AVISHEK PAUL

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EDUCATION

McGill University Sept. 2015 – May 2020	Ph.D. Researcher - Electrical and Computer Science Engineering Courses taken: Machine Learning, Linear Systems, Optimization, Detection and Estimation, Power Electronics, Power Systems Operation	CGPA 3.9/4.0

WORK EXPERIENCE

Senior Data Scientist — Sep 2022 – Present, Montreal
Aspen Tech

- Developed a prototype that allows to train **reinforcement learning agents** to **alleviate congestion on transmission network** using **topological actions** (line/bus switching) can **autonomously operate** a grid and/or suggest possible set of actions to operators.
- Received **CEO Award** for development of an internal tool that generates a **Requirement Tracking Matrix** that maps each customer requirement to OSI product test procedure. Mapping is done through **semantic similarity**, yields high accuracy and **reduce manual efforts** of engineer by **60%**
- Received **People's Choice Award** at AspenTech Tech Summit 2023 for developing an **AI powered Visualization tool** for WebStudio that automatically determines the **best KPI metrics, plots, analysis summary** and a **chat mechanism** from a given dataset. It provides an improved analytical tool for user
- Transformation of unstructured documents of **Functional Design Specification (FDS)** into **Knowledge Graphs** and performing **Retrieval Augmentation Generation** on graphs to respond to queries
- Developed a prototype to **analyze alarm list** and **suggest possible actions** to rectify them and **filter critical alarms** thereby reducing operator fatigue and improving monitoring
- Various **QLORA fine tuning** of Large Language Models & inferencing (https://github.com/AvisP/LM_Finetune)
- Creating agentic workflows of parsing documents or information from manuals and tutorials

Power Systems Developer — Nov 2020 – August 2022, Montreal
Open Systems International

- **Resolving** software issues, **bugs** and **feature enhancement** as requested by customers of Energy Management System software (**OpenNet**, **OpenVSA** etc.)
- **Triaging** and **debugging** (coding, memory issues) in **C language**, code maintenance and working in an **agile** environment with 2 week sprint planning
- Communicating with Project Delivery and other development teams, understanding new project deliverables and writing development documentation
- Testing new features before release and making builds using CI/CD pipelines (Jenkins)

Research Assistant (Comp. Biology) — June 2018 - Aug 2020, Montreal
McGill University

- Differentiating zebra finch bird song based on communicative behaviour using three different technique : (a) **Decision tree** classifier trained on a massive audio feature set extracted from the songs (b) **Long Short Term Memory** network classifier with attention mechanism on overlapping song segments (c) **Convolutional Neural Network** on spectrogram images of the songs { https://github.com/AvisP/ZebraFinchClassification}
- Determine the importance of sequence information and characterizing vocal learning through **Unidirectional** and **Bidirectional LSTM** classification network using features extracted from spectrogram using **DenseNet**.
- Low dimension visualization of hidden layers of trained models through **TSNE**/**UMAP**
- Developed an interactive tool for fast labeling of syllables (segments) in dataset using features from DenseNet utilizing **bokeh** library.

MACHINE LEARNING RESEARCHER - CONTRACT AARISH TECHNOLOGIES	DEC 2021- DEC 2022

- **Quantizing** pretrained models (MobileNet/ InceptionNet/ FaceNet) for face recognition
  (a) Post Training Static Quantization (b) Quantization Aware Training
- Evaluating quantized model performance in real world scenario using web camera
- Developing a quantized model without using pytorch library and matching it with original model, an intermediate step before generating C model for edge device

MACHINE LEARNING ENGINEER - CONTRACT UBENWA HEALTH	NOV 2021 – JAN 2022

- Successfully established a pipeline to extract features from a massive dataset of pre-segmented audio segments (called cry units), plot with spectrogram and save option
- Developed process that facilitates ease of performing exploratory data analysis to identify features that readily demarcates the cohorts
- Established a process for development on local machine through jupyter-notebook that access VM instance on **Google Cloud Platform** and data on **Google Storage**

PROJECTS

- **Web applications** developed using **Streamlit** as frontend with user authentication and backened running on a **cloud infrastructure** (beam / modal) which runs **open source generative AI** models/applications. Few sample applications include **Image generation** from text, Image to image transformation with ControlNet using stable diffusion, **Image to Video generation**, private chatbot using Mistral, Retrieval Augmentation Generation (**https://github.com/AvisP/Streamlit_beam** , https://github.com/AvisP/Streamlit_modal)
- Published Medium article on QLORA fine tuning of newly released Llama3 model (https://medium.com/@avishekpaul31/89075e0dfa04) Creating web applications using serverless GPU (https://medium.com/@avishekpaul31/35eff89c74ed) Comprehensive guide to DeepSeek hosting on serverless GPU infrastructure (https://medium.com/@avishekpaul31/d51456c652bd)
- Demo model training of RL agents quadruped and humanoid robot using **Nvidia IsaacLab** and synthetic generation of World model videos using **NVIDIA Cosmos**

