DEEPIKA AGGRAWAL

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RESEARCH INTERESTS

- Deep learning: Enhancing model performance, scalability, and efficiency
- Explainable AI: Focussing on transparency and trustworthiness in healthcare
- Deep learning for Photoacoustic and Thermoacoutis signal processing

EDUCATION

University of Illinois   Chicago, Illinois
Ph.D. in Computer Engineering   Ongoing
- GPA: 3.50/4.00
- Advisors: Prof. Dan Schonfeld , Prof. Kamran Avanaki

Purdue University   West Lafayette, Indiana
Bachelor of Science in Computer Engineering   May 2019
- Semester Honors: Fall 2018

TECHNICAL SKILLS

- **Programming Languages**: Python, C++, MATLAB
- **Libraries, Frameworks, and Collaborative Tools**: TensorFlow, Pytorch, sci-kit-learn, Keras, XGBoost, OpenCV, Jupyter Notebook, GitHub

ACADEMIC & PROFESSIONAL EXPERIENCE

Research Engineer (Part-time)   Chicago, Illinois
UIC Innovation Center (Caterpillar Inc.)   Jun 2022 – Jan 2024
- Played a leadership role for Caterpillar Inc. project, covered by a Non-Disclosure Agreement. The project focused on transitioning the organization from legacy hardware to recent hardware ensuring performance optimization and long-term sustainability. Conducted an extensive literature review on hardware migration and challenges acquired by organizations during similar transitions. Analyzed existing legacy hardware by gaining in-depth knowledge of specifications and configurations.
- Successfully delivered an initial version of the user-friendly tool for the migration and created a comprehensive documentation to assist users.

Machine Learning Research Assistant   Chicago, Illinois
BioMicrosystems Lab (Led by Prof. Erica Jung)   Jan 2021 – Jan 2022
- Worked on methods focused on precision tracking of behavioral patterns in zebrafish to facilitate fundamental neuroscience research.Conducted experiments by exposing the fish to diverse stimuli, recording neural activity, and capturing movement data. Applied advanced pattern recognition and machine learning techniques to analyze the intricate correlation between stimulus direction and the fish's tail and eye movements.

Machine Learning Engineer   Chicago, Illinois
ezClinic   Sep 2020 – Jan 2021
- Worked towards bridging gaps in urgent patient care situations through prompt interventions. Worked on real-time tracking of critical patient actions, such as detecting intubation tube removal and monitoring aggressive behaviors through deep learning techniques.
- Designed a deep-learning architecture that focused on an intricate analysis of patients' actions such as eye movement using 3D volumetric video streaming data.

Software Engineer Intern   Chicago, Illinois
CNA Insurance   May 2020 – August 2020
- Elevated CNA Appetite Application functionality through the implementation of React JS and Sonar Lint, providing brokers with a comprehensive view of the diverse business markets offered by CNA Insurance. The revamped interface brought substantial value to CNA's small business segment, offering users improved website navigation.
- Key functionalities, including filtering, searching, exporting to Excel, and sorting, were seamlessly integrated.

Graduate Research Assistant   Chicago, Illinois
Orthopedics Biomechanics Research Lab (Led by Prof. Farid Amirouce)   Oct 2019 – Mar 2020
- Worked on improving knee health treatments by exploring how adjusting graft tightness at different bending positions impacts the knee's comfort and stability. Conducted precise data collection utilizing the Optotrak Certus 3D motion-capture system. Implemented robust methodologies to enhance data quality, remove inconsistencies,

and prepare datasets for in-depth analysis. Applied advanced feature engineering techniques to extract meaningful insights from the collected data.
▪ Demonstrating versatility, I took the initiative to develop a dedicated website for the research lab. For a more detailed view of the website, please visit: Website Link

Mobile Application Intern   Delhi, India
Konsult App Private Limited   May 2015 – July 2015
▪ Advanced the mobile-based platform by providing seamless connections between patients and their healthcare providers. Promoted flexibility and convenience by introducing features for rescheduling and canceling appointments. Implemented a notification system that informed users about their upcoming appointments.
▪ Engaged in collaborative problem-solving to address technical challenges.

