Bavesh Balaji Website: https://bavesh-b.github.io/ Email: bavesh.balaji@gmail.com

Statement of Interest

of Bavesh Balaji (Prof. MSc CS applicant for Fall–2022)

While it takes humans years of training and experience to become a good umpire, all it takes for a HawkEye is a few days of bingeing cricket. Being a cricketer, these artificial systems intrigued me more so because of the numerous times I lost my games due to wrong umpiring decisions. I was fascinated by the accuracy with which the algorithm predicts the trajectory of a cricket ball in real-time. Upon subsequent reading on object tracking, I was introduced to the vast fields of Machine learning (ML) and Artificial Intelligence (AI), more specifically, Computer Vision(CV). Enthralled by the ability of machines to emulate the human brain in making intelligent decisions, I was eager to learn more about it. My curiosity was further fueled upon discovering the wide range of applications of CV apart from sports, such as medical imaging, robotics and surveillance. Realizing the significance and impact of AI and ML in our everyday lives, I am galvanized to pursue the same.

The impetus and inquisitiveness to understand the theory behind ML were satisfied by the courses I undertook in my undergraduate studies. An elective course on Pattern Recognition coupled with Prof. Christopher Bishop's PRML exposed me to the intricate math behind the buzzword 'Machine Learning'. Knowledge of Linear Algebra and Probability further piqued my interest in how much an algorithm could achieve with the help of a few mathematical concepts. Captivated by the immense improvement that could be accomplished via the incorporation of Calculus into ML, I started to explore Deep Learning(DL). Professor Andrew Ng's specialization course served me as the ideal starting point. After completing all the courses, my fundamentals became stronger and so did my passion. The clarity that I gained on attending these courses bolstered my interest in this field and pushed me to study further.

After gaining an in-depth understanding of the various concepts, I wanted to apply these concepts to solve some real-world problems and understand the difficulties involved in working with real-life data. Hence, I started as a Machine learning Intern at **Quantrium-Tech**, Chennai, India. I focused on developing a DL-based video analytics solution for detecting, classifying, and tracking highly occluded fishes from low-frame videos. Experimenting with multiple hyper-parameters helped me gain a deeper intuition behind the convolutional filters and the backpropagation of loss. This also reinforced the importance of fully comprehending the nuances and subtleties of the data at hand — a mindset I've found invaluable in data-driven research. Furthermore, working in a collaborative environment helped me develop the ability to communicate technical information to people with different sets of expertise while also teaching me the value of writing clean and maintainable code. All these invaluable learnings made me want to continue the internship. Presently, I am working on Coral Reef monitoring.

The process of researching and implementing multiple architectures to tackle the same problem made me understand the subtle differences between them. This understanding subsequently led me to develop an interest in these algorithms and their applications. It is this interest that motivates me to pursue a master's in Computing Science, where I would like to delve deep into these concepts. This eagerness to learn more about these architectures has also prompted me to take up a research internship under the guidance of **Dr. Partha Pratim Roy** in **IIT Roorkee**, where I am working on object detection of aerial images using synthetic data.

Along with academics, extracurriculars have also played a significant role in my life as they provide a refreshing break from books and assignments. As a professional cricketer, I have played many state and national-level tournaments. Years of playing and leading my team have equipped me with leadership abilities such as making quick decisions and adapting to diverse scenarios, and have instilled in me the desire to excel in everything I pursue. I am also an avid competitive programmer and have participated in various collegiate, national and international contests and have also set problems for intra-college contests. This odyssey of solving and creating problems has helped me develop a keen understanding of different algorithms and underscored the importance of efficiency. Constant participation in contests has also aided me in writing fast and memory-efficient codes, a skill that was invaluable in my internship. Aside from participating, I have also mentored students from my college and helped them kickstart their competitive programming journey. Mentoring students from all societal and geographical backgrounds was really memorable. I would like to channelize this interest by serving as a teaching assistant.

Through a master's degree, I would like to obtain a thorough understanding of the underly- ing theory behind various AI techniques and hone my implementation skills to complement my conceptual expertise. Given the diverse set of courses encompassing current and emerging state-of-the-art topics coupled with an excellent research community, I consider the **Prof. MSc in Computing Science, Visual Computing** program at **SFU** the ideal launchpad to widen my horizon of knowledge and work with experienced, adroit professors. The 'Special Topics in AI' course on graph data and their impact in various domains such as social networks and bioinformatics is highly intriguing. I strongly believe that the detailed understanding of Graph Neural Networks and generative models I acquire through this course will help me develop concrete solutions to critical problems.

Also, courses on ML, DL, and Reinforcement Learning(RL) will provide me with the statistical, probabilistic, and technical intuition required to build large-scale artificial systems in various domains such as medicine, robotics, and sports analytics. I firmly believe that courses on Biomedical Computer Vision, Graduate Co-op, and Graduate Project will help me put my technical skills to correct use.

After the master's program, I would like to take up challenging positions in the industry and leverage my skills to develop intelligent models that solve significant problems. With such great opportunities and a robust set of courses driven towards achieving excellence in the industry, I am confident that this program will help me in achieving my goals of creating impactful models.