SOFTWARE AND TECHNICAL LANGUAGE PROFICIENCY

- Programming Languages : C, python, lua, html
- Cloud Technologies : Microsoft Azure, Amazon Web Services, Google Cloud, beam, modal, runpod
- Devops : docker, git, JIRA, ray, mlflow, Jenkins
- Simulators : Matlab/Simulink, PSS/E, C, Linux, PowerWorld, IssacSim/IssacLab (Beginner)
- Python libraries : Pytorch, scikit-learn, matplotlib, seaborn, pandas, pytorch-quantization, sb3, rllib (RL) GUI (flask, streamlit, tkinter), FastAPI, axolotl, transformers, diffusers (fine-tuning), lang-smith, lancghain

RESEARCH EXPERIENCE

MCGILL UNIVERSITY **Ph.D. Research:**	• Established a **Centralized Dynamic State Estimator** (DSE) that deals with communication interruption and delays • Demonstrated applicability of a **multivariate LSTM** network for instability prediction using instability indices and contrasted with featured based **random forest** classifier • Developed a new **Response-based RAS** for Instability Mitigation through online identification of runaway generators

AWARDS

- **McGill Engineering Doctoral Award** (MEDA) – Awarded based on excellence of student's academic and research record, including publications, presentations and potential to make an impact in engineering
- Awarded for volunteering efforts with IEEE Montreal Section (2017) and Student Branch coordinator(2019)

PUBLICATIONS

- A.Paul, H.McCelndon, V.Rally, J.T.Sakata, S.C.Woolley, “Behavioral discrimination and time-series phenotyping of birdsong performance”, PLoS Computational Biology, April 8 2021.
- A.Paul, I.Kamwa, G.Joos, “PMU Signals Responses-Based RAS for Instability Mitigation through on-the Fly Identification and Shedding of Run-Away Generators”, *IEEE Trans. On Power System, 2019.*
- A. Paul, I. Kamwa and G. Jóos, "Centralized Dynamic State Estimation Using a Federation of Extended Kalman Filters With Intermittent PMU Data From Generator Terminals," in *IEEE Transactions on Power Systems*, vol. 33, no. 6, pp. 6109-6119, Nov. 2018.

VOLUNTEERING

- Treasurer for IEEE Young Professionals Montreal since Feb. 2016 (Co-hosted and organized networking events at various conferences in Montreal (http://sites.ieee.org/montreal-yp/)
- President for Electrical Engineering Graduate Student Society (EEGSS) 2017-2019 and VP-Internal for 2016-2017 http://www.eegss.ece.mcgill.ca/index.html
- Innovation Commissioner for Post Graduate Student Society McGill University (2019 -2020)

LANGUAGE SKILLS : English, Bengali, Hindi – full proficiency French - Intermediate

Avishek Paul
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Date : 26/5/2025

Sub : Cover letter Machine Learning Engineer, AGIF (Job ID 2875476)

Dear Sir/Madam,

I am expressing my enthusiastic interest in the **Machine Learning Engineer, AGIF** position at Alexa AI II. With my extensive experience in AI/ML research within the energy sector, coupled with a strong foundation in industrial software development and a proven ability to conduct independent research, I am confident I have cultivated a robust set of skills and qualifications to excel in this role and significantly contribute to this position.

I currently work as a **Senior Data Scientist** for an American company that makes industrial software for the utility energy sector (power systems, petroleum and chemicals etc), after finishing my **Ph.D**. program at **McGill University**, Canada in the Department of **Electrical and Computer Engineering**.

In my current role, I have successfully led and executed numerous **AI/ML research projects** in the domain of energy systems, in particular the transmission sector. In one of the projects current job, I worked with **reinforcement learning** libraries (**rllib, stable-baselines**) and train agents to prevent power system congestion. Other works involved and product document generation, improving internal efficiencies by finetuning language models, generating knowledge graphs and retrieval augmented generation. In my previous position, I worked as a software developer tasked with objective of debugging in C, feature development on industrial software in the agile sprint cycle.

I have close to 5 years of professional software development experience and have significant experience with C and python. I am familiar with CI/CD tools, MLOps and familiar with best practices of coding standards, code reviews and source control management, process building and testing before deployment.

My technical proficiency extends beyond AI/ML into software engineering. I am highly proficient in python and related libraries (transformers, pytorch etc) essential for AI/ML application development and have good knowledge of state of the art DNN architectures and machine learning techniques in natural language processing, information retrieval techniques using generative AI. Furthermore, I have a strong foundation in software engineering principles and have created numerous applications using open-source models deployed on serverless GPU infrastructure with API endpoints and a simple frontend to access them. Also I am familiar with model training on containers (docker) across multiple GPU infrastructure.

I am familiar with working in fast collaborative environments that have particular objectives to reach within certain deadlines. With a results-oriented mindset, I prioritize flexibility and impact, striving to contribute meaningfully to each assigned project. I can work in collaboration with colleagues as well as independently as required in fast paced dynamic environment. I have excellent written and verbal communication skills from presenting publications and research work in academia and industry events and internal office presentations.

I am eager to discuss how my skills align with the needs of your team and how I can contribute to company's objectives. I have always been passionate about being involved with Artificial General Intelligence development and would be proud if I can be part of the team's legacy and expertise in this domain and contribute to the best of my ability. Thank you for considering my application.

Yours sincerely,

Avishek Paul