Nivedhitha Dhanasekaran

E-Mail | LinkedIn | GitHub | Website

Education

- **Carnegie Mellon University** — Pittsburgh, PA
  Master of Computational Data Science; — *Aug 2023 - May 2025*
  - **Dual Concentration:** Majoring in both **Analytics** and **Human-Centered Data Science**
  - **Teaching Assistant:** for 05-839 Interactive Data Science (Spring 2024) taught by Prof. John Stamper
  - **Volunteering:** *Volunteer* @Pretty Good Race 2023, SCS, CMU
- **Sri Sivasubramaniya Nadar College of Engineering** — Kalavakkam, India
  *B.E. Computer Science and Engineering; CGPA: **9.345**/10, Class Rank: **13/221*** (Top 6%) — *Aug 2018 - Jul 2022*
  - **Academic Honors:** Awarded **First Class with Distinction** degree; **Silver Medalist** in Semester 7
  - **Teaching Assistant:** for the Short-term Hands-on Supplementary Course in C Programming
  - **Leadership, Responsibilities & Societies:** *Team Lead & Research Assistant @Underwater Robotics (UWARL)*, *Secretary* @ACM Student Chapter, *Secretary* @Assoc. of Computer Engineers Student Chapter, *Vice-chairperson* @CSI Student Chapter, *Chief Editor* @Smriti - CSE Dept. Newsletter

Research Experience

Carnegie Mellon University — Remote
Research Assistant | *COMPUTATIONAL BIOMEDICINE* — *Jan 2022 - Present*

- **Giant Cell Arteritis Detection:** Developed a patentable, automated pipeline to extract regions of interest from temporal artery biopsy specimens. Built a deep neural network to analyze ROIs that attained an accuracy of 91.65% and an AUC of 0.87. Visualized with GradCAM & validated by pathologists.
- **Physicochemical Characterization of CNT/F Toxicity:** Blinded validation of the effectiveness of physical dimension features in toxicity level designation of new specimens using clustering methods. Performed PCA, K-Means & hierarchical clustering analysis with interpretable and interactive visualizations.
- **ApneaStat, Bedside Diagnosis of Sleep Apnea using PulseOx:** Developed as a cross-platform Mobile application with a ReactNative UI/UX, a REST API for retrieving inference from the trained ML model & a BLE connection widget to communicate with the PulseOx wearable to diagnose Sleep Apnea.
- **ADVISOR:** Dr. Naveena Yanamala

UnderWater Acoustic Research Lab (UWARL), SSNCE — Kalavakkam, India
R&D Team Lead | *ROBOTIC VISION & NAVIGATION* — *Aug 2020 - Jun 2022*

- **Navigation Suite for an Underwater Robot:** Developed the localization & navigation module to carry out adaptively autonomous missions using the MOOS-IvP open source C++ modules. Received ₹9.5 lakhs funding from the consortium and ₹30,000 internal funding from SSNCE.
- **C-GAN & Sequence Correlation for Enhanced Localization:** Employed a cyclical GAN strategy to adversarially train on 2 datasets with unpaired images of 'good' and 'poor' quality underwater images: EUVP and proprietary dataset from an aquaculture tank in Muthukadu, Tamil Nadu, India, over various visibility conditions of fishes and shrimps.
- **EyeSea: Marine Species Threat Alerting at Shoreline via Underwater Surveillance:** Pattern Recognition Algorithm to Detect, Localize and Identify lethal marine animals using Real-time feed from high-definition underwater cameras moored in the sea at an optimal distance from the coast to alert swimmers at the shoreline. Attained 96.34% accuracy in the detection and identification of marine species.
- **ADVISOR:** Dr. S. Sakthivel Murugan

NetRL, Dept. of Computer Science, University of Cyprus — Remote
Research Intern | *MACHINE LEARNING* — *Jun 2021 - Jan 2022*

- **5G Mobile Network Augmentation using ML :** Developed a two-stage ML engine in *Python* for automating the selection and activation of UE-VBSs by clustering simulated network areas and then employing an ensemble classifier trained to nominate a UE-VBS in each cluster. Worked on improving the explainability of the model using SHAP and LIME. Research lab was backed by the *European Union's Horizon 2020 research & innovation programme* and the government of the Republic of Cyprus.
- **ADVISORS:** Dr. S. V. Jansi Rani and Dr. Andreas Pitsillides

Professional Work Experience

Citicorp Services India Private Limited — Chennai, India

Technical Analyst | *DATA & SOFTWARE DEVELOPMENT* — 18^{th} *Jul 2022* - 24^{th} *Jun 2023*

- **Personal Banking & Wealth Management - Digital Technology:** Implemented and enhanced several API features and streamlined data management for Angular-based applications, achieving a 20% increase in operational efficiency and significantly reducing cognitive load in website UI/UX design for the Cards and Customer Acquisition Team across Singapore and Hong Kong markets. Developed a cloud-based cross-asset investment portfolio optimization platform prototype using Python, Flask, and MySQL, incorporating multi-asset data ingestion and dynamic visualizations, leveraging the Capital Asset Pricing Model for optimal risk-return management, and automated deployment through a CI/CD pipeline with Jenkins and Docker.

