

SHREYAS SUNIL KULKARNI

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[Google Scholar](#) [LinkedIn](#) [GitHub](#)

WORK EXPERIENCE

Amazon

Applied Scientist, International Machine Learning

Jan 2021 - Present

Bangalore, Karnataka

Catalog Quality

- Led development of image-only and Multilingual Multimodal generative models, achieving a 20% increase in fill rates and driving over \$100M in product sales impact, while architecting a comprehensive system for data collection, cleaning, and model productionization
- Designed and implemented Image-based and Multimodal LLMs for autonomous product listing generation from seller-provided images and text inputs. Successfully deployed these models into production, drastically reducing onboarding time for new products from 48 hours to just 4 hours
- Utilized cutting-edge Large Language Models (LLMs) like Mixtral and Claude, employing advanced prompt engineering techniques to regenerate 10MM product titles and attributes accurately from images and information, while minimizing the occurrence of hallucinations

Recommendations

- Designed and implemented a DINOv2 based image-only model, SKILL, specifically tailored for recommending visually similar clothing items, prioritizing color invariance and matching based on design and style. This initiative yielded a significant operational impact, contributing to a \$10 million increase in revenue
- Developed a deep learning model to recommend new product designs by combining top features of best-selling products, avoiding spurious combinations, and leveraging SHAP values for feature importance analysis. Identified key success drivers from top-selling product features and designed novel products with optimized market appeal

International Institute of Information Technology, Bangalore May 2019 - August 2019

Research Intern

Bangalore, Karnataka

- Designed and implemented a novel mesh simplification algorithm that preserves the inherent shape and volume of complex 3D meshes, enabling efficient rendering and manipulation without compromising structural integrity
- Developed a two-phase approach: decomposed the mesh into distinct parts, generated a fully-implicit contour tree, and identified edges for collapsing based on critical topological conditions, ensuring minimal structural loss and maximal simplification.

Pixxel

AI Engineer

Aug 2018 - Dec 2018

- Worked on building predictive models for crop yield estimation using satellite imagery data. Employed crop growth simulation models like Infocrop, with inputs derived from Landsat-7 and MODIS data, to forecast yields for major crops such as rice and wheat

PROJECTS

Electrical Fuse Detection for Arc Flash Studies

Prof. Martin Vallières, University of Sherbrooke, Canada

- Designed and trained a Faster R-CNN with OCR model for CIMA+, meticulously annotating and preparing a comprehensive training dataset from survey data, leading to efficient detection, localization, and classification of electric fuse types, saving 100+ hours of manual labor
- Engineered an Active Learning System for precise labeling and analysis of electrical circuit diagrams, integrating advanced computer vision to enhance workflow efficiency in interpreting and processing designs

Forgery Detection using Illumination Inconsistencies

Prof. Manik Gupta, BITS Pilani, Hyderabad, India

- Implemented a state-of-the-art Image Forensics solution for detecting forgeries and localizing splicing, combining a Residual Network with an SVM classifier for accuracy and leveraging Grad-CAM for precise tampered region detection
- Integrated the model into the SocialTruth Project, a comprehensive Open Distributed Digital Content Verification platform

Pneumonia Detection and Analysis from Chest X-Rays

Prof. Addepalli Ramu, and Prof V Haragopal, BITS Pilani, Hyderabad, India

- Spearheaded the development of advanced deep learning models for precise pneumonia detection and diagnosis from Chest X-Rays. Performed statistical analyses to correlate pneumonia presence with demographic factors like age, sex, and location
- Led rigorous experimentation and fine-tuning of diverse deep learning architectures to achieve optimal accuracy while minimizing false positives, ensuring exceptional performance in critical healthcare applications

An exponential shape function for wormholes in modified gravity

Prof. Pradyumn K Sahoo, BITS Pilani, Hyderabad, India

- Explored wormhole solutions within $f(R, T)$ gravity framework, utilizing the Friedmann-Robertson-Walker Metric and Power and Exponential Law methodologies.
- Introduced a novel exponential shape function in wormhole geometry, deriving energy conditions and equation of state parameters to validate the proposed model, with productivity and accuracy improved by Mathematica

Publications

- [1] Shreyas Sunil Kulkarni et al. “Towards Hallucination-Free Natural Language Generation: A Loss function Perspective for Attribute Value Generation”. In: *Amazon Machine Learning Conference*. 2024.
- [2] Simon Giard-Leroux et al. “Electric power fuse identification with deep learning”. In: *IEEE Transactions on Industrial Informatics* (2023).
- [3] Anant Khandelwal et al. “[Industry] Large Scale Generative Multimodal Attribute Extraction for E-commerce Attributes”. In: *The 61st Annual Meeting Of The Association For Computational Linguistics*. 2023.
- [4] Vinay K Verma et al. “SkiLL: Skipping Color and Label Landscape: self supervised design representations for products in e-commerce”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023, pp. 3502–3506.

- [5] Roshan Roy et al. “Transformer-based Flood Scene Segmentation for Developing Countries”. In: *NeurIPS 2021: ML for Developing World Workshop*. 2022.
- [6] R Ahan M and Shreyas Sunil Kulkarni. “End-to-End Code Switching Language Models for Automatic Speech Recognition”. In: *arXiv e-prints* (2020), arXiv–2006.
- [7] PHRS Moraes et al. “An exponential shape function for wormholes in modified gravity”. In: *Chinese Physics Letters* 36.12 (2019), p. 120401.

AWARDS

IML Ramanujan Award - Awarded in 2023 for scientific depth and research leadership.

EDUCATION

Birla Institute of Technology and Science, Pilani	<i>Hyderabad, India</i>
Bachelors in Engineering (Hons.)	August 2016 - May 2021
Computer Science	GPA: 8.86/10
Birla Institute of Technology and Science, Pilani	<i>Hyderabad, India</i>
Masters in Science (Hons.)	August 2016 - May 2021
Mathematics	GPA: 8.86/10

TECHNICAL COMPETENCIES

Programming	Python(PyTorch, Numpy, OpenCV, Matplotlib, Pandas, NLTK) C, C++ (OpenMP), Mathematica, Matlab, Java
Web Technologies	Django, HTML5, CSS3, Bootstrap, Javascript, PHP, XAMPP

EXTRA-CURRICULARS

Coordinator Student Welfare Division	Led a team of ten to enhance campus life by addressing grievances from the students, and the administration.
Web Developer TEDxBITSHyderabad	Developed the Website and Ticketing Gateway TEDxBITSHyderabad '17

COURSEWORK

Core Computer Science Courses: Operating Systems, Computer Architecture, Data Structures and Algorithms, Database Management Systems, Object-Oriented Programming, Principles of Programming Language, Logic in Computer Science, Design and Analysis of Algorithms, Computer Networks, Compiler Design,

Mathematics: Engineering Mathematics(I), Engineering Mathematics(II), Engineering Mathematics(III), Discrete Mathematics for Computer Science, Optimization, Operations Research, Numerical Analysis, Applied Statistical Methods

Electives: Information Retrieval, Parallel Computing, Data Mining, Machine Learning

HOBBIES

Reading: Finished around 24 books last year, mostly fiction and fantasy.

Contemporary Dance: Been learning it for the past 6 months, gearing up for a stage production

Crocheting: Exploring amigurumi crocheting, transitioning to crafting practical items like coasters.