Naga Karthik Enamundram

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naga-karthik.github.io

Research Objective

Goal-oriented and self-motivated student with the knowledge of mathematical fundamentals for deep learning and experience in medical image processing. With my technical abilities, I aspire to advance my knowledge in the field and make deep learning models interpretable and explainable for their safe deployment in real clinical settings by working with expert supervisors and collaborating with my peers.

Education

- **Polytechnique Montréal** — Montréal, Canada
  Ph.D. in Biomedical Engineering — *2021 - Current*
  - Ph.D. Thesis: (to be decided)
  - Supervisor and Co-Supervisor: Prof. Julien Cohen-Adad and Prof. Sarath Chandar
  - Current Cumulative GPA: /4.3
- **École de Technologie Supérieure** — Montréal, Canada
  M.A.Sc in Electrical Engineering — *2019 - 2021*
  - Master's Thesis: Unsupervised Three-dimensional Segmentation of Scoliotic Spines from MR Volumes with Uncertainty Estimation (**Best Thesis Award**)
  - Supervisor and Co-Supervisor: Prof. Catherine Laporte and Prof. Farida Cheriet
  - Graduated with Cumulative GPA: 4.3/4.3

Shiv Nadar University — Greater Noida, India

- *B.Tech in Electronics and Communication Engineering with Minor in Mathematics* — *2015 - 2019*
  - Undergraduate Thesis: Extraction and Visualization of the Features of Fingerprints using Conventional Methods and Convolutional Neural Networks
  - Supervisor: Prof. Madan Gopal
  - Graduated with Cumulative GPA of 9.19/10.0

Publications (also available here)

Peer-Reviewed Journal Articles

- **Naga Karthik, E., M., V.**, Karimi, E., Lulich, S.M., Laporte, C. "Automatic Tongue Surface Extraction from Three-Dimensional Ultrasound Vocal Tract Images". *The Journal of Acoustical Society of America*, 147(3), pp. 1623-1633, 2020. (Paper)

Conference Proceedings and Abstracts

- **Naga Karthik, E., M., V.**, Laporte, C., Cheriet, F. "Three-dimensional Segmentation of the Scoliotic Spine from MRI using Unsupervised Volume-based MR-CT Synthesis". In *Proceedings of SPIE Medical Imaging*, 2021. (Preprint) (Presentation)
- Lulich, S., M., **Naga Karthik, E., M., V.**, Laporte, C., (2020, October), "Automatic Tongue Surface Extraction from 3D Ultrasound using 3D SLURP", Abstract Presented at UltraFest IX: Ultrasound Imaging for Speech and Language Virtual Conference. (Abstract)

Book Chapters

- **E. M. V. Naga, K.** and Madan, G. (2021). "Extraction of the Features of Fingerprints Using Conventional Methods and Convolutional Neural Networks". In *Machine Learning Algorithms and Applications* (eds M. Srinivas, G. Sucharitha, A. Matta and P. Chatterjee). (Paper)

Academic Awards & Honours

Governor General of Canada's Gold Medal 2021
- Recipient of Canada's most prestigious academic medal for achieving the highest CGPA for the academic year 2020-21.

ÉTS Best Master's Thesis Award 2021

FRQNT Doctoral Research Scholarship 2021
- Ranked 1st out of 29 applicants for the prestigious Fonds de Recherche du Québec Nature et Technologies Doctoral Scholarship.

ÉTS Funding for Research Outreach 2021
Master's Tuition Fee Exemptions 2020
ÉTS Internal Scholarship 2020
ÉTS Research Internship - Travel and Subsistence Allowance 2018
Undergraduate Dean's List Mentions
- Spring 2018 • Fall 2018 • Fall 2017

Graduate Courses Taken

- **Neural Scaling Laws and Continual Learning**
  Winter 2022 at Université de Montréal/MILA
- **Self-Supervised Representation Learning**
  Fall 2021 at Université de Montréal/MILA
- **Mathematical Tools for Computer Science**
  Fall 2021 at McGill University
- **Probabilistic Graphical Models**
  Fall 2020 at Université de Montréal/MILA
- **Learning Representations**
  Winter 2020 at Université de Montréal/MILA

Research Experience

Undergraduate Research Intern — École de Technologie Supérieure, Montréal
- *Automatic Detection of the Tongue Surface in 3D Ultrasound Images* — *May 2018 – August 2018*
  - Worked with my Master's supervisor Prof. Catherine Laporte and her student to detect and extract the surface of the tongue from raw 3D ultrasound (US) images.
  - Applied the concepts of 3D phase symmetry and active surfaces in the context of 3D US images of the tongue by developing the necessary codes in MATLAB.
  - Work done in collaboration with the Speech and Hearing Sciences Department, Indiana University, Bloomington.

- **Undergraduate Research Intern** — Indian Institute of Technology, Bombay
  Tomographic Reconstruction — *May 2017 – July 2017*
  - Worked under the supervision of Prof. Ajit Rajwade at the Department of Computer Science and Engineering.

- Adapted the concepts of filtered back projection (FBP), dictionary learning and conjugate gradient methods to reconstruct computed tomography (CT) images of a walnut.

Workshops

- **IVADO Code@Health** IVADO/UdeM
  Workshop Facilitator *November 2021*
  - Conducted the workshop titled, Ivadomed: A Framework for Medical Image Analysis with Deep Learning.

Teaching Experience

- **Deep Learning Summer School** Neuromatch Academy
  Regular Teaching Assistant *Aug. 2021 - Aug. 2021*
  - Responsible for teaching a crash-course on deep learning to a group of 10 students in the course of 3 weeks.
  - Topics ranged from basic (Multilayer Perceptrons, Optimization) to advanced (Reinforcement, Continual, and Self-supervised Learning). Complete syllabus can be found here.
- **Introduction to Robotics** Shiv Nadar University
  Undergraduate Teaching Assistant *Aug. 2018 - Dec. 2018*
  - Conducted experiments with basic robot movement such as the line follower, obstacle avoider and Proportional Integral and Derivative (PID) control.
  - Engaged with the students during the class hours in their experiments.
  - Assisted the instructor in evaluating the final projects and grading the performance of students.

Technical Skills

- **Programming Languages**
  - Python
- **Markup Languages**
  - LaTeX, Markdown, HTML
- **Specialized Libraries**
  - PyTorch, Keras, PyMC3
- **Specialized Software**
  - MATLAB, Slicer3D

Volunteer Experience

- **Student Reviewer** École de Technologie Supérieure, Montréal
  Service d'Aide à la Rédaction d'Articles (SARA) *October 2019 – June 2021*
  - SARA is a scientific community at ÉTS aiming to help graduate researchers better the art of academic writing.
  - Volunteered for two paper-review requests, which involved the tasks of critically analyzing the authors' papers and providing insightful comments on the clarity and expression of their work.
  - Cultivated the skill of critiquing my own writing from a reviewer's perspective.
  - Learned the importance of constructive criticism.

Other Skills

- Sports/Athletics
  - **Winner** of the Shiv Nadar University Sports League (SNUSL) Table Tennis Championship, an intra-university tournament held every academic year. February 2019
  - **Winner** of the SNUSL Table Tennis Championship. January 2018
  - **Winner** of the **best player** award in SNUSL Table Tennis Championship for the academic year 2017-18. January 2018
  - **Winner** of the Banyan League Table Tennis Championship, an annual tournament held between four universities: Shiv Nadar University, Ashoka University, O.P. Jindal Global University and BML Munjal University. September 2017
- Languages
  - **Expert:** English
  - **Intermediate:** Hindi, Telugu
  - **Novice:** French