MIHIR JAGTAP

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⋄ Madison, Wisconsin, USA

ACADEMIC QUALIFICATION

Bachelor of Science - Computer Science and Data Science   Sep 2020 - May 2024
University of Wisconsin-Madison

- *CGPA: 3.861/4.000*
- *Dean's List Award in Fall 2020, Spring 2021, Fall 2021, Spring 2022, Spring 2023*

PUBLICATION

In Preparation:
Jagtap, Mihir, *Applications of GANs in Supervised vs. Unsupervised Learning: A Review*, expected submission in February 2024.

RESEARCH & INDUSTRY EXPERIENCE

Assessing Generative Models for Predicting Materials Structure and Properties   Jun 2023 - Present
Informatics Skunkworks, Computational Materials Group, Dept. of Materials Science & Engineering, UW-Madison.
Advised by: **Prof. Dane Morgan & Dr. Benjamin Afflerbach**

- Assessing the Crystal Diffusion Variational AutoEncoder *(CDVAE)* model with many datasets to generate desired and specific material structure and properties.
- Achieved a **high occurrence** of valid generated structures, and developed a python script to **precisely visualize** the lattice structure of the generated molecular structures.
- Working on the challenge to **lower the error metrics**, and **achieve specific bandgaps from the generated molecule**.

Cloud Based Prediction Tools for Materials Properties *(Foundry Models)*   Jan 2022 - May 2023
Informatics Skunkworks, Computational Materials Group, Dept. of Materials Science & Engineering, UW-Madison.
Advised by: **Prof. Dane Morgan**

- Retrained and optimized the Alfabet Model on QM9 (dataset of 134 kilo molecules with unique quantum mechanical features) and, **developed** a machine learning model using the Neural Fingerprint library for enthalpy and material property predictions from SMILES strings; **reduced errors by 60% improved accuracy to 94%**.
- Achieved comparable results to published papers for the **DimeNet** and the **Cubic Crystal Space Group** models and uploaded the optimized and running models on Foundry Cloud with usability through an integrated preprocessor. **Developed** a deep learning network to predict band gaps in organic compounds and created a preprocessor for Foundry compatibility.

Model-Based Decision Support Tools   March 2022 - Present
Project Assistant   *Madison, WI*
Dept. of Animal and Dairy Sciences
Advised by: **Prof. Victor Cabrera**
Profile: https://dairymgt.cals.wisc.edu/people.php#developer-profile-mihir

- **Currently working** on a Machine Learning Model to detect perturbations (arising due to environmental and natural factors) in the daily milk yield of dairy cow (loss in milk production). The aim is to analyse and minimize the loss by studying adjoining factors responsible for the perturbation. Maximize the Dairy Milk Yield and develop a tool based on the research.
- **Developed** the tool *Optimal Allocation of Nutritional Resources and Crop Planning in a Dairy Herd*. The linear optimization tool, gives the best crop plan and feed distribution which decreases farmer's input costs and maximize profits from the particular farm. Tool achieves a **\$109 ± 96.9 greater net return per cow per year**.

Computer Vision & AI Research Intern May 2022 - Aug 2022

Cairovision Pvt. Ltd. (*previously* CamfyVision Innovations) *Bangalore, India*

- Worked in development of computer vision software using OpenCV & PyTorch CUDA.
- Processed images (filtering, blurring, enhancement) to give the object detection models a varied dataset and increase accuracy. Developed models to extract registration number from car plates, and to recognize hats in kitchen.
- Developed a hand-raising and behaviour detection system for school classrooms using YOLOv4 model, focusing on pose estimation accuracy (achieved **gain** in accuracy of **5%**).

TEACHING & MENTORING EXPERIENCE

Peer Mentor Sept 2023 - Present

Department of Mathematics, UW-Madison *Madison, WI*

- Peer Mentor for the **MATH 96** and **MATH 112** courses. Responsibilities include planning for the syllabus to be covered for that day, helping students with questions and clearing their doubts.
- Drop-in tutor in the Department. Assisting students in Pre-Calculus and Calculus courses.

Academic Tutor Sept 2021 - May 2022

ACTS, Division of Diversity, Equity & Educational Achievement (DDEEA) *Madison, WI*

- Peer-to-peer tutoring. Assisted students with Math 221 and CS200.