Fidelity Investments — Chennai, India

Full Stack Engineer Intern | *ETL & AUTOMATION* — 1^{st} *Jun 2021* - 23^{rd} *Jul 2021*

- **Next-Gen Daily Accrual Funds, Mutual Funds Team:** Developed and deployed a new automated ETL pipeline and custom masking feature for electronic compliance reports, leveraging Java, Oracle DB, Liberty Server, and Angular, enabling seamless migration for two major customers to a new software platform and enhancing compliance processing and reporting.

Technical Projects

- **LLMs for Sensemaking: Comprehensive and Contextualized Information Synthesis (Jan - Apr 2024) :** Developing a browser extension using LLMs to enhance online sensemaking by enabling users to efficiently synthesize and visualize data from multiple sources with personalized, context-aware prompt engineering and feedback mechanisms for continuous learning.
- **Cloud-deployed Twitter Analytics Platform (Jan 2024 to Present):** Developed highly performant, scalable, and low latency (< 50 ms) microservices for QR code authentication and Twitter User Recommendations using Docker, Kubernetes, Azure, and AWS while fulfilling strict client criteria for budget ($< \$0.7$/hr) using Java, MySQL, and PySpark (Databricks) for ETL on 1TB of Twitter data.
- **Music Magician Analytics Dashboard (Oct - Dec 2023) :** Developed an Interactive Analytics Dashboard focused on exploring the evolution of music and quantifying the influence of artists using Streamlit, Vega-Altair, Plotly, NetworkX, & Python. Implemented informative visualizations and interactive features to analyze music trends, artist characteristics, and the influence of past music on new compositions. Successfully addressed the problem by creating a user-friendly interface that enables in-depth exploration of the dataset with storytelling, uncovering patterns and correlations in the realm of music.
- **GraphEHR: Heterogeneous Graph Neural Network for Electronic Health Records (Sep - Dec 2023) :** Ideated a Graph Neural Network (GNN) for predictive tasks in Electronic Health Records (EHR) demonstrating robustness in understanding complex relationships among medical concepts and achieved adaptive performance improvements across diverse predictive tasks.
- **BrailleVoice - A Language Agnostic Assistive Technology for Braille-to-Text Translation (Nov 2021 - Jul 2022) :** A novel multi-stage pipeline (Mobile & Web app) for Braille-to-Text translation of whole single-sided printed braille documents with support for text-to-speech audio playback & text summarization in two languages: English & Tamil.
- **SatVison - Non-residential Built-up Cluster Detection (Apr - Aug 2022) :** Two-step segmentation and merging approach to effectively detect non-residential built-up clusters in highly populated cities like Mumbai, Kolkata and Delhi. Project awarded ₹1,00,000 by the *Ministry of Earth Sciences, Gov. of India.*
- **Flight Delay Prediction (Jan - Jun 2021) :** A data science project that involves *data cleaning, pre-processing and modelling* a two-stage predictive machine learning engine that forecasts the on-time performance of flights for 15 different airports in the USA based on data collected in 2016 and 2017 for 18,00,000 flights in *Python.*
- **Airline Reservation System (Apr 2019) :** Implemented the support for multiple users with authentication using C, incorporated a simple and clean user interface using getch() and clrscr(), and collaborated with the team to develop a modified graph search algorithm to identify indirect flight routes.

Publications & Pre-prints

1. **Machine Learning Algorithm to Analyze Histopathologic Sections of Temporal Artery Biopsy Specimens** ACCEPTED in the Association for Research in Vision and Ophthalmology Conference 2023.
2. **Localization Systems for Autonomous Operation of Underwater Robotic Vehicles: A Survey** ACCEPTED in IEEE OCEANS 2022.
3. **GraphEHR: Heterogeneous Graph Neural Network for Electronic Health Records** UNDER REVIEW in International Joint Conference on Artificial Intelligence (IJCAI) 2024.
4. **A Dynamic Two-stage Machine Learning Approach for the Selection of a UE-VBS in a 5G/6G Network** UNDER REVIEW in Wireless Personal Communications journal.

