Vivek Suresh Raj

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Education

- **Kumaraguru College of Technology** — Tamil Nadu, India
  Bachelor of Engineering - Electrical and Electronics Engineering; GPA: 7.90 — *August 2013 - April 2017*
  Courses: *Data Structures and Algorithms, Numerical Methods and Statistics(U13MAT410), Object-Oriented Programming and C++(U13CST511), Partial Differential equations and Transforms (U13MAT309), Digital Signal Processing (U13ECT631)*

- **University of Calgary** — Calgary, Alberta, Canada
  Master of Engineering - Geomatics Engineering; GPA: 3.45 — *September 2019 - February 2021*
  Courses: *Spatial Databases and Data Mining, Fundamentals of Social Media Networks and Machine Learning, Agent-based Software Engineering, Graduate project - I (Spatial Data Analysis), Graduate project - II (Advanced GIS)*

Skills Summary

- **Languages**: Python, C++, JavaScript, SQL, Bash
- **Frameworks**: OpenAI-Gym, scikit-learn, NLTK, SpaCy, TensorFlow, PyTorch
- **Tools**: Docker, GIT, PostgreSQL, Android Studio
- **Platforms**: Linux, Web, Windows, Arduino
- **Soft Skills**: Leadership, Event Management, Writing, Public Speaking, Time Management

Experience

- **Intelligent Robots Learning Laboratory (IRL Lab), Edmonton, Alberta** — Currently Remote
  Research Assistant, under Dr. Matthew Taylor — *January 2022 - Present*
  - **Research Areas**: Deep RL, Learning from Demonstrations, Human-AI collaboration, self-autonomous driving.
  - **Theoretical study**: Concentration of measure, RL theory.
  - **Contributions**: Implemented behaviour cloning to reuse advice(state-action pair) for given observation. Working on HER with DDPG in current project to overcome sparse reward system.

Projects

- **RL + Human in the loop - Collaborative research with IRL lab, Edmonton, Thales Inc. and AI-Redefined, Montreal**: (Work in progress) Research oriented, open source RL framework (Cogment) built by AI-R Inc., Human-AI collaboration in teaching drones to capture enemy drone in the environment built by AI-R. Tech: Python, NodeJS, Cogment, Google protobuf (system communication), PyTorch (June '21 - August '22)
- **Action advice reuse - Imitation learning + Deep Reinforcement Learning, IRL lab, Edmonton**: (Work in progress) Working to improve action advicing through imitation in Deep RL setting. (March '22)
- **Controlled text generation (NLP, seq2seq architecture)**: Implemented seq2seq learning architecture for contextual text generation. Evaluation were conducted on certain metrics. Tech: Python (March '21)
- **DINO (Statistical rule based voice-assistant)**: Developed a vector similarity score evaluation based system on tf-idf vectorization (text-processing) of the tokens. Tech: Python, pyttsx3 - PyAudio driver) (May '21)
- **Forecasting Covid19 data with RNN**: Implemented methods to forecast sequential data of covid19 in Canada, during Nov-2020, using LSTM unit cells. Tech: Python, Tensorflow, (Dec '20)

Publications

- **Manuscript in preparation: Action advising (Imitation learning, Deep reinforcement learning) with Sahil (Indian Institute of Science Education and Research, Bhopal, India)**: Work in Progress for Publication in late 2022. (March '22 - present)

Honors and Awards

- Python project - PyPi (pip install vivek2dropoffnan, v0.0.1) Count and visualize the missing and Not-An-Integer values in structured dataframe (Licensed and published) - June, 2021
- ESRI event – Developed user interface part of webapp representing University of Calgary - February, 2020
- Participated in Hackathon on "Hypothesis testing using z-score and T-test" by MachineHack - May, 2020

Volunteer Experience

- **Executive member at Society for Industrial and Applied Mathematics.** — Calgary, Canada
  Oversee the treasurer and financial reports to be submitted to the President by end of academic year.
- Acted closely with event organizers to avoid delays in collecting and drafting ideas for organizing SIAM events.