PROJECTS

VR-Toolkit Jan 2023

Code: *https://github.com/MihirJagtap/VR-Toolkit*
Website: *https://sites.google.com/wisc.edu/vr-toolkit/home*
Advised by: *Prof. Mohit Gupta*

- Created a software stack called "Virtual Reality Toolkit (VR-Toolkit)" designed to assist individuals with low vision. This innovative tool improves their ability to recognize objects, view images, and read more effectively. It enhances the user's visual experience through features like magnification to enlarge text and color contrast adjustments in images.
- Incorporated more functionalities in VR-Toolkit for an enriched user experience. Creating captions for photos is one way to improve content accessibility. The toolkit includes a text-to-speech architecture to help users who have trouble reading these captions by giving them an audible alternative.
- **Tools**: Image Processing, Optical Character Recognition, OpenCV, tesseract

ActionCount Analytics Oct 2022

Code: *https://github.com/MihirJagtap/ActionCount-Analytics*

- 3D pose detection of humans and classifies them.
- This ML software implementation can be used in large halls to quantify people according to their actions.
- Tools: OpenPose, Python, CUDA, and Tensorflow

Computer Vision Apps Dec 2022

Code: *https://github.com/MihirJagtap/Computer-Vision-Apps*

- The project uses statistical methods and mathematical based models to implement computer vision apps mainly object tracking, image mosaicking, detecting straight lines, image refocusing and burning an image. Tools: MATLAB, Python, neural networks.

Join Algorithm May 2023

Code: *https://github.com/MihirJagtap/Join-Algorithms*

- In this project, I implemented, tested, and benchmarked a disk-based join algorithm. Efficiently uses memory and disk resources to return the answer to the join query.

SQLite Page Cache Apr 2023

Code: *https://github.com/MihirJagtap/SQLite-cache*

- The project entails customizing SQLite's pager by creating two new page replacement methods in the page cache component, which manages the memory management of database pages, including dynamic resizing, unpinned page discarding, page ID reassignment, and bulk discarding within ID ranges.

Country Happiness & HRD Analysis May 2022

Code: *https://github.com/MihirJagtap/Country-Happiness-HRD-Analysis*

- The report aims to compare Western Europe's mean happiness score with the global average and examine the correlation between a particular country's freedom and its happiness score.. Tools: R, Linear Regression, Statistical Analysis

RELEVANT COURSEWORK

Foundations	Java Programming & Data Structures (COMPSCI 200, 300, 400), Data Sci Programming (COMPSCI 220, 320), Machine Organization and Programming (COMPSCI 252, 354), Algorithms (COMPSCI 577)
ML & Deep Learning	Computer Vision (COMPSCI 639), Deep Learning for Computer Vision (COMPSCI 639), Matrix Methods in Machine Learning (COMPSCI 532)
Systems	Big Data Systems and Databases (COMPSCI 544), Database Management Systems: Design and Implementation (COMPSCI 564), Operating Systems (COMPSCI 537) (*In Spring 2024*)
Mathematics	Calculus (MATH 221, 222, 234), Linear Algebra (MATH 340), Discrete Mathematics (MATH 240)
Statistics	Statistical Data Modeling (STAT 240, 340), Forecasting and Analysis Theory and Methods of Mathematical Statistics (STAT 311)
Electives	Intro to Human Computer Interaction (COMPSCI 570)

CERTIFICATIONS

Fundamentals of Deep Learning Jul 2022

NVIDIA Deep Learning Institute

https://courses.nvidia.com/certificates/417e100242634e05be68be11e91314d6/

SKILLS

Languages	Java, Python, R, SQL, MATLAB, PHP, HTML, CSS, C, C++, JavaScript, LaTeX
Frameworks	Flask, React, Shiny
Tools/Platforms	Git, OpenCV, PyTorch, Tensorflow, Linux, Windows

EXTRA-CURRICULAR ACTIVITIES

The Late Anantrao Pawar Memorial English Medium School (LAPMEMS) Jun 2023 - Aug 2023

Teaching Vounteer *Pune, India*

- Volunteered in a school for students from low-income and under-represented household. Assisted the math and science school teacher and took initiative in organizing and conducting several experiments to illustrate the principles and concepts of Science, and Mathematics to school children. I tried to make a collaborative environment, different from the competitive school classroom environment during the small group mentoring sessions.

- Skills : Communication, Speaking, Organising, Management, Teaching

BadgerFly April 2022 - Dec 2022

Software Development team member *Madison, WI*

- Functionality and software and maneuvering operation on prototype.
  Skills : Python, ROS