VISHAL NAGARAJAN

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EDUCATION

- **University of California, San Diego** — San Diego, United States
  *Master of Science - Computer Science; **GPA: 3.97/4.0*** — *Sep 2022 - Mar 2024*
  Courses: *AI: Probabilistic Reasoning and Learning, Biomedical NLP, Unsupervised Learning, Networked Systems*

- **SSN College of Engineering (Affiliated to Anna University)** — Chennai, India
  *Bachelor of Engineering - Computer Science and Engineering; **GPA: 8.55/10.0*** — *Aug 2018 - Jun 2022*
  Courses: *Machine Learning, Software Engineering, Operating Systems, Computer Architecture*

SKILLS

- **Languages** — **Python**, Java, JavaScript, C++, C
- **Frameworks** — **PyTorch**, TensorFlow, LangChain, Flask, Selenium, Unittest, React.js, Next.js
- **Tools** — Docker, Git, gRPC, MongoDB, Postman, GitHub Actions
- **Platforms** — **AWS**, Google Cloud Platform, Linux, Raspberry

EXPERIENCE

- **Software Developer (Graduate Student Researcher)** — Apr 2023 - Jan 2024
  UC San Diego Health (The Nemati Lab) — *San Diego, United States*
  - Implemented utilities to automate extraction of vitals and fitness data from **Fitbit** devices. Developed a custom framework to use **Google Fit API** calls and extract healthcare data from **Apple Watch**. Automated login sessions, handled existing session tokens using **OAuth2** authentication, and **cron-job** to automate executing backgrounds repeatedly.
  - Built a **Raspberry Pi** based virtual health assistant using open source Speech-To-Text and Text-To-Speech frameworks to interact with patients. Utilized **LLM** for real-time validation of patient responses with **5** secs/query inference time. Exploring ways to perform differential diagnosis using **LLM**.
  - Developed an LSTM based hospital readmission prediction model that achieved AUC of **81%**. Preparing to integrate the model in real-world setting.

- **Research Assistant and Teaching Assistant** — Jun 2020 - Jun 2022
  Solarillion Foundation — *Chennai, India*
  - **"End-to-end optimized arrhythmia detection pipeline using machine learning for Ultra-Edge devices"** - Research project developed with Python to detect Atrial Fibrillation in subjects using ECG signals. Applied machine learning algorithms that used only **0.508 KB** of RAM on Raspberry Pi 3. Published in the 20th **IEEE International Conference on Machine Learning and Applications (ICMLA)**. [Code-Link]
  - Developed a novel two-staged pipeline containing XGBoost Classifier and Regressor using Python to improve performance of evaluation of flight delay in minutes. Data processing was performed on over 10 million datapoints by **combining flight and weather data** based on time of the flight date. Achieved a Mean Absolute Error of **13.82** minutes, and R^2 score of **0.94**. [Code-Link]
  - Guided and mentored **5 students** through assignments in Python and basics of Machine Learning.

SELECTED PROJECTS

- **Enhanced Medical Image Captioning using Step-by-Step Distillation** — San Diego, United States
  Python3 | PyTorch | LLM | LangChain | Vision-Image-Transformer | GPT-2 | T5 — *Jun 2023*
  Multi-modal approach using LangChain's Chain of Thought (CoT) and **Llama** model to generate captions and relationships for medical images using RoCo Dataset. Improved the *BLEU* score with rationale given by LLM. Increased BLEU score by ∼**70%** with LLM on T5 and Vision Encoder-Decoder models over baseline without LLM models.[Report-Link]   [Code-Link]

- **Sentiment Analysis Flask App using Docker and Google Cloud** — San Diego, United States
  Python3 | Flask | Docker | Google Cloud Run — *Dec 2022*
  Developed an ML based sentiment classification web application that reads sentence. The app is wrapped using Flask, containerized using Docker, and deployed on Google Cloud Run. [Code-Link]

- **Early sepsis prediction using clinical radiology reports and vitals** — San Diego, United States
  LSTM | CNN | DNN | Scikit-Learn | NLTK | SciSpacy — *Dec 2022*
  Collaborated with a **multi-disciplinary** team to build Deep learning (DL) models using TensorFlow that take structured vitals and annotated clinical reports of patients to predict sepsis by utilizing the innate time-series properties. LSTM + Word2Vec delivered **66%** AUC score and **37%** PPV score on the highly imbalanced dataset.

- **Neonatal Seizure Detection** — Chennai, India
  Python3 | PyTorch | EdgeML — *Dec 2021*
  Leveraged **ProtoNN** ML classifier to classify **EEG** signals into ictal or normal activity in neonates. Employed feature engineering and signal processing to achieve low **182 ms** detection latency with a **4.8 kB** memory footprint, and a sensitivity of **87%** making it suitable for low-power wearable devices. Research project culminated into publication at the **AISP 2022**. [Code-Link]   [Paper-Link]