Digbalay Bose

Curriculum Vitae

3710 McClintock Ave
Los Angeles, CA-90007
📞 +1 323 356 7550
✉ dbose@usc.edu
🖥 sail.usc.edu/~dbose
⭕ digbose92

Research Interests

Multimodal Machine Learning, Computer Vision, Affective computing, Machine learning for Healthcare

Education

2018–Present   **University of Southern California(USC)**.
- Ph.D in Electrical and Computer Engineering; **GPA: 3.84/4.00**
- **Advisor:** Prof. Shrikanth Narayanan

2014–2016   **Indian Institute of Technology Bombay**.
- M.Tech in Electrical Engineering; **CPI: 9.51/10**
- **Specialization**: Control and Computing (Rank: 2/16)
- **Advisor:** Prof. Subhasis Chaudhuri

2010-2014   **Jadavpur University**.
- B.E. in Electronics and Telecommunication Engineering; **CPI: 9.34/10**
- **Specialization rank**: 2/46

Selected Publications

Please see Google Scholar for the complete list of publications

- **Automated analysis of asymmetry in facial paralysis patients using landmark-based measures**
  Digbalay Bose, Krishna Somandepalli, Tymon Tai, Courtney Voelker, Shrikanth Narayanan, Amit Kochhar | ***Facial Plastic Surgery and Aesthetic Medicine***, *Under Review*

- **Cross Domain Emotion Recognition using few shot knowledge transfer**
  Justin Olah, Sabyasachee Baruah*, *Digbalay Bose**, Shrikanth Narayanan | ***arXiv***, *2021* [pdf]

- **Understanding of Emotion Perception from Art**
  Digbalay Bose, Krishna Somandepalli, Souvik Kundu, Rimita Lahiri, Jonathan Gratch, Shrikanth Narayanan | ***4th ICCV Workshop on Closing the Loop Between Language and Vision(CLVL)***, *2021* [pdf]

- **Robust resource demand estimation using hierarchical Bayesian model in a distributed service system**
  Sumanta Mukherjee, Krishnasuri Narayanam, Nupur Aggarwal, *Digbalay Bose* and Amith Singhee | ***CODS-COMAD***, *2021* [pdf]

- **Hierarchical Spectral Clustering based Large Margin Classification of Visually Correlated Categories**
  Digbalay Bose, Subhasis Chaudhuri | ***Indian Conference on Vision, Graphics and Image Processing(ICVGIP)***, *2016* [pdf]

- **Optimal filter design using an improved artificial bee colony algorithm**
  Digbalay Bose, Subhodip Biswas, Athanasios V. Vasilakos, Sougata Laha | ***Information Sciences***, *2014* [pdf]

Patents

- **Visually Guided Query Processing**
  Ashok Pon Kumar Sree Prakash, Ayushi Dalmia, Amith Singhee, *Digbalay Bose*, Sumanta Mukherjee, Raghavendra Singh, Vikas C. Raykar| ***US Patent (US10878291B2)***, *2020* [pdf]

Work Experience

July 2016-June 2018   **IBM Research Lab, India**, *Research Software Engineer*.
- Developed an end-to-end soil moisture extraction system from satellite images by incorporating image interpolation techniques as a part of IBM Geospatial Analytics suite.
- Developed explainable deep learning models in the domains of image classification and visual search as a part of retail and operations effort

May 2013 - July 2013   **Indian Statistical Institute, Kolkata**, *Research Intern*.
Advisor: Prof. Subhamoy Maitra, Applied Statistics Unit
- Developed a key recovery scheme based on the properties of Slid Pairs for stream cipher Salsa20.

Summer schools

July 2020 - August 2020   **Oxford Machine Learning Summer School**.
- Acceptance rate: 15% [Certificate]

