Statement of Purpose

for the role of Researcher at AI laboratory, Fujitsu

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Research Experience

Over the course of my Masters at IIT Bombay, I have been involved in a variety of projects – as part of courses and my Masters project. I have participated in projects on Deep Learning and Online Learning.

My first project on Deep Learning was titled the Lottery Ticket Hypothesis. In this project, I (as part of a team of 3 students) investigated the complexity of deep neural network architecture and whether they really need to be parameter-heavy. The crux of the project was to look at the possibility/plausibility of reducing the parameters of a deep neural network and find a subnetwork by an efficient pruning strategy and proper initializations, but maintaining the accuracy of the original dense network. However, finding the said subnetwork is computationally intensive. So, a natural follow-up on this work that occurred to us was the scope of transfer learning, such that the subnetwork (read: lottery ticket) can be utilized across data set. To this end, we investigated with the subnetwork obtained after training over one data set, and tested on a different partition of the data set having similar distribution.

Another interesting paradigm of transfer learning that I came across recently through a project is the concept of Zero-shot learning in classification. This technique is built upon the idea of semantic knowledge transfer (in image/ text classifications) such that a model can predict classes it has never witnessed previously. In another project under the domain of NLP, I reviewed various state-of-the-art models for language translation, and worked on investigating the translation of Bengali to English using XLNet language model.

I looked into some real-life applications of Online Learning as well – in the domain of communication networks by proposing improvements over an existing algorithm using multi-armed bandits. I also looked into the crucial task of hyperparameter optimization formulated as a bandit problem.

Motivation

In all honesty, my elder brother (who has been an active researcher for the past 8 years) was the one who planted the seeds of research in me. And my stint at IIT Bombay over the past 2 years has only nurtured and helped grow this budding tree inside of me, to help me pursue my interests. The job role of “Researcher, Artificial Intelligence Laboratory” at Fujitsu aligns perfectly with my domain interest, and would provide me with the perfect opportunity to learn and contribute in the ever-evolving field of Artificial Intelligence.

Fujitsu has been a mammoth in the technological landscape, being at the forefront of innovation, consistently contributing in the field of research and bearing witness to novel technological advancements for more than half a century now. With the recent advances in the domain of artificial intelligence, there has been an inherent question of ethics and about explainability

of artificial intelligence and machine learning. But Fujitsu building *"Transparent, ethical and accountable AI technologies"* is what kindled and furthered my desire to apply for the said role.

In addition, being a multinational corporation, Fujitsu houses people of diverse backgrounds – technically, geographically as well as culturally. In my opinion, diversity in a team helps incorporating approaches from a multitude of viewpoints, contributes to broadening one's perspective and bringing the best to the table. This further intrigued me to pursue my interest at Fujitsu.

Suitability and Career Goals:

"Nobody who ever gave their best regretted it."

Fujitsu is a firm of high ethos and values, and to uphold them is our responsibility. But when it comes to value addition at a personal level, I, as a member of the Fujitsu family, would thrive towards pushing my boundaries of research and innovation and bring my best to the table.

After completing my undergraduate in Statistics, I joined IEOR at IIT Bombay to learn from the best, with the best. Here, I was introduced to the world of machine learning, deep learning and optimization - each of them being immensely captivating. I have always tried to dig deeper into the subject, breaking down the algorithms taught and understanding their functioning bottom-up. The underlying mathematics of these algorithms are often labelled as "overwhelming", but being from a quantitative discipline has always helped me grasp the foundational mathematics well. Working in diverse projects, a few of them being natural language processing in context of my native language Bengali, zero-shot learning paradigm for text classification, optimization of existing deep neural architecture using pruning strategy, hyperparameter optimization as a bandit problem, application of online learning in communication networks, has helped with greater adaptability and perspective. I believe I will be able to put these learnings to use at Fujitsu on the real-world challenges undertaken by the corporation and help the firm deliver the best of results.

In the journey towards innovation, it is imperative to ask the right questions - and even more important to seek their answers. With the right questions being asked, it is apparent that Fujitsu will witness new breakthroughs. In the process, I hope to gain and hone my technical expertise from the experienced researchers and fellow peers in the team and beyond, build up on my soft skills and mould myself into a better version of my current self. I believe this can be best encompassed by the word "KAIZEN" (改善), meaning continuous improvement for the good. In time, I hope to be on the other side of this table and give back what I am privileged to gain today.

Thank you. Arigato Gozaimasu.