversarial Noise-Texture Augmentation", **ICIP 2019**. (Arxiv link) [PDF]
Highlights:
   - A novel adversarial learning approach has been applied to the classical Binarization Problem in Image Processing.
   - A Texture Augmentation Network has been constructed that transfers the texture element of a degraded reference document image to a clean binary image.
   - The two networks are jointly trained to increase the adversarial robustness of the system.
   - Finally the framework has been tested with DIBCO datasets, and the results have been compared with other existing methods to demonstrate its efficiency.

Papers in Preparation

1. **Aneeshan Sain**, Ayan Kumar Bhunia, Yongxin Yang, Tao Xiang, Yi-Zhe Song "Cross-Modal Hierarchical Modelling for Fine-Grained Sketch Based Image Retrieval" Submitted to **British Machine Vision Conference**. [PDF]
Highlights:
   - An end-to-end trainable architecture is proposed that enables the discovery of the underlying hierarchy of a sketch.
   - A cross-modal co-attention module is introduced to facilitate cross-modal hierarchy construction.
   - A unique perspective of utilising hierarchies for the problem of FG-SBIR has been put forth.
   - Extensive ablative studies and evaluations against state-of-the-arts on three standard FG-SBIR and GUI retrieval datasets, show our method to outperform most existing methods by a significant margin.

Scientific Research Experience

Nov, 2015 to Oct 2017
Text detection in Video Frames/Scene Images,
Image Retrieval, Logo Detection, Kinship Verification.
Advisor: Prof. Partha Pratim Roy, Ph.D.
- Dept. of Computer Science.
- Indian Institute of Technology, Roorkee, India.

Advisor: Prof. Dr. Umapada Pal , Ph.D.
- Head, Computer Vision and Pattern Recognition Unit.
- Indian Statistical Institute, Kolkata, India.

Oct, 2019 to Present
Modelling Hierarchy in Sketch Analysis,
Supervisor: Dr. Yi-Zhe Song, Ph.D.
- Dept. of Electrical and Electronics Engineering.
- CVSSP, University of Surrey, UK.

Co-Supervisor: Prof. Dr. Tao Xiang , Ph.D.
- Professor of Computer Vision and Machine Learning.
- CVSSP, University of Surrey, UK.

Relevant Projects

- Scene-text detection in Scene Image and Video Frames.
- Logo detection in Scene Images and Video Frame.
- Feature Design for Image Retrieval.
- Deep Learning Based Scene Text Detection
- Video Text Frame Categorization

Achievements

- Secured rank 3333 in WBJEE among 1.5 lakhs students, 2013.
- Secured state rank 963 in JEEMAINS, 2013.
- Got selected in Indian Nationial Olympiad in Informatics 2013.
- Got selected in Zonal Informatics Olympiad 2013.
- Ranked 74 out of 2000 competitors in an online coding competition on Hackerrank.

Relevant Coursework

(i) Linear Algebra & Diff. Eqn. (ii) Statistics & Probability (iii) Control System
(iv) Digital Image Processing (v) Digital Signal Processing (vi) Signals and System

Technical Skills

- Programming Languages: C, C++, MATLAB, Python, JAVA, JCL, COBOL.
- Low level Programming : Atmel AVR (Atmega32) & 8085 Assembly, ASSEMBLER.
- ML Framework: Scikit-learn.
- Deep Learning Framework: Tensorflow, Pytorch.
- Hardware Exposure: AVR Micro-controller, Arduino.
- Mathematics: Linear-algebra, Probability, Statistics.
- Miscellaneous: OpenCV, LIBSVM library, HTK library.

Professional Experience

Organisation	: Cognizant Technological Solutions
Job Title	: Programmer Analyst
Role	: Mainframe Developer
Technology Used	: JCL,COBOL,ASSEMBLER

References

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Prof. Dr. Tao Xiang
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Dr. Partha Pratim Roy
Assistant Professor
Dept. of Computer Science
Indian Institute of Technology, Roorkee.
Phone: (+91)-1332-284816
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Head & Professor
Comp. Vision Pattern Recog. Unit
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