Sanchayan Sarkar

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Experience

***Graduate Student Researcher*, University of Pittsburgh,** Pittsburgh, PA, USA. Aug 2018-Present

Research assistant in multimodal machine learning.

- Building multimodal machine learning models for predicting turn-taking strategies (end-of-turns, speaker pauses) from audio-video-text sequences in dyadic conversations. • **Quantified significant** influence of head movement, facial expressions, vocal dynamics in multimodal turn-taking and **proposed** multimodal transformers to model cross-modal dynamics (using PyTorch).
- Building context aware spatiotemporal neural models (based on LSTM, Conv-LSTM, Transformers) for emotion recognition in multimodal interpersonal conversations (using Python, PyTorch).
- **Created** jointly learned Siamese spatiotemporal neural networks for predicting depression severity in mothers from mother-child face to face conversations (using Python, PyTorch). • Achieved 3% F1-score improvement over non-siamese models.

***Project Researcher*, Indian Statistical Institute,** Kolkata, West Bengal, India. Nov 2015- Dec 2016

Research Intern working on developing mathematical and statistical models for human face recognition.

- **Created** a novel local gradient-based illumination-invariant feature descriptor for face recognition beating accuracy of SOTA methods by 6.7% on CMU-PIE, 5% on Yale B and 2% AR, CUHK dataset • Technologies: MATLAB. [Paper]
- Used regression to stabilize Kernel lower entropy space for dimension reduction in face recognition. • **Established** proof of correctness for the stabilized lower entropy space • **Achieved** 3% improvement on FRAV-2D, FERET dataset over SOTA methods • Technologies: MATLAB [Details]

Skills & Interests

Tools: Python, PyTorch, Keras, TensorFlow, C/C++, Caffe, Pandas, Scikit, Seaborn, OpenCV, Linux, AWS, MATLAB, SQL git
Research Skills: Deep Learning/Machine Learning, Natural Language Processing, Computer Vision, Data Analysis.

Education

Master of Science (MS), University of Pittsburgh, PA, USA Aug 2017- Aug 2021 (expected)

- Computer Science with specialization and 3+ years research experience in Machine Learning. | *CGPA: 3.55 / 4.0*
- *Courses:* Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Artificial Intelligence.

Master of Science, (MSc) University of Calcutta, India Jul 2013- Jun2015

- Computer and Information Science. | *First Class, 75 % (in top 5)*
- *Thesis*: Image Enhancement using Cuckoo-Search Optimization.

Bachelor of Science, **(BSc)**, **St. Xavier's College, Kolkata**, India Jul 2010- Jun 2013

- Computer Science (Honors). | *First Class, 76% (in top 10)*

Selected Academic Projects

Image Captioning using context attention (3730 NLP) Oct 2020- Nov 2020

- Designed a caption generator (in PyTorch) from images using a Resnet-101 encoder with an attention-based LSTM decoder.

Continuous Mortality Prediction using Heterogenous data sources (3750 ML) Mar 2020- Apr 2020

- Investigated contribution of multiple data sources (medications, vital signs) on morality and built a Transformer architecture to predict mortality from continuous time-series events on large scale MIMIC-III dataset (using PyTorch).
- Achieved 3% improvement with Transformers over LSTM with Microbiology events.

Detecting Deep Fakes (11785 Deep Learning). Nov 2019- Dec 2019

- Created a Siamese Statistical Recurrent Neural Networks to detect deep-fake video sequences of individuals (using PyTorch)
- Achieved 10% increase in AUC-ROC over Statistical Recurrent Networks in FaceForensics++ dataset. [Details]

Detecting Pneumonia in Chest X-Ray Images: ML approaches (2750 ML) Mar 2019 – Apr 2019

- Implemented Resnet-50, InceptionNet, CNN, Resnet-50 on Chest X-ray images (using Keras, Tensorlow).
- Improved recall performance by 3% using Resnet-50 over InceptionNet. [Details]

Tiny Google – A parallel word search engine (2510 OS) Nov 2018- Dec 2018

- Developed a distributed search engine, using multithreading, that searches and retrieves documents based on search words from multiple worker nodes. Project done using Python and Threading. [Details]

Direct Manipulation in Virtual Reality (2610 HCI). Nov 2017- Dec 2017

- Extracted tracked movements from smartwatch to move objects in Virtual Reality (using Android SDK, Unity 3D).
- Created a user study gauging the difficulty of moving a box to a sphere of varying length in the virtual environment. [Details]

Publications

- ***"Leaning Turn-Taking Strategies in Multimodal Dialogue", 2021.*** (under preparation).
- ***"Local Centre of Mass Face For Face Recognition under varying Illumination", 2017.*** *[Link]*
- ***"Challenges and Effects of Plastic Surgery on Face Recognition Performance: A review", 2016.*** *[Link]*