Research Experience

- *Research Assistant,* **Signal Analysis and Interpretation Laboratory, University of Southern California (2018 - Present)**
  - **Advisor:** Prof. Shrikanth Narayanan
  - **Automated analysis of facial paralysis patients**:
    - Developed a configurable web application for recording and segmenting clinical sessions involving facial paralysis patients.
    - Developed a facial landmark based video pipeline involving novel asymmetry measures which were used to predict standardized clinician graded scores in a linear mixed effects modeling setup. (Under review in **Facial Plastic Surgery and Aesthetic Medicine**).
    - Work done in collaboration with Dr. Amit Kochhar and Dr. Courtney Voelker.
  - **Understanding emotion perception in art work**:
    - Developed multimodal transformer (MMBT) based architectures with configurable image features for 9 class evoked emotion recognition using art images and captions in Artemis dataset. (Accepted at ICCV CLVL Workshop 2021)
  - **Visual ambience understanding**:
    - Developed an automatic clustering based method of extracting multi-label background scene taxonomy from movies($\sim$ 170 scene labels from movie scripts and auxiliary video datasets).
    - Developed 3D convolutional models for multi-label scene classification from short video clips in HVU and VidSitu datasets.
    - Work done in collaboration with Google Research.
  - **Cross-domain emotion recognition from text**:
    - Co-developed a method for few shot emotion recognition by transferring knowledge from GoEmotions dataset of Reddit comments to SemEval tweet corpus using various label representation methods.
  - **Content analysis of advertisement videos:**
    - Curated a large scale dataset of advertisement videos ($\sim$ 10k) and developed multimodal deep learning methods for content understanding along the lines of semantic concepts (17 concept labels), tone transitions and social messages.
  - **Computational analysis of gender portrayal in media**:
    - Collaborated with Geena Davis Institute on the Seejane Project to computationally analyze TV shows and advertisements from 2020-2021.
- *Research Scholar,* **Vision and Image Processing Laboratory, Indian Institute of Technology, Bombay (2015 - 2016)**
  - **Advisor:** Prof. Subhasis Chaudhuri
  - **Applications of sparsity and metric learning based methods in classification problems (Master's thesis)**
    - Developed a hierarchical scheme of fine-grained image classification based on a self tuning variant of spectral clustering followed by application of large margin nearest neighbor algorithm.

Skills

- **Languages:** Python, C, C++, R, Javascript, HTML, Bash
- **Machine Learning Frameworks:** Pytorch, Tensorflow, Keras, Caffe, Scikit-learn
- **Computer Vision Frameworks:** OpenCV, Scikit-Image, PIL
- **NLP Frameworks:** Spacy, StanfordCoreNLP

Selected Academic Projects

- **Future sales prediction using ensemble models (CSCI 567, USC)** [Report] [Code]
  - Obtained a world rank of 80 among 8292 teams in the Kaggle future sales competition
- **Visual Question Answering : Attention and Fusion based approaches (CSCI 599, USC)** [Report] [Code]
  - Awarded the best project by the poster session sponsors, Neudesic.
- **Multimodal Emotion Recognition from speech utterances (EE 599, USC)** [Slides]

Professional Service

- **Conference Review:** ICME 2021, ICASSP 2020, ICME 2020, HiPC 2017

Invited Talk

- Invited talk on **Understanding context in movies: Taxonomies, Benchmarks and Challenges** at the 3rd Media Understanding Workshop on Context and Environment. organized by Google Research and Center for Computational Media Intelligence, USC.

Selected Awards and Honors:

- **2021:** Phase 1 Finalist in **OpenCV AI Competition** as part of USC SAIL Team (top 200 teams globally).
- **2018:** Awarded **Annenberg Fellowship** by **University of Southern California** .
- **2016: Managers choice award** by **IBM Research, India** for research contributions in data-driven soil moisture modeling.
- **2016: Academic excellence award** by **IIT Bombay** for ranking among top 1% students of Masters in Electrical Engineering.

- **2014:** Secured All India Rank **251** out of 216367 candidates in **Graduate Aptitude Test in Engineering (GATE) 2014**

Selected Coursework

- **USC:** Machine Learning, Deep Learning and its Applications, Affective Computing, Random Processes.
- **IIT Bombay:** Computer Vision, High Performance Scientific Computing, Matrix Computations.

Teaching Experience

- **Fall 2020:** Teaching Assistant, EE 599: Deep Learning Systems (USC)

Mentoring

- **exploreCSR:** Mentored 3 senior and 1 freshman student for exploreCSR workshop.
- **CURVE:** Currently mentoring two freshmen as a part of USC Viterbi CURVE program.
  - Haoyang Zhang - CURVE Fellow (Fall 2021)
  - Selina Martinez - CURVE Fellow (Spring 2020), continuing as Viterbi Research Scholar (Fall 2021)