Keshav Mittal

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Education

University of California, San Diego — California, USA
Bachelor of Science in Computer Engineering — Expected August 2024

Professional Work Experience

Machine Learning Engineer — California, USA
The Salk Institute, Computational Neuroscience — Jan 2024 - Current

- Developing MCell (Monte Carlo Cell), a particle-based simulator for the movements within 3-dimensional reaction-diffusion systems, utilizing specialized random walk Markov-Chain Monte Carlo algorithms.
- Performed network performance testing and **reduced the latency by 21%** through critical evaluation, refinement, optimization, and innovative restructuring of the system's architecture.
- **Refactored imaging data analysis MATLAB project** by improving the efficiency and processing speed by 67.51%, and enhancing the user interaction for better visualization.

Software Development Engineering Intern — Bangalore, India
BestEx Research Group, LLC — Jul 2023 - Sep 2023

- **Led the deployment** of PagerDuty, a SaaS incident response platform, into BestEx's algo-trading infrastructure to monitor the backend server logs and errors.
- Collaborated with software engineers and **reduced the issue-resolution time by over 83%** by integrating the company's MySQL and Elasticsearch database with the PagerDuty API.
- Seamlessly integrated systems escalation policies to ensure critical events get triggered and **resolved within 9 hours**.
- Improved maintainability and readability by adding object-oriented design principles and **technical documentation**.

Research Assistant — California, USA
UCSD Department of Physics (Prof. Elena Koslover) — June 2020 - May 2022

- **Developed theoretical models** to quantify the dynamics of particle movement inside the Endoplasmic Reticulum (ER), the largest cellular organelle, increasing simulation accuracy by 33%.
- **Automated** segmentation of ER structures using ImageJ (Fiji) and trained from raw datasets in a Machine Learning based tool (Ilastik), increasing segmentation accuracy by 27%.
- ***Publication:*** 'Unraveling trajectories of diffusive particles on networks,' Physical Review Journal (2022), Yunhao Sun, Zexi Yu, Christopher J Obara, **Keshav Mittal**, Jennifer Lippincott-Schwartz, Elena F Koslover

Teaching Assistant, Advanced Data Structures & Entrepreneurship for Engineers — California, USA
UCSD CSE Department (Prof. Niema Moshiri and Prof. Rakesh Kumar) — Jan 2021 - Sept 2021

- **Led weekly lab sessions** for Advanced Data Structures course (265 students), assisted with the bug fixing process, helped in troubleshooting final projects such as Huffman encoding.
- Taught advanced software development principles, reinforcing core C++ concepts, achieving 99.9% student approval.
- Designed rubrics, curriculum revisions, & assignments and graded presentations for Entrepreneurship for Engineers course.

Undergraduate Researcher — California, USA
Systems and Networking Group, CSE (Prof. Alex Snoeren and Prof. George Porter) — Sept 2019 - June 2020

- **Built a 24/7 data extraction/collection pipeline** using Python and Bash scripts to process raw metrics from a server cluster to a model compatible form.
- **Designed an analytics dashboard** to visualize aggregate page load time waterfall data served using Express-Node.js web application framework.
- Wrote scripts that collect website analytic data and send it to **a RESTful endpoint service** with MongoDB.
- **Presented** a poster to 100+ professors and graduate students at the Early Research Scholars Program 2020 Conference.

Projects

Mechanisms towards building a UNIX-based Operating System *C, UNIX*
Designed a **multi-threaded system library** and wrote **kernel-level C code** to enable various scheduling policies. Allowed semaphores support to allow synchronization in a user-mode UNIX-based operating system.

Artificial Intelligence to play Gomoku and Sudoku *PyGame, Search and Optimization algorithms*
Implemented an AI in Python which uses Reinforcement Learning given a computational budget to play Gomoku & Sudoku. The tree search was **augmented by Temporal Difference Learning** to help evaluate the values of states better.

Wireless Communications Systems and Networking Group Project *Java, Android Studio, Networking*
Built a mobile application in Android Studio to scan Bluetooth Low Energy (BLE) signals in proximity by capturing phone's accelerometer data, returning RSSI-strength based directions to **guide the user towards the device**.

Technical Knowledge

Relevant Coursework: Software Engineering; Artificial Intelligence; Deep Learning; Linear Algebra; Computer Architecture; Systems and Signals; OOPs; Data Structures & Algorithms; Web Services; Networked Systems, Security
Skills: Python; C/C++; Java; Bash; MATLAB; HTML/CSS; JavaScript; MongoDB; Node.js, React; REST APIs
Tools: CI/CD; Unit Testing; NumPy, PyTorch, Tensorflow; Docker; Kubernetes; TCP/IP; Distributed Systems; AWS