Letter of Motivation

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I am currently interning as a MITACS Globalink Research intern, fully sponsored by the Government of Canada and AICTE for undertaking a research internshsip at Canada. Here, I am fortunate to be advised by Prof. Jiju Poovvancheri at Saint Mary's University. My work here mostly involves computer graphics and geometry. I am currently developing a novel body tracking algorithm from a sphere-mesh initialized template which can be readily used for tracking objects real time from an edge device such as a Intel D435 RGB-D camera (in our case).

I was fortunate enough to return to IISc again the previous winter to work under Prof. Anirban Chakraborty, at the Visual Computing Lab (VCL) where I worked on two different projects: Person Re-Identification using domain adaptation and Data Free test time adversarial robustness of models respectively. In the first project, I developed a novel clustering method based on SupCon (Supervised contrastive learning) and a modified anchor which considers the euclidean distances between image clusters and not between individual images. Further, I was also responsible for understand the strengths and weaknesses of various works related to meta learning, unsupervised clustering and contrastive learning. I also worked on designing robust models by ensembling various attack radiuses (the DFT frequency boundary after which models start to give wrong predictions). I also performed knowledge distillation on these robust models and studied whether the obtained student models could be made naturally robust or not.

Meanwhile, I was very fortunate for the opportunity to get to work with Prof. Kunal Chaudhury at the Indian Institute of Science (IISc) also earlier in the summer of 2021. It enabled me to explore Convolutional Neural Networks (CNNs) and Fully Connected Networks (FCNs) at a much more fundamental level and understand the rigorous mathematical principles behind it (Lots of Matrix Theory, Linear Algebra and Semi definite programming). My task was to explore the robustness of these networks and find out the extent to which the upper bound can be made more tighter using Lipschitz regularization. This internship helped me appreciate neural networks at a much more deeper extent and work with various robustness budgets. The final paper is currently under review at IEEE ICCCNT 2022.

I started my journey into video understanding by researching about Human Activity Recognition (HAR) at my home university. Part of what inspired me to take up HAR is that it is an integral part to achieving full video understanding and the existing drawbacks in this domain. My task was to explore relatively efficient architectures suitable for edge deployment. Instead of keeping such an expensive temporal stream for optical flow processing, I proposed a simple late fusion between a spatiotemporal stream and another spatial stream (I3D and Xception). The findings from this work lead to a publication at the IEEE INDICON 2021 conference. Also, further extending this work, we perform few shot knowledge distillation on an end-to-end transfer learning network and also propose a new soccer dataset, the findings of which are being prepared to be submitted to the IEEE Signal Processing Letters.

At TCS Research, I believe that by being a pre-doctoral fellow, the very experience of being surrounded by some of the best brains in this domain will certainly mould me to gain a deeper insight in building deep learning based visual models. Through this fellowship, I would be incredibly humbled to get an opportunity to work at TCS Research and look forward to contribute to technologies that will lead the world to a more sustainable future.