Dikshant Sagar

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Education

California State University, Los Angeles — Los Angeles, CA
Master of Science in Computer Science | *GPA:* ***4.0*** — 2022 - 2024
Thesis: Deep Reconstruction Model for Exposing Low Concentration Metabolites in Edited-MRS Brain Scans.

Indraprastha Institute of Information Technology, Delhi — New Delhi, IN
Bachelor Of Technology in Computer Science | Upper GPA: ***3.5*** — 2017 - 2021
Thesis: Multiple Myeloma(MM) Cancer Cell Instance Segmentation

Research Interests

- Deep Learning Applications in Healthcare
- Generative Models for Computational Drug Discovery
- Machine Learning in Bioinformatics

Publications

➤ Published/Accepted

Sagar, D., Mohammadi F., Pourhomayoun M., Joen J., & Amini N. (2023 October). **Deep Learning Based GABA Edited-MRS Signal Reconstruction**. To appear in the proceedings of the 18th International Symposium on Visual Computing (ISVC 2023), Lake Tahoe, NV, Oct. 2023. [30% Acceptance Rate]

Sagar, D., Risheh A., Sheikh N. & Forouzesh N. (2023, September). **Physics-Guided Deep Generative Model for New Ligand Discovery**. To appear in the proceedings of the 14th ACM International Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB 2023), Houston, TX, Sept. 2023. [⭐ **Best paper finalist award** ⭐ | 29% Acceptance Rate]

Sagar, D., Aggarwal, P., Farswan, A., Gupta, R., & Gupta, A. (2022). **GCRS: A hybrid graph convolutional network for risk stratification in multiple myeloma cancer patients**. Computers in Biology and Medicine, 149, 106048. [https://pubmed.ncbi.nlm.nih.gov/36113255/ | Impact Factor: 7.7]

Sagar, D., Garg, J., Kansal, P., Bhalla, S., Shah, R. R., & Yu, Y. (2020, September). **PAI-BPR: Personalized outfit recommendation scheme with attribute-wise interpretability**. In 2020 IEEE Sixth International Conference on Multimedia Big Data (BigMM 2020) (pp. 221-230). IEEE Virtual Conference.[https://ieeexplore.ieee.org/abstract/document/9232589 | 19.5% Acceptance Rate]

➤ Under Review

Chatterjee R., **Sagar D.**, Pourhomayoun M., Kaur M., & Amini N. (2023, December). **Deep Residual Distilled Convolutional Learning For Detection of Large Vessel Occlusion in Ischemic Stroke Patients**. In review under the 23rd IEEE International Conference on Bioinformatics and Bioengineering (BIBE 2023), Virtual Conference, Dec. 2023. [25% Acceptance Rate]

Sagar D., Dwivedi T., Aggarwal P., Gupta R., Bhatnagar S., Mohan A., Kaur P., & Gupta A. (2023). **CoSP: An Interpretable AI Model on COVID-19 Severity Prediction using Clinical Data at Hospital Admission.** In Review for publication in Elsevier's International Journal of Cognitive Computing in Engineering. [Impact Factor: 8.35]

Motwani S., **Sagar D**., Aggarwal P., Gupta R., Abrol V., & Gupta A. (2023). **MuSARCyto: Multi-Head Self-Attention-based Representation Learning for Unsupervised Clustering of Cytometry Data.** In Review for publication in Elsevier's Journal of Biomedical Informatics. [Impact Factor: 8.0]

➤ Theses

Deep Reconstruction Model for Exposing Low Concentration Metabolites in Edited-MRS Brain Scans. [Ongoing]

Multiple Myeloma Cancer Cell Instance Segmentation. A tool to detect and segment MM cancer cells from bone marrow aspirate slides using Deep Learning. *[Published as B.Tech Thesis in IIIT Delhi Thesis Archive 2021. | https://arxiv.org/abs/2110.04275]*

Scholarships, Student Grants, Honors, and Awards

- 14th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB 2023) - **Best Paper Finalist Award**.
- California State University, Los Angeles Non-Resident Tuition Fee Waiver Scholarship 2023.
- CSUPERB Faculty-Student Research Collaboration Grant 2023.
- California State University, Los Angeles Graduate Scholarship 2023.
- CSUPERB Student Research Travel Grant 2023.
- California State University, Los Angeles - Computer Science Department - **Dean's List 2022.**

Skills

Programming Languages: Python, Java, Javascript, HTML/CSS, C/C++, SQL.

Tools and Libraries: Tensorflow, PyTorch, Keras, Scikit-Learn, OpenCV, NumPy, Pandas, Django, Docker, Tableau, Google Cloud Platform, High-Performance Computing, Bash/Sh/Zsh, Raspberry Pi/Arduino.

