

Balakumaran Murugesan

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AI Research Engineer with 3 years of experience leveraging deep learning architectures for Computer Vision and NLP applications. Skilled professional in ML algorithms, data manipulation, handling and visualization, model building. My background in Aerospace Engineering equips me to tackle complex problems with a strong foundation in applied mathematics and physics. Proficient in Python with expertise in AI libraries like TensorFlow and PyTorch. I also possess strong software development skills (OOPs) and experience with Docker, Flask, Linux, and cloud platforms (AWS, Azure).

Experience

SLK Software Private Ltd

Apr 2024 – present

Product Engineer

Bangalore, India

- Leading sales module development in the IIm erp design.
- Created a chatbot to insert, update, modify multiple module databases using **Multi-Agent System (MAS) Large Language Model** with coordination module, module level agents, Agent specialization, inter agent communication.
- Designing entire sales database, trigger functions, sales api's using FastAPI

Vijna Labs Private Ltd

Jan 2023 – Apr 2024

Product Engineer

Bangalore, India

- Worked on a project to study on various Autoencoders for unsupervised representation learning. To visualize and analyzed the learned feature representation, used dimensionality reduction technique like t-SNE, PCA.
- Worked on finetuning stable diffusion using LORA technique to generate class specific realistic images
- Worked on training various diffusion inpainting techniques for road top damage.
- Worked on Finetuning the pretrained LLM using Parameter-Efficient Fine-Tuning (PEFT) methods, which includes multiple reparameterized fine-tuning techniques of LORA derivative methods consisting Delta-LoRA, QLoRA, AdaLoRA.
- Worked on confidence score analysis of LLM's using ensemble techniques and consistency checks by varying query prompts including syntactical rephrasing, semantic rephrasing, seed variation, temprature variations.
- Build a software tool using python for annotating computer vision object segmentation using Django, Flask, Requests.
- Build a GUI tool using python tkinter, pyqt and multithreading, multiprocessing technique to efficient annotation evaluation tool.

Pavo and Tusker Innovation Pvt Ltd

Aug 2021 – Dec 2022

Associate AI Research Engineer

Chennai, India

- Worked on semi-supervised image classification technique using contrastive learning technique. Finetuned on curated huge mixture of dataset, improved unsupervised classification accuracy to 90% on respective test data.
- Build, tested, and deployed in the cloud, a no-code end-to-end pipeline for the image classification, object detection, instance and semantic segmentation models.(Link)
- Build image processing Engines including Image super-resolution using a GAN-based model (Link).
- Image Denoising engine using a pre- trained U-Net-based model (Link).
- Build 5+ Engines in Kandula.ai using python librairies, AI modules: Image super-resolution using a GAN-based model, Image Denoising engine using a pre-trained U-Net-based model.
- Created a real-time bounding box to instance segmentation engine using a fully-convolutional model(Link).
- Let a team of engineers in the development and deployment of AI based design for planogram tracking of sku's by an end to end SOTA unsupervised approach which incudes object detection, unsupervised clustering, text detection, vector search models .

Education

Indian Institute of Technology Kharagpur <i>Masters of Technology in Aerospace Engineering (GPA: 8.40 / 10.00)</i> <ul style="list-style-type: none">Relevant Coursework: Advances in AI and Robotics for high impact outdoor applications	July 2019 - May 2021 Kharagpur, India
Anna University <i>Bachelors of Engineering in Aeronautical Engineering (GPA: 7.40 / 10.00)</i> <ul style="list-style-type: none">Relevant Coursework: Engineering Mathematics, Technical english, Computer Programming, Communication and soft skills	July 2015 - May 2019 Chennai, India

Position of Responsibility

Module Lead — SLK Software Pvt Ltd <i>Lead the Sales module on IIm based erp design.</i>	Apr 2024 – present Bangalore, India
Module Lead — Vijna Labs Private Ltd <i>Lead the GenAI module</i>	Jan 2023 – Dec 2023 Bangalore, India
Teaching Assistant — Indian Institute of Technology, Kharagpur	Dec 2019 – May 2021 Kharagpur, India

M.Tech Thesis

Stacking Sequence optimization of a composite C section using MCDM and Deep Neural Network | Prof.Anup Ghosh

- * **Physics Informed Neural Network** design to automate Finite Element Analysis (FEA).
- * A Non-Linear Optimization technique called **Generalized Reduced Gradient Method (GRG)** to determine the composite ply sequences matches the strength requirement.
- * **Multi Criteria Decision Making (MCDM)** is used for choosing the best structure based on various strength, Stiffness and failure mode factors.
- * A decision making theoretical concept called **Analytical Hierarchical Process (AHP)** is used to give a single score from the multiple criteria for selecting the best design.
- * This single AHP score for different strength, Stiffness and failure mode factors is predicted using deep neural network for other composite stacking sequences, as there are thousands of possible stacking sequence to make a composite structure.

Technical Skills

Languages: C, C++, Python, Java, Matlab, R, MySQL, SQL, PostgreSQL.
Python Libraries: Numpy, Pandas, Seaborn, cuda, CPython.
Technologies: Django, Flask, Anaconda, GiT, SSH, VSCode, Docker, Kubernetes, Redis, Jenkins, MongoDB.
Concepts: Artificial Intelligence, Machine Learning, Neural Networks, API, Agile Methodology, Cloud Computing
Deep Learning Frameworks: Pytorch, Tensorflow, Keras, Scikit-Learn, PaddlePaddle, Nltk, Amazon SageMaker

Achievements

GATE – Graduate Aptitude Test in Engineering – Eligible for scholarship and postgraduate admission to the most premier research institutes in India. All India Rank – **151**.
District First and Division Second on **Triple Jump Event**

References

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