

Rudresh Veerkhare

MSCSE Student, UC San Diego

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Research Interests

My research sits at the intersection of **Discrete Differential Geometry**, **geometry processing**, and **physics-based simulation**. Right now I'm focused on:

- > **Point-vortex dynamics on genus- g surfaces** — building mesh-based formulations that match analytical solutions on the plane, then extending to higher-genus shapes.
- > **Geometric & topological algorithms for fluid flow** — harmonic decomposition, pressure projection, and efficient Poisson solvers that respect manifold structure.
- > **Physically based graphics** — leveraging the same DDG foundations for robust rendering and visualization.

Experience

Current Mar 2025	UC San Diego CSE 8A: Intro to Programming [🔗] <i>Teaching Assistant Taught by: Prof. Leo Porter</i> Designing exams & quizzes, coordinated programming labs, and conducted office hours & discussion sessions.	San Diego, USA
Mar 2025 Jan 2025	UC San Diego CSE 167: Computer Graphics [🔗] <i>Teaching Assistant Taught by: Prof. Albert Chern</i> Ran weekly office hours for one-on-one help and hour-long discussion sessions on engaging graphics topics; crafted a student-friendly ray-tracing final project ; and worked on a Gradescope autograder for fast, consistent grading.	San Diego, USA
Aug 2024 Jul 2022	Deutsche India Chief Technology Office, TDI <i>Senior Analyst</i> I worked on OCR and Document Understanding to streamline document processing. My work spanned Custom Document Entity Extraction , Smart Document Splitting , LLM-aided Contract Drafting , and innovative software automations like Automated Vulnerability Scanning . I have also worked on the adaptation of Document AI within the organization and have experience in Software Governance .	Pune, India
Jul 2021 Jun 2021	Deutsche India Chief Technology Office, TDI <i>Technology Analyst Intern</i> As part of the research project, I worked on Optical Character Recognition, which encompassed tasks such as Table Detection , Table Structure Recognition from scanned documents, Signature Extraction , Custom Named Entity Recognition , and Intelligent Character Recognition .	Pune, India
Apr 2021 Jan 2021	Sardar Patel Institute of Technology <i>Research Assistant Advisor: Prof. Pramod Bide</i> I conducted research in the field of Cross Event Detection and Topic Evolution Mining from Social Media Posts, developing innovative algorithms for Cross Event Detection and Sub-Topic Evolution through the application of statistical NLP techniques.	Mumbai, India

Education

May 2022 Aug 2018	University Of California, San Diego MS, Computer Science & Engineering GPA: 3.7/4	California, USA
May 2022 Aug 2018	Sardar Patel Institute of Technology B.Tech, Computer Engineering CGPA: 9.63/10	Mumbai, India

Relevant Course Work

- CSE 270: Discrete Differential Geometry • CSE 272: Advanced Image Synthesis • CSE 276C: Mathematics for Robotics
- CSE 203B: Convex Optimization • CSE 291: Physics Simulation

Publications

- [1] **HRescue: A Modern ML approach for Employee Attrition Prediction** [🔗]
Rudresh Veerkhare*, Parshwa Shah*, Jiten Sidhpura*, Sudhir Dhage (* = Equal Contribution)
Springer Proceedings in Mathematics & Statistics, vol 401. Springer, Cham. [ICMLBDA 2022]
- [2] **FedSpam: Privacy Preserving SMS Spam Prediction** [🔗]
Jiten Sidhpura*, Parshwa Shah*, Rudresh Veerkhare*, Anand Godbole (* = Equal Contribution)
Communications in Computer and Information Science, vol 1793. Springer, Singapore. [ICONIP 2022]
- [3] **Face To BMI: A Deep Learning Based Approach for Computing BMI from Face** [🔗]
Jiten Sidhpura*, Rudresh Veerkhare*, Parshwa Shah*, Surekha Dholay (* = Equal Contribution)
In Proceedings of ICITIIT, Kottayam, India, 2022, pp. 1-6. IEEE [ICITIIT 2022]

Awards

- **India Excellence Award (Deutsche Bank, Feb 2023)** Award granted to only **280 out of 17000** (1.65%).
- **Best Graduation Project Exhibition Award (SPIT Mumbai, Apr 2022)** Awarded **1st prize** for project FedSpam.

Research Projects

FedSpam: Privacy Preserving SMS Spam Detection (Team Size: 3)

Federated Learning, NLP, Edge Computing

- FedSpam is an edge computing application which leverages **Federated ML** to **preserve the user data privacy** while using the advanced data-driven ML solutions for spam detection.

CustomXGBoost: XGBoost Implementation with Optimizers (Solo) [in | 🔗]

Gradient Boosting, Optimizers

- XGBoost **Implementation from scratch** where I've modified the **gradient boosting** to utilize optimizers such as **ADAM** and **RMSProp**.

Arbit: A Decentralized Crypto Exchange Arbitrage System (Solo)

Linear Algebra & Graphs, Blockchain Smart Contracts

- Developed an efficient algorithm with **O(1)** time complexity for detecting **Nth order arbitrage** opportunity in Decentralized Crypto Exchanges (DeX).
- Utilized graphs and linear algebra in the derivation process.
- Implemented the system on the Cloud with optimal regions for low network latency, enabling continuous real-time blockchain monitoring and swift execution of profitable arbitrage transactions.
- Created a profitable personal project, generating approximately **\$10,000** in cryptocurrency in early 2022.

