AAKASH RAJESH KAKU

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EDUCATION

- **New York University - Center for Data Science (Courant) (NYU CDS)** — New York City, USA
  Master of Science in Data Science; **CGPA**: 3.889/4 — Sept 2017 onwards
  - Key Courses: *Inference and Representation Learning, Deep Learning for Medicine, Natural Language Processing and Representation Learning, Machine Learning, Mathematical tools for Data Science (Spring 2019), Deep Learning (Yann LeCun) (Spring 2019), Probability and Statistics, Python Programming for Data Science, Big Data*
- **Indian Institute of Management, Bangalore (IIMB)** — Bangalore, India
  Post Grad. Diploma in Mgmt. (equivalent to MBA); **CGPA**: 3.55/4 (Rank: 16/410) — Jun 2014 – Mar 2016
  - Major: **Business Analytics**; Minor: **Finance**
  - Key Courses: *Biz. Analytics and Intelligence, Applied Multivariate Data Analysis, Quant. Methods - 1 & 2*
  - Received perfect As in all the Finance, Marketing and Business Analytics courses
- **Institute of Chemical Technology (ICT)** — Mumbai, India
  Bachelor of Chemical Engineering; **CGPA**: 8.93/10.00 (Top 10% of the Class) — 2010 – 2014
  - Key Courses: *Biological Sciences, Biochemical Engineering, Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Applied Mathematics -1,2,3,4*

PUBLICATIONS

- "Scheduling loss functions for optimal training of segmentation models" [Extended Abstract]
  Authors: Chaitra Hegde[1]*,* ***Aakash Kaku***[1]*, Sohae Chung, Xiuyuan Wang, Yvonne Lui, Narges Razavian*
  Accepted as a Poster by **ISMRM** ML Workshop in Sept 2018

SCHOLASTIC ACHIEVEMENTS

- Recipient of **Moore-Sloan research grant** to conduct research on human activity recognition in stroke patient using IMU sensors and deep learning
- **Dean's Merit List** Awardee for being in **top 5%** of IIMB graduating class of 2014-16; **Institute Rank 2** and **Section Topper** for term III (3.86/4)
- Awarded *Sir Ratan Tata* scholarship for standing among **Top 5** ranks of the class at ICT
- Felicitated by Mumbai Municipal Corp. with a scholarship for excellent performance (Top 2%) in Class XII Exams

RESEARCH EXPERIENCE

Human activity recognition in stroke patients using IMU sensor data

- *NYU Center for Data Science and NYU School of Medicine, New York* — May 2018 – Present
  Prof. Carlos Fernandez Granda, Prof. Heidi Schambra
  - Designed and implemented a domain adapted bi-LSTM using generative adversarial network that generalizes well across the stroke patients with different level of impairment.
  - The proposed adversarially trained model achieved 10% increase in performance as compared to the models trained in traditional manner
  - Adversarial component ensured the model generated feature vector was patient agnostic but at the same time relevant for predicting the action. This enhanced the generalizability of model.

Complete Anatomical Brain MR Segmentation using loss scheduling [Extended Abstract]

- *NYU School of Medicine, New York* — May 2018 – Present
  Prof. Narges Razavian, Prof. Yvonne Lui
  - Designed and implemented a 46 class segmentation model to segment highly imbalanced brain MR dataset. Proposed a method to schedule (change) loss function while training to ensure better convergence of the model.
  - A simple vanilla U-Net (trained using loss scheduling) was shown to outperform a more complex & state-of-the-art QuickNAT model (trained using a fixed loss function) hence showing the importance of loss scheduling

Muscolo-skeletal MR Segmentation using dilated convolutions [github] [Project Report]

- *NYU School of Medicine, New York* — Feb – May 2018
  Prof. José Maria Raya Garcia Del Olmo
  - Performed highly imbalanced multi-class knee cartilage tissue segmentation using diffusion weighted MRIs. Developed and implemented an efficient variant of the 2d U-Net model with 40x fewer parameters and dilated convolutions. Proposed model achieved state-of-the-art results and surpassed a human radiologist level.

[1] Equal Contribution

- Performed perturbation analysis to understand important features of MRI for the segmentation task. Built confidence maps that showed the model's confidence for the voxel-level predictions.

