Tanmay Gautam | Curriculum Vitae

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Education

University of California, Berkeley **San Francisco Bay Area, USA**
PhD in Electrical Engineering and Computer Science *Aug 2019 - Present*

- **Advisor:** Professor Somayeh Sojoudi
- **Focus Areas:** Optimization, Machine Learning, Control Theory
- **Notable courses:** Optimization Algorithms (EE227C), Convex Optimization (EE227B), Statistical Learning Theory (CS281A), Optimization Models (EECS227A), Linear Systems Theory (EE221A), Nonlinear Systems Theory (EE222), Machine Learning (CS289)
- **Academic Awards:** Berkeley EECS Fellowship

Imperial College London **London, UK**
MEng. in Electrical and Electronic Engineering *Oct 2014 - Jun 2018*

- **Results:** First Class Honours, *summa cum laude*
- **Focus Areas:** Signal Processing, Speech Processing, Machine Learning
- **Academic Distinctions:** Dean's List (Top 10% of cohort), First Class examination aggregate in all years

Publications

Y. Bai, **T. Gautam**, Y. Gai, S. Sojoudi, "Convex Formulation of Robust Two-layer Neural Network Training", *Submitted to conference - under review*, 2021.

Teaching Experience

EECS Department, UC Berkeley **Berkeley, CA, USA**
Graduate Student Instructor (GSI) *January 2021 - May 2021*

- **Course:** Optimization Models (EECS227A)
- **Head Instructor:** Professor Laurent El Ghaoui
- **Role:** Head GSI responsible for designing course content, managing course logistics, holding office hours.

Research Experience

EECS Department, UC Berkeley **Berkeley, CA, USA**
Graduate Student Researcher (GSR) *August 2019 - Present*

- **Advisor:** Professor Somayeh Sojoudi
- **Research focus/interests:** Convex Optimization, Optimization Algorithms, Matrix Completion, Learning Theory, Online Optimization, Robust Neural Network Training.

Brainlab AG **Munich, DE**
Software Engineer in the Machine Learning Research and Development Team *Feb 2019 - Jul 2019*

- **Supervisor:** Dr. Jens Schmaler
- **Aim:** Develop a classification system to distinguish between X-ray scans of various body parts (e.g. hip, knees) and their scan directions (i.e. frontal vs side-on scans).
- **Methodology:**
  - The end-to-end system involved constructing a data pre-processing pipeline for DICOM medical files, developing a system architecture composed of convolutional neural networks and evaluating the final system performance
  - The system was integrated as a REST service in the Brainlab TraumaCad software which is used to assist surgeons during orthopedic operations.
  - Documented research/analysis findings in a report
- **Key software tools:** Python (*including frameworks e.g. Tensorflow, NumPy*) and C++

Nuance Communications **London, UK**
Research and Development Internship *Jul 2018 - Oct 2018*

- **Supervisors:** Dr. Dushyant Sharma, Dr. Patrick Naylor
- **Aim:** Develop human detection/tracking system for video content to enhance speaker diarization performance.
- **Methodology:**
  - Surveyed state-of-the-art object detection and tracking methods.
  - Implemented system which combines the Medianflow tracking algorithm with the single-shot multibox detection (SSD) algorithm for a robust tracking performance.
  - Developed a custom tool to ease the procedure of generating ground truth labels for system evaluation.
- **Key software tools:** Python (*including packages e.g. OpenCV, NumPy*)