Research Experience

Computational Molecular Biology Lab, California State University, Los Angeles Los Angeles, CA
Graduate Research Assistant 03/2023-Currently
Conducting research in Deep Learning based drug discovery under Dr. Negin Forouzesh and published a paper at the ACM-BCB 2023 conference.

Machine Learning and Sensing Lab, California State University, Los Angeles Los Angeles, CA
Graduate Research Assistant 01/2023-Currently
Conducting research for Artificial Intelligence in Healthcare under Dr. Navid Amini and published a paper on deep learning-based GABA signal reconstruction from raw MRS scans at the ISVC 2023 conference.

SBI Lab, IIIT Delhi New Delhi, IN
Research Associate 11/2021-08/2022
Worked on building Deep Learning Solutions for Bio-Medical Applications under Dr. Anubha Gupta and published a paper on Multiple myeloma cancer risk stratification in Elsevier's CIBM journal.

SBI Lab, IIIT Delhi New Delhi, IN
Undergraduate Researcher 02/2020-07/2021
Built a low-cost MM Cancer Cell Detection and Segmentation System using Deep Learning Methodologies under advisor Dr. Anubha Gupta, IIITD, in collaboration with Nvidia and Dr. Ritu Gupta(Prof., Dept. of Oncology AIIMS).

MIDAS Lab, IIIT Delhi New Delhi, IN
Undergraduate Researcher 01/2020-09/2020
Created a User Preference Mapping System Using Deep Learning Architectures and published a paper on the same at the IEEE BigMM'2020 conference under advisor Dr. Rajiv Ratn Shah, IIITD, and in collaboration with Dr. Yi Yu from NII, Japan.

Teaching Experience

California State University, Los Angeles
Teaching Assistant for CS4550 - Computer Graphics in Fall 2023

Computational Molecular Biology Lab, California State University, Los Angeles
Taught Intro to Deep Learning Course for Lab Undergraduates in Summer 2023

California State University, Los Angeles
Teaching Assistant for CS4540 - Data Visualization in Spring 2022

Selected Projects

Physics-Guided Deep Generative Model for New Ligand Discovery
A novel hybrid conditional variational autoencoder that utilizes both the structural grids and the physics-based features to generate new drug candidate structures conditioned on a receptor protein that have significantly higher binding free energy when compared to reference ligands.

MuSARCyto: Multi-Head Self-Attention-based Representation Learning for Unsupervised Clustering of Cytometry Data
A novel multi-head self-attention-based representation learning network that performs clustering to isolate different cell types in mass cytometric data. Our model outperforms previous SOTA by more than 13% in F1 score on 2 different benchmark datasets.

CoSP: An Interpretable AI Model on COVID-19 Severity Prediction using Clinical Data at Hospital Admission
A Hierarchical Strategy Random Forest-based COVID-19 severity predictor with feature vs. output interpretability providing an AUC-ROC of 0.95, 18% better than the previous best work.

GCRS: A Hybrid Graph Convolutional Network for Risk Stratification in Multiple Myeloma Cancer Patients
A GCN-based Risk Stratification system for cancer risk-stage prediction of newly diagnosed MM patients achieving a concordance index of 0.68 on the MMRF dataset as compared to state-of-the-art, managing only 0.67.

Multiple Myeloma Cancer Cell Instance Segmentation
A modified MaskRCNN-based arch for segmenting MM cancer cell instances from microscopic cell slide images with BoxAP of 64.7, MaskAP of 65.6, and an mIOU of 0.86, all metrics performing better than the SOTA.

PAI-BPR: Personalized Outfit Recommendation Scheme with Attribute-wise Interpretability
A Deep Learning-based attribute-wise user preference matching and learning using Bayesian Personalized Ranking obtained an AUC of 0.8502, increasing it by 2% more than the best previous work.

Photorealistic Facial Expression Synthesis using Conditional Generative Adversarial Networks
A GAN-based tool that generates photorealistic images containing different facial expressions from an input image based on a conditional emotion input.

Cloud Structure Instance Segmentation
A Kaggle Challenge on NASA's Sattelite data by Max Plank Institute of Meteorology to classify different types of cloud structures. Achieved using a MaskRCNN implementation to classify and create masks on Satellite images, attaining a Dice coefficient of 0.5876, 5% better than other segmentation models.

Certifications

- **Machine Learning and Reinforcement Learning in Finance Specialization Certificate** from NYU.
- **TensorFlow Developer Professional Certificate** from DeepLearning.AI
- **Machine Learning Certification** from Coding Ninjas.

References

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