OM PRABHU

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ABOUT ME

I'm an engineering graduate from IIT Bombay, with a keen interest in deep learning and AI solutions for operations research. As a technical enthusiast, I thrive on exploring the frontiers of data science and deep learning.

SKILLS

Languages: Python, R, SQL, C++, C#, Octave, CSS, JavaScript

Tools: PyTorch, Tensorflow, MATLAB, RStudio, GitHub, Visual Studio

EDUCATION

Jul '19 - Jun '24 — **Indian Institute of Technology Bombay** — **University**
Bachelor of Technology + Master of Technology in Mechanical Engineering

Dec '23 - Mar '24 — **IBM (Machine Learning)** — **Professional Certificate**

Sep '22 - Jul '23 — **Harvard University (Data Science)** — **Professional Certificate**

Jul '17 - Jun '19 — **Sathaye Junior College of Science and Arts** — **High School**

Jun '17 — **Ajmera Global School** — **School**

RESEARCH EXPERIENCE

Jul '23 - Jun '24 (GitHub Link) — **Obstacle Avoidance and Path Planning of Autonomous Vehicles** — **Thesis Project**

Project Advisor: Prof. Avinash Bhardwaj (Mechanical Engineering, IIT Bombay)

- Reviewed and implemented existing techniques for **path planning** and **obstacle detection** in self-driving vehicles, including **PID controllers**, **pure pursuit controllers** and **Stanley controllers**
- Implemented a reward-based **reinforcement learning** algorithm using **OpenCV** for processing image data in the **CARLA simulator**, achieving a **92.47% peak accuracy** over **1,000 epochs** along a racetrack
- Implemented a **finite-time horizon optimization model** for path tracking and obstacle avoidance using **model predictive controllers**, achieving upto **98.72% accuracy** along a closed loop and highway track

PROFESSIONAL EXPERIENCE

May '22 - Jul '22 — **Research & Development Intern** | **SEDEMAC Mechatronics Pvt Ltd** — **Summer Internship**

- Conducted stress analysis simulations in **ANSYS Fluent** by consulting **SAE** and **ASTM** guidelines to characterize joint behaviour and estimate optimum pre-load in eccentric motor loading conditions

ACADEMIC PROJECTS

Jan '23 - Apr '23 (GitHub Link) — **Model Regression Networks for Easy Small Sample Learning** — **Course Project**

- Analyzed existing transfer learning models for **multi-label image classification**, and implemented a **CNN model** with the AlexNet architecture, achieving **93.5% top-5 test accuracy** on ILSVRC 2012 data
- Performed a study detailing the effect of number of blocks of CNN layers on model accuracy, achieving **73.55% peak accuracy, outclassing cutting edge models** such as ANODE (60.61%) and ViN (65.06%)

Jan '23 - Apr '23 (GitHub Link) — **Parameters Affecting Performance in Visual Acuity Tests** — **Course Project**

- Designed an experiment to analyze **correlation** between gender and performance in visual acuity tests, yielding an **experimental t-value of 0.0193** against a **critical t-value of 1.986** for a **two-sample t-test**
- Performed an **analysis of variance (ANOVA) test** on the data, yielding an **F-statistic of 1.443** against a **critical F-value of 4.057**, to eliminate effects of variation in blocking factors across several weeks

Feb '22 - May '22 (GitHub Link) — **Optimization Algorithms for Air Traffic Flow Management** — **Course Project**

- Conducted an extensive literature review of various **optimization techniques** used in air traffic control, such as **integer programming** and **network models**, to model ground holding and airborne delay costs
- Implemented a **binary mixed-integer linear program** with **129 variables** and **104 constraints** for a small-scale problem using **AMPL**, and performed an uncertainty analysis of loss against objective value

Aug '21 - Dec '21 (GitHub Link) — **ColBERT: Using BERT Sentence Embedding for Humor Detection** — **Course Project**

- Analyzed existing deep learning models for humor detection, and implemented **tokenisation** of text into **BERT sentence embeddings** using **Tensorflow**, achieving **0.982 F1 score** against the ColBERT dataset
- Modified the neural network architecture for improved model efficiency, achieving a **0.956 F1 score** against Spanish data, **surpassing state-of-the-art algorithms** such as XLNet (0.92) and XGBoost (0.813)

TEACHING & MENTORSHIP

Jan '23 - May '23 — **Undergraduate Teaching Assistant** | **ME 308: Industrial Engineering & Operations Research**

Course Instructor: Prof. Avinash Bhardwaj (Mechanical Engineering, IIT Bombay)

- Mentored **28 students** across **7 groups** throughout a semester-long course project and addressed conceptual queries, and collaborated with the instructor and fellow TAs for setting up course logistics