HRescue: A Modern ML approach for Employee Attrition Prediction (Team Size: 3)

Gradient Boosting, Explainable AI, Data Augmentations

- Numerous attrition prediction methods have been developed in the past. However, This approach focuses on **interpretability** of ML models for sensitive employee attrition decisions and **outperforms prior methods** while addressing **data imbalance**.

Face To BMI: A Deep Learning Based Approach for Computing BMI from Face (Team Size: 3)

Computer Vision, Transfer Learning, Discriminative Learning

- Developed a BMI prediction model from facial images using **transfer learning** on deep convolution networks, implementing **discriminative learning** to train the last few layers with varying learning rates for further model fine-tuning.
- Used **Tensor Processing Unit** for training Deep Learning models.

Technical Skill

Programming	C++, Python 3, Java, C, JavaScript, Typescript, Solidity, PowerShell, Shell Script
Frameworks & Libraries	PyTorch, Numpy, Taichi-Lang, Keras, Tensorflow, Scikit-Learn, Huggingface, LangChain, ReactJS, NextJS, Django, Flask, FastAPI, SpringBoot

Software Projects

Catalyst (Solo) [[🔗](#) | [📄](#) | [in](#)]

Open Source, Node js, VSCode Extension

- Catalyst is a VS code Extension to accelerate the process of solving problems on Codeforces. It has **3000+ installed user and 12000+ downloads**

ReactPy (Solo) [[🔗](#) | [in](#)]

Open Source, Web Python, Algorithm

- ReactPy is a implementation of React in Python using Brython. It's a **from scratch implementation** of **React Fiber**, along with **diffing and Virtual DOM** in Python 3.

Numras (Solo) [[🔗](#)]

Open Source, Numpy, Neural Networks

- A **mini-framework** completely **implemented from scratch** using Numpy. Its api is similar to **Keras**. All of the operations like forward pass, backward pass and optimizations are carried mathematically from scratch.

Recruitment Assisting Platform (Team Size: 4) [[🔗](#)]

Data Mining, Data Visualization

- Used **Latent Dirichlet Allocation (LDA)** for grouping candidates based on the Resume.

Elliptical Curve Diffie Hellman (Solo) [[🔗](#)]

Cryptography, Algorithms

- Implemented **Elliptical Curve Diffie Hellman Key Exchange algorithm**, from scratch.

Volunteering

40+ Hours of CSR, Deutsche India

2022 - Present

- Volunteered for development of applications to spread awareness about Mental Health.
- Volunteered for School Kit Assembly and Distribution for underprivileged children.
- Volunteered for crafting of environment friendly paper bags.

Scikit Learn Open Source Contribution [[🔗](#) | [📄](#)]

Nov 2022

- Implemented an Enhancements Proposal for allowing Minkowski distance with $0 < p < 1$.

10+ Hours of SEVA, Mumbai

2019 - 2020

- Volunteered for teaching Maths and Science to high school underprivileged children.
- Volunteered for Mumbai's Beach Cleaning.

Hackathons

- **Predicting House Prices In Bengaluru (Machine Hack, Feb 2021)** Ranked **6th** out of 403 submissions (Top 1.4%).
- **Predict The Data Scientists Salary In India (Machine Hack, July 2020)** Ranked **3rd** out of 192 submissions (Top 1.5%).
- **Predict The Price Of Books (Machine Hack, July 2020)** Ranked **46th** out of 847 submissions (Top 5%).
- **Video Game Sales Prediction (Machine Hack, June 2020)** Ranked **24th** out of 231 submissions (Top 10%).
- **Computer Vision Classic (Machine Hack, July 2020)** Ranked **10th** out of 87 submissions (Top 11%).
- **JanataHack: Machine Learning for IoT (Analytics Vidya, May 2020)** Ranked **28th** out of 202 submissions (Top 14%).

- **KJSCE HACK 6.0 (KJSCE Mumbai, Apr 2022)** Won the Filecoin Track Prize of **\$260**.
- **SPIT Hackathon 2021 (SPIT Mumbai, Feb 2021)** Won the Best Hack Build on Ethereum + Matic Prize of **\$200**.
- **HackNITR 3.0 (NIT Rourkela, Oct 2021)** Won the Best Dapp Built on Celo Prize of **\$265**.

Online Certifications

- > Advanced Machine Learning and Signal Processing (IBM, April 2020) 
 - > Neural Networks and Deep Learning (Deeplearning.ai, May 2020) 
 - > Structuring Machine Learning Projects (Deeplearning.ai, May 2020) 
 - > Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization (Deeplearning.ai, May 2020) 
 - > Convolutional Neural Networks (Deeplearning.ai, June 2020) 
 - > Sequence Models (Deeplearning.ai, July 2020) 
 - > Image Super Resolution Using Autoencoders in Keras (Coursera, July 2020) 
 - > Generate Synthetic Images with DCGANs in Keras (Coursera, July 2020) 
 - > Regression with Automatic Differentiation in TensorFlow (Coursera, July 2020) 
 - > Sequences, Time Series and Prediction (Deeplearning.ai, March 2021) 
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