Honors & Awards

- **Smart India Hackathon Winner (Aug 2022) :** Awarded **Rs. 1,00,000** by the Ministry of Earth Sciences, Gov. of India, for the problem statement GR823.
- **Internally Funded Student Project - IFSP (May 2022):** IFSP is a scheme in SSNCE where innovative student projects are granted funds to research alongside faculty and develop products. Received **Rs. 30,000** for developing the hardware system of the underwater robot, ORCA and equipping it with perception capabilities under the guidance of Dr. S. Sakthivel Murugan.
- **Winner of 'AIRSA' Hackathon 2021 (Nov 2021) :** Performed simulation and performance analysis of 3 benchmark models for Multiclass Semantic Segmentation of Satellite Images. Proposed a new model with InceptionResNetV2 and Transfer Learning with a U-Net base.
- **Selected for the Online Asian Machine Learning School 2021 & ACML 2021 (Oct 2021) :** Accepted for the exclusive, application-based invitation to attend OAMLS and ACML.
- **Winner of IEEE R10 Undergraduate Student Project Video Contest (Aug 2021) :** Winner of the Asia-Pacific Region (spanning 7 countries and 50+ councils). Awarded a cash prize of **300 USD**.
- **vGHC2021 Scholarship Awardee (Jul 2021):** One of the 1200 student scholars selected worldwide from over 30+ countries.
- **Runner Up at Techstars Startup Weekend Chennai (Feb 2021) :** Declared the runner-up team of the challenge, ranked 4th out of 90 idea pitches in the Ideation round.

Volunteering, Leadership & Teaching

- **Teaching Assistant (May 2022 - Sep 2022) :** Taught a C Programming certificate course for undergraduates at SSNCE under the guidance of Dr. T. T. Mirnalinee and Dr. B. Prabavathy. Developed a curated lesson plan with offline & online classes, weekly assignments, code demos, and a capstone-project-cum-final-assessment for issuing merit certificates.
- **Chief Editor, Smriti Newsletter (Apr - Jun 2022) :** Proofread, edited and wrote articles to meet publication standards. Oversaw photography, design and artwork to be used in the publication. Actively raised the profile of the publication & assisted all staff in meeting deadlines.
- **Secretary, Assoc. of Computer Engineers Student Chapter (Aug 2021 - Jun 2022) :** Secured *2.3 lakhs* in sponsorship, oversaw the execution of all the 8 CSE department events and led the planning of a new flagship startup hackathon in the annual, *nation-wide technical symposium Invente 6.0* with *2000+* participants. Juggled various roles in sponsorship, marketing, editorial, brochure & poster design.
- **Secretary, ACM Student Chapter (Jul 2020 - Apr 2022) :** Handled all the chapter correspondence and co-ordinated the operations of the Content & Editorial Team and the PR, Marketing & Social Media Team for *9+* events.
- **Global Ambassador, WomenTech Network (May 2021 - Aug 2021) :** By working as Global Ambassador, I supported Women Tech Network to inspire *100,000 women in technology* and helped them to *Drive Change with Purpose and Impact.* Received an exclusive invite to the annual conference to learn about *diversity & inclusion*, develop my leadership skills and expand my network.
- **Student Volunteer, National Service Scheme (Dec 2018 - Jul 2020):** Engaged in *85+ hours* of community service activities including *campus cleanups, content writing, workshops, organic gardening & fireless cooking.* Took responsibility for the paperwork related to three webinars.

Skills

- **Programming Languages:** Python, C++, C, BASH, SQL, Java, HTML/JavaScript, LaTeX, MATLAB
- **Machine Learning:** PyTorch, pandas, numpy, scikit-learn, Tensorflow, Keras, NLTK, Huggingface, Weka, Streamlit, Vega-Altair
- **Cloud/Web/Tools:** AWS, Azure, GCP, Flask, SQL, MongoDB, Databricks, PySpark, Scala, Neo4j, Docker, Kubernetes, Git

Relevant Coursework

9.1 Graduate

Summer 2023: 11-637 Foundations of Computational Data Science; **Fall 2023**: 05-839 Interactive Data Science, 11-785 Introduction to Deep Learning (PhD-level), 11-631 Data Science Seminar; **Spring 2024**: 15-619 Cloud Computing, 10-601 Introduction to Machine Learning, 05-610 User Centered Research & Evaluation, 11-634 Capstone Planning Seminar

9.2 Undergraduate

Data Structures (O), Operating Systems (A), Probability and Statistics (O), Discrete Mathematics (O), Design and Analysis of Algorithms (O), Database Management Systems (A), Computer Networks (A+), Logic Programming (O), Internet Programming (A+), Introduction to Machine Learning (A), Object Oriented Analysis and Design (A), Social Network Analysis (O), Data Warehousing and Data Mining (A+), Big Data Analytics (O)