RESEARCH ARTICLES

Deepika Aggrawal, Mohsin Zafar, Md Tarikul Islam, Rayyan Manwar, Dan Schonfeld, Kamran Avanaki, "**E-Unet: a deep learning method for photoacoustic signal enhancement,**" Proc. SPIE 12379, Photons Plus Ultrasound: Imaging and Sensing 2023, 123790X (9 March 2023); https://doi.org/10.1117/12.2651217

Loïc Saint-Martin, Deepika Aggrawal, Rayyan Manwar, Dan Schonfeld, Kamran Avanaki, "**Relationship between skull phantoms physical characteristics and acoustic wave signal features,**" Proc. SPIE 12379, Photons Plus Ultrasound: Imaging and Sensing 2023, 123790S (9 March 2023); https://doi.org/10.1117/12.2651207

Deepika Aggrawal, Mohsin Zafar, Dan Schonfeld, Kamran Avanaki, "**Deep learning-boosted photoacoustic microscopy with an extremely low energy laser,**" Proc. SPIE 11960, Photons Plus Ultrasound: Imaging and Sensing 2022, 1196010 (3 March 2022); https://doi.org/10.1117/12.2613061

CURRENT RESEARCH PROJECTS (*Under Submission)

Machine Learning-Based Analysis of Polysomnography Data for Sleep Apnea Detection
Under the supervision of Dr. Dan Schonfeld and Dr. Bharati Prasad

Applied Machine Learning-Based Denoising Techniques to Enhance Signal Quality in Thermoacoustic Data: Facilitating Accurate Diagnostics
Under the supervision of Dr. Dan Schonfeld and Dr. Kamran Avanaki

An Efficient Weight-Combination Technique for Merging Of Trained Neural Networks*
Under the supervision of Dr. Dan Schonfeld

TEACHING EXPERIENCE

Teaching Assistant
University of Illinois at Chicago   2021-2024
Digital Signal Processing I, Communication Engineering, Probability Random Processes, Senior Design I, Senior Design II, Electrical Circuit Analysis

SHORT TERM PROJECTS

Predicting Susceptibility of Quarantine Patients to COVID-19 Virus Using X-ray Scan
Course Project: Prof. Evan McCarty, Intro to Machine Learning   May 2020
▪ Developed a deep learning architecture using transfer learning on a Convolutional Neural Network (CNN) model to classify the risk of COVID-19 infection in patients using chest radiography images.

Deep Learning-based Vehicle Detection and Counting System for Traffic Surveillance
Course Project: Prof. Jim Kosmach, Imag Analysis & Com Vis II   *May 2020*
▪ Implemented Gaussian Mixture Model background subtraction for robust vehicle detection in images
▪ Employed a sophisticated centroid tracking system to count vehicles in video streams precisely. This involved strategically drawing a line within each frame, and the counter incremented each time the centroid of a bounding box intersected with this line.

DeepFace Attendance: Enhancing Employee Attendance Monitoring through Face Recognition with Deep Learning
Course Project: Imag Analysis & Com Vis I   *Dec 2019*
▪ Developed a deep learning architecture for an employee tracking system for office attendance, meticulously recording entry and exit timestamps to calculate the total duration spent within the office space.

- This project aims to provide an additional check system by ensuring accurate and efficient monitoring of employee's presence at the workplace.

UNIVERSITY AND COMMUNITY SERVICE

Volunteer, Indira Nursing Home, Uttar Pradesh, India   Summer 2014 - 2024
- Helped manage patient flow by booking appointments in-person and on phone. Helped with administrative tasks such as filing, data entry, and organizing patient records, contributing to the overall efficiency of hospital operations.

Rally Line, Purdue University   Jan 2019 – May 2019
- Served as a college ambassador. In charge of informing alumni, parents, and friends of the campus happenings while encouraging them to financially support the Annual Fund and other college programs and priorities.

Mentor at Code Café event, Purdue University.   March 2018
- Taught Python concepts which range from variables, loops, and conditionals to scientific computing techniques, Python APIs, and other advanced Python tools, techniques, and libraries.