Imperial College London **London, UK**
MEng. Thesis *Oct 2017 - Jun 2018*

- **Supervisors:** Dr. Patrick Naylor, Mr Mike Brookes
- **Aim:** Develop an end-to-end speaker diarization system, which when given an audio recording of a multi-party meeting scenario, can automatically determine the number of speakers and effectively distinguish between them.
- **Methodology:**
  - Identified the state-of-the art bottom-up system architecture and underlying algorithms used to implement the different system stages (feature extraction, speech activity detection, segmentation, speaker clustering).
  - Extracted Mel Frequency Cepstral coefficients as optimal speech features to discriminate between speakers.
  - Implemented multiple algorithms for each system stage (using classification techniques such as auto-associative neural networks, GMMs and SVMs). Carried out statistical significance testing on the algorithm performances to identify the optimal method for each system stage.
  - Evaluated system performance using Diarization Error Rate metric.
- **Novel Contributions**: A new combination of optimally selected algorithms formed the final system, which when evaluated on a particular toy dataset resulted in an error rate of 10.4% (compared to reported benchmark of 31%).
- **Key software tools:** MATLAB (*including e.g. Statistics, Machine Learning toolbox*)

Control and Power Group, Imperial College London **London, UK**
Research Placement *Apr 2017 - Oct 2017*

- **Supervisors:** Prof. Alessandro Astolfi, Dr. Giordano Scarciotti
- **Aim:** Develop toolbox that implements the data-driven approach for the Moment Matching Model Reduction technique for linear and nonlinear dynamical systems.
- **Methodology**:
  - Surveyed and implemented the data-driven moment matching technique for linear systems based on algorithms and procedures presented in consulted publications.
  - Estimated the original system's moments with an iterative algorithm, approximated the transient response and determined a reduced-order model with system parameters that preserve the original steady-state response.
- **Novel Contributions**: Proposed and implemented partially-linearized reduced-order solution for the problem of the data-driven reduction method for nonlinear systems.
- **Key software tools:** MATLAB (*including e.g. System Identification toolbox*)

Industrial Experience

Deutsche Bank AG **Frankfurt, DE**
Chief Information Security Office (CISO) Research Internship *Jul 2016 - Oct 2016*

- **Managers:** Mr. Alexander von Bardeleben, Mr. Robert Klawes
- Independently led the "Blockchain Awareness Series" for the CISO department with support from internal staff; the project team comprised of two interns.
- Conducted independent research/analysis of the underlying protocols, cryptographic functions and consensus algorithms of the blockchain system.
- Documented research/analysis findings and presented them in several 60 minute sessions in front of approx. 30 CISO staff each time, including senior management.

Deutsche Bank AG **Frankfurt, DE**
Chief Information Security Office (CISO) Summer Internship *Jul 2015 - Sep 2015*

- **Manager:** Mr. Robert Klawes
- Worked in team on a CISO project focused on using the CyberReveal Platform (BAE solutions) for additional security against malware and advanced persistent threats.
- Carried out requirements engineering and created/executed test cases with guidance from senior business analysts.

Notable Projects

PCA for Face Recognition **London, UK**
Pattern Recognition Course, Imperial College London

- **Course Lecturers:** Dr. Tae-Kyun Kim, Dr. Krystian Mikolajczyk
- Explored how the use of the PCA technique, when applied on an image dataset, affects face recognition accuracy and overall memory/time complexity.
- Explored how the varying different SVM parameters (e.g. kernel type, kernel scale) impacts face recognition accuracy and overall memory/time complexity.

Movie Recommendation System using Collaborative Filtering **London, UK**
Machine Learning Course, Imperial College London

- **Course Lecturer:** Dr. Andras Gyorgy
- Developed a movie recommendation system, which predicts user ratings for movies based on their prior preference.
- Implemented collaborative filtering and the stochastic gradient descent algorithm to identify the weights for the user and movie vectors such that the overall mean squared error is minimized.

Skills

Programming

- **Numerical Computing Environments:** MATLAB
- **OOP Languages:** Python (packages including NumPy, Pandas, PySpark, SciKit, OpenCV), C++, Java
- **Web Development:** HTML
- **Software/OS:** LaTex, MS Office, MS Windows, Linux, Mac OS

Languages

- English (Native), German (Native), Hindi (Fluent), Spanish (Basic)

Other Interests

- UK Maths Challenge Gold Certificate (2010, 2013)
- Tennis: Silver Medalist at Inter-School Competitions (SCIS, ISSTs)
- Saxophone: Member of School Jazz, Concert Bands