Multi-Label Classification & Unsupervised Localization of Thoracic Diseases

- *NYU Center for Data Science, New York* Dec 2017 – Jan 2018

Independent Research

- Built custom-made ResNet CNN to perform multi-label classification and unsupervised localization of common thoracic diseases using 1024 × 1024 Chest X-rays. Achieved modest AUCs of ≈ 0.7
- Used Class Activation Maps (CAMs) & Saliency maps to perform unsupervised localization of diseases

RELEVANT DATA SCIENCE PROJECTS

Neural Machine Translation [github]

- NYU Center for Data Science, New York Sept 2018 - Present
  - Built a neural machine translation model using an encoder-decoder architecture with word and character level encoding to translate Vietnamese to English and Chinese to English.
  - Compared and analyzed performance of different encoder and decoder architectures like bi-GRU with and without attention, self-attention based encoders, CNN-based encoders, and fully self-attention based encoder and decoder model (like Transformer model).

Yelp Recommendation Engine [github] [Project Report]

- NYU Center for Data Science, New York Sept - Dec 2017
  - Built a recommendation engine for recommending restaurants to Yelp users a sparse rating matrix (99.4% sparse) and traditional models like Cosine similarity based model, SVD and Alternating Least Square model
  - Developed advanced models like SGD - based Matrix factorization model, Neural Network based model, Random Forest Regressor based model and an ensemble model to achieve higher performance on the sparse rating matrix completion task

Prediction of Domestic Violence in India

- Indian Institute of Management, Bangalore Sept - Dec 2015
  - Predicted probability of domestic violence in an household in India using Indian Human Development Survey data and logistic regression based model, applied to top k PCs after reducing dimensionality using PCA
  - Suggested ways to improve situation in the domestic violence-prone regions based on the model's feature weights

Bank Marketing Campaign Analysis [github] [Project Report]

- NYU Center for Data Science, New York Sept - Dec 2017
  - Analyzed the prior marketing campaigns of a Portuguese Bank using various ML techniques like Random Forests, Decision Trees, Grad. Boosting and AdaBoost and predicted if the user will buy the term deposit or not
  - Recommended ways to better target customers using feature importance maps and business intuition

Dataset Search Engine for NYC Open Data portal [github] [Project Report]

- NYU Center for Data Science, New York Feb - May 2018
  - Built a sophisticated search engine for datasets in NYC Open Data portal containing ≈ 1500 datasets (650 GB)
  - Developed 11 advanced search functionalities, currently not supported by NYC Open Data website, to help the user find relevant; Created data summaries and used PySpark to parallelize and speed up the search process

PROFESSIONAL EXPERIENCE

Strategy Analyst

- *Accenture Strategy Management Consulting Firm, Bangalore* May 2016 – Aug 2017
  - Built & implemented an NLP model to categorize the process activities as automated, semi- automated or manual; Automatic categorization helped in process optimization; Resulted in savings of $3 Mn for the client.
  - Assisted two largest chemical companies in the world to undergo a successful merger by doing a thorough process due diligence; Received a letter of appreciation from the client (a Fortune 100 company) for excellent execution of the project.

TEACHING AND GRADING EXPERIENCE

- **Teaching Assistant** NYU Med School
  Deep Learning for Medicine, Prof. Narges Razavian and Prof. Cem Deniz Jan – May 2019
- **Grader** NYU CDS
  Machine Learning, Prof. David Rosenberg and Prof. Julia Kempe Jan – May 2019
- **Teaching Assistant** IIM Bangalore
  Quantitative Methods 2, Prof. Rajlaxmi Murthy Sept – Oct 2015
  - Conducted tutorial classes and assisted students in building strong quantitative and business concepts

TECHNICAL SKILLS

- **Programming Languages:** R, Python, Matlab, C++, C, , Excel VBA,
- **Tools & Libraries :** Pytorch, keras, Pandas, nltk, Scikit-Learn, TensorFlow, OpenCV

CO CURRICULAR ACTIVITIES

- **Sports (Cricket)**
  - Core member of IIMB Cricket team; Gold and Silver Medalist in Inter-IIM Competition held in 2014 and 2015
  - Awarded Player of the Match for an all-round performance during an Inter-IIM Competition held in 2015
- **Arts and Drama**
  - Senior Coordinator, Dramatics Club; Composed, Organized and Directed various street & stage plays in IIMB
  - Directed & performed Street Play for an audience of 400+ at the Independence day event, IIMB, 2015
  - Winner (out of 23 teams), Jaagruti, a street play competition, Theme of the play: Women Empowerment