Thivyanth M V

Latest Draft of This Statement of Purpose | Latest Résumé | thivyanth | thivyanthiitb | thivyanth | thivyanth.github.io | thivyanth4@gmail.com | thivyanth@iitb.ac.in |

Statement of Purpose

Introduction

I am a third-year Engineering Physics student at the Indian Institute of Technology Bombay, specializing in Machine Learning with a profound passion for advancing Artificial Intelligence. My academic journey is driven by a keen interest in Reinforcement Learning (RL), Agentic AI, AI Alignment, Generative AI, and AI Reasoning. My goal is to contribute to the seamless transition of humanity into the era of transhumanism.

Research Projects

Throughout my academic career, I have actively engaged in research and practical projects, including participation in the RoboDrive Competition (ICRA 2024). Here, I focused on robust multi-modal BEV 3D object detection using corrupted camera and LiDAR data from the NuScenes dataset. Our team achieved 4th place with scores of 42.8 (NDS) and 26.4 (mAP) and was invited to present at the ICRA 2024 conference, showcasing our innovative approach inspired by FUTR3D and BEVFusion architectures.

- Under the guidance of Prof. Biplab Banerjee, I am currently working on optimizing diffusion models for downstream tasks using reinforcement learning. This project builds upon the pioneering work described in *Training Diffusion Models with Reinforcement Learning* by Kevin Black and colleagues, aiming to frame denoising as a multi-step decision-making problem and applying policy gradient algorithms for effective optimization. I developed and integrated the DDPO algorithm in PyTorch, enhancing image-text alignment using CLIP scores, and plan to extend this methodology to generate high-quality satellite images from text prompts. The implementation can be found in my GitHub repository.
- I have also implemented Proximal Policy Optimization (PPO) for CartPole Balancing, designing and developing a PPO-based reinforcement learning agent using Python and PyTorch. This project involved integrating Generalized Advantage Estimation (GAE) and clip loss, setting up a multi-environment training pipeline with Gym, and leveraging TensorBoard for detailed logging and Wandb for experiment tracking. Additionally, I have worked on optimizing the DeepLabV3 model using Ray Tune, achieving significant accuracy and efficiency improvements.

Technical Projects

My technical projects have further diversified my experience. I have developed a Smart Appliance IR Controller, an Obstacle Removing Line Follower Robot, and a University Network Auto-Login Browser Extension, among others. These projects have honed my skills in various programming languages, tools, and platforms, including Python, PyTorch, TensorFlow, HuggingFace, and Docker.

Leadership Experience

I have held leadership positions, including serving as a Senior Engineer (Machine Learning & Localization Subsystem) at the Unmesh Mashruwala Innovation Cell, IIT Bombay. In this role, I contributed to **machine learning competitions**, mentored junior members, and participated in recruitment panels.

Future Goals

My ultimate goal is to publish two papers this year for submission to prestigious conferences such as ICLR, AAAI, NeurIPS, and ICML. I aim to pursue AI graduate studies at top universities near Silicon Valley, contributing to groundbreaking research and real-world applications of AI. An internship with your organization would provide me with invaluable experience and mentorship, furthering my career in AI research. I am eager to contribute to your projects, learn from your team, and bring my unique perspective and skills to the table.

Conclusion

Thank you for considering my application. I look forward to discussing how my background, skills, and aspirations align with your organization's goals.