

# Sanchayan Sarkar

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**Summary :** 5+ years experience in machine learning with expertise in multimodal vision and language models, graph neural networks and time series data. Passionate and adept in researching novel problems and building deep learning solutions for production.

## Experience

**Data Scientist II (Machine Learning Engineer), Katana Graph, Denver, CO, USA.** *Oct 2021- May 2023*

- Developed novel scalable semi-supervised machine learning pipelines for automatic graph topology learning, from raw relational data. Achieved **5-7% precision gain** over existing algorithms.
- Designed a novel distributed Graph AI platform, for end-to-end feature engineering and training of graph machine learning pipelines. Gained a **10-100x improvement** in performance time on several components of the pipeline.
- Created distributed graph-augmented neural networks for node classification tasks achieving **10x improvement** in performance time over non-distributed models, without any loss in accuracy.

**Graduate Research Assistant, University of Pittsburgh, Pittsburgh, PA, USA.** *May 2018-Aug 2021*

- Built context aware multimodal language models for predicting turn-taking and emotion states (end-of-turn, affect) from audio-video dyadic conversations. **Created a novel** multimodal transformer to achieve state of the art performance.
- Built a novel siamese CNN+LSTM based approach to predict depression severity from mother-child dyadic conversation videos, achieving a **3% F1-Score gain** over non-dyadic models.
- Led** classes and **evaluated** courses: Artificial Intelligence (CS 2710, CS 1571), Machine Learning (CS 1675), Human Computer Interaction (CS 1637), Algorithm Implementation (CS1501).

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

- Created a novel** local illumination-invariant descriptor for face recognition under varying lighting conditions, with a **2-5% increase** in accuracy over state-of-the-art methods on CMU-PIE, Yale B and CUHK datasets. [\[Paper\]](#)
- Designed** a regression model to stabilize entropy space for dimension reduction in noisy facial images with **3% accuracy gain** over state-of-the-art methods on FERET and FRAV-2D datasets. [\[Details\]](#)

## Skills

**Programming Languages:** Python, C/C++, Matlab.

**Tools** : PyTorch, TensorFlow, DGL, dask, scikit-learn, matplotlib, git, AWS.

**Research Skills** : Machine Learning, Natural Language Processing, Graph Neural Networks, Computer Vision.

## Education

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

- Computer Science with 3+ years research experience in Machine Learning, Computer Vision and NLP.
- PhD Arts & Science Fellowship, 2017-2018

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

- Computer and Information Science. | *First Class, 75 % (in top 10)*

## Selected Projects

**Automatic semi-supervised graph learning from tabular data** *Oct 2022-May 2023*

- Created a **novel scalable** semi-supervised algorithm for automated graph learning, from relational data, using GRALE.
- Achieved **5-7% precision gain** on downstream GNN models for both fraud detection tasks..

**Multimodal Turn Taking and Emotion Recognition in Dyadic Conversations** *Aug 2019- Aug 2021*

- Developed a **novel** multimodal transformer for cross-modal attention based learning for predicting end-of-turns in multimodal dialogue (audio + video + text). Achieved a **3% F1-score gain** over SOTA approaches.
- Identified** statistically significant cues and built context aware sequential neural models (Conv-LSTMs) with them for predicting composite emotion constructs (aggressive, dysphoric, etc.) from dyadic conversation videos.

**Image Captioning Using attention-based image context (3730 Advanced NLP)** *Oct 2020- Nov 2020*

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

**Detecting Deep Fakes (11785 Deep Learning) [\[Details\]](#)** *Nov 2019- Dec 2019*

- Built a novel Siamese Statistical Recurrent Neural Network to detect deep-fake video sequence.
- Achieved 10% increase** in AUC-ROC over Statistical Recurrent Networks in FaceForensics++ dataset.