

Dr. Romie Banerjee

Mathematics PhD/ Data Science / Deep Learning



Curriculum Vitae

Personal Details

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Github <https://github.com/romiebanerjee>
Date of birth 16th August 1982, India
Marital status Married, 1 child

Personal Profile

Mathematician specialising in machine learning and deep learning with professional experience in computer vision, deep learning and bringing ML models from concept to production, at all scales; academic research experience in topological data analysis applied to deep learning. Expert skills in programming and algorithm design. Passionate about working with statistics and ML and solving complex problems with analytical methods in a collaborative environment. Enjoy communication with customers and travelling.

Objective

Quantitative position in data-driven environment requiring high level of technical knowledge and analytical skills to create and implement solutions that have a strong business impact, take on roles of responsibility and be a part of a motivated dynamic team,

Professional Experience

- 08/2019 – 04/2020 **Machine Learning Architect/Developer**, *Bleenco GmbH*, A camera-based and human-centered artificial intelligence startup, Munich.
- Researched scientific literature to propose solutions for open problems in AI and computer vision and built prototypes for proof-of-concept
 - Built end-to-end machine learning pipeline for real time human detection and tracking people in complex environments with multiple cameras
 - Implemented deep learning models for human re-identification.
 - Created data pre-processing pipelines

- 05/2014 – **Assistant Professor of Mathematics**, *Indian Institute of Science Education and Research, Bhopal, India*, Department of Mathematics.
- Researched on topics in Category Theory, Algebraic Topology, Topological Data Analysis, Quantitative Finance, Stochastic Calculus
 - Presented research results in workshops and conferences.
 - Taught undergraduate and graduate courses in various branches of Mathematics, Statistics and Computer Science and supervised research.
 - Reviewer for zbMATH, European Mathematical Society
 - Invited talks at Johns Hopkins University and University of Bonn
- 09/2011 – **Research Scientist**, *Tata Institute of Fundamental Research*, Mumbai, India.
- 03/2014 Department of Mathematics
- Research in Algebraic Topology, Topological Data Analysis, Data structures encoding high-dimensional topological features of point cloud data, high-dimensional feature extraction using k-nerve and persistent homology
 - Presented research results in workshops and conferences.
 - Invited talks at American Mathematical Society Joint Meetings, Boston and Wayne State University and University of Regensburg
- 09/2010 – **Lecturer**, *Johns Hopkins University*, Baltimore, USA.
- 05/2011 Department of Mathematics
- Taught undergraduate courses in Mathematics.
 - Invited talks at University of Chicago and Brown University

Education

- 05/2010 **Ph.D. in Mathematics**, *Johns Hopkins University*, Baltimore, USA.
Research done in Algebraic Topology/ Homotopy Theory
- 05/2008 **M.S. in mathematics**, *Johns Hopkins University*, Baltimore, USA.
- 08/2004 **B.Sc. (Hons.) in Mathematics and Computer Science**, *Chennai Mathematical Institute*, Chennai, India.

Publications

- 2017 Galois descent for real spectra , J. Homotopy Relat. Struct., Springer Volume 12:273-297
- 2014 A modular description of $ER(2)$, New York J. Math., Volume 20, p. 743-758
- 2013 On the $ER(2)$ -cohomology of some odd-dimensional projective spaces, Topology Appl., Elsevier, Volume 160, Issue 12, p. 1395-140

IT-Skills

Languages	Python(advanced), C++(intermediate)
Data Science	MATLAB, R, SQL, D3.js
ML/DL	Numpy, Pandas, TensorFlow, Keras, PyTorch, MXNet, Scikit-Learn
CV/NLP	OpenCV, ffmpeg, nltk
Software Dev	Docker, Git, Shell script

Languages

English	<i>fluent</i>
German	<i>basic, learning through online courses</i>
Bengali	<i>native</i>

Project list

- Project **Multi-Object Tracking**
 Employer Bleenco GmbH
 Tasks Detect bounding boxes around humans and develop a tracking algorithm.
 Technologies Python, Keras, Tensorflow
 Details Developed a tracking algorithm using Kalman Filter on features from bounding box location, velocity, image information and converting the data association task into a Linear Programming problem.
- Project **Tracking and Counting People**
 Employer Bleenco GmbH
 Period November 2019 - January 2020
 Tasks Design the pipeline to track passenger movement in a train.
 Technologies Python, OpenCV, tensorflow
 Details Trained A FastRCNN model using Transfer Learning to detect humans and heads, used multi-camera input, top-down view obtained from homography matrix and multi-camera tracking algorithms to track passenger movements. Used clustering algorithm DBSCAN and Topological Mapper to get summary of passenger presence over a given period of time.
- Project **Human Re-identification Module using Deep Metric Learning**
 Employer Bleenco GmbH
 Period February 2020 - March 2020
 Tasks Designed and implemented pipeline for feature extraction from human images for re-identification.
 Technologies Python, OpenCV, Keras, Tensorflow
- Project **Neural Network Quantization**
 Employer Bleenco GmbH
 Period February 2020 - March 2020
 Tasks Compressed a FasterR-CNN network using state-of-the-art quantization for lower memory consumption and faster inference.
 Technologies Python, OpenCV, Keras, Tensorflow
- Project **Semantic Segmentation of Humans**
 Period February 2020 - March 2020
 Tasks Implemented a U-Net with focal loss and quantization aware training for semantic segmentation of humans.
 Technologies Python, OpenCV, Keras, Tensorflow
- Project **Topological Mapper k-Nerve**
 Employer IISER Bhopal
 Period May 2018 - December 2018
 Role Mathematics Professor
 Tasks Visualized high dimensional dataset by exploring connectivity features at all dimensions. Built Python libraries for data structures supporting high dimensional simplicial complexes and computing persistent homology.
 Technologies Python, Javascript, D3.js, TDA
 Details <https://github.com/romiebanerjee/k-nerve>
- Project **Natural language processing using Topological Data Analysis**

Period May 2018 - December 2018
Tasks Visualize text data for inferring sentiments combining Topological Mapper and t-SNE.
Technologies Python, Javascript, D3.js, TDA

Reference

Nicolas Zick Ex-COO and Co-founder, Bleenco GmbH
LinkedIn <https://www.linkedin.com/in/nicolaszick/>



Munich, 19th April 2020