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Chandan Kumar
Ph.D. Candidate

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COMPUTER VISION AND DEEP LEARNING EXPERT

AI/ML ∼ Unsupervised Learning ∼ Computer Vision ∼ Edge Computing ∼ Real-time Analysis

Ph.D. candidate in Computer Science with expertise in unsupervised learning and computer vision. Currently conducting cutting-edge research at Oak Ridge National Laboratory on building footprint reconstruction and multimodal foundation models, while contributing to material thrust analysis at Pacific Northwest National Laboratory. Award-winning industry experience includes the President's Award at Hagie Manufacturing (John Deere). Published researcher in top-tier conferences (ICLR, CVPR), successful in securing NSF grants ($180K+), and active reviewer for prestigious conferences (ECCV, ICML, NeurIPS). Specialized in developing real-time computer vision systems, unsupervised object detection algorithms, and edge computing solutions.

EDUCATION

Ph.D. in Computer Science (Focus:Computer Vision, Deep Learning), *Iowa State University*   Jan 2017-Feb 2025
Masters of Science in Computer Science, *Iowa State University*   Jan 2017- Dec 2022
Bachelor of Technology in Computer Science (With Distinction), *B.I.T. Sindri*   Aug 2011-Jun 2015

RECENT WORK EXPERIENCE

Graduate Researcher   **Sep 2024 —**
Oak Ridge National Laboratory   *Oak Ridge, TN*

- Reconstructing building footprints using Semantic segmentation with vector polygons for satellite images.
- Developing algorithms for polygonization of building footprints.
- Developing a multimodal foundation model for instruction following and large-scale earth observation.

Graduate Teaching Assistant   **Aug 2024 — Sep 2024**
Iowa State University   *Ames, IA*

- Taught lab sessions, helped students with projects and held office hours for the Applied AI course.
- Created and graded assignments that involved recommendation systems, computer vision methods, predictive methods, generative AI, LLMs and prompt engineering.
- Taught lab sessions and held office hours for Microsoft Excel and Access courses which has an enrollment of more than 1200 students.

Visiting Researcher   **May 2024 - Dec 2024**
Pacific Northwest National Laboratory   *Richland, WA*

- Developing unsupervised semantic segmentation models for material thrust.

Graduate Research Assistant   **May 2024 — Aug 2024**
Iowa State University   *Ames, IA*

- Developed algorithm to detect width and length of all parts of hands in real-time.
- Detected 21 landmarks on the hands and calculated lengths in actual world distances in real-time.
- Developed algorithm to predict the toxicity of the smoke.
- Predicted the quantities of different toxin particles present in smoke at different stages of fire-burning process.

Graduate Research Assistant   **Jan 2023 —May 2024**
Iowa State University   *Ames, IA*

- Developing a Deep Learning algorithm using unsupervised learning for object discovery and image retrieval.
- Developing an object detection algorithm using unsupervised learning.

Data Scientist   **Jan 2022 — Jan 2023**
Hagie Manufacturing   *Clarion, IA*

- President award winner for extraordinary performance within 1st half year of joining.
- Using tools and techniques to perform Text Mining, ML models development for predictive analysis and automation and Computer Vision models.
- Design and develop project pipeline(Data Exploration, Sampling, Feature Engineering, Model Building, Field Performance Evaluation).

Graduate Research Assistant   Jan 2019 — Dec 2021
Iowa State University   *Ames, IA*

- Developed an Unsupervised Learning algorithm for Object-Detection.
- Real-time driver assist system for large farm-vehicles using a combination of 16 cameras and and edge devices.
- Real-time depth detection and analysis using stereo camera(s).

Graduate Teaching Assistant   Jan 2017 — May 2019
Iowa State University   *Ames, IA*

- COMS 106 (Introduction to programming using HTML5, CSS, PHP, SQL, JQuery, JavaScript).
- Responsible for helping students understanding concepts, clearing their doubts, and grading assignments.

Business Analyst   Feb 2016 — Dec 2016
EXL(Inductis) Services India Pvt. Ltd.   *Gurugram, India*

- Rising Star award for excellent contributions within the 1st quarter of joining.
- Utilized applications like SAS to identify trends and relationships between different pieces of data, draw appropriate conclusions and translated analytical findings.
- Created and worked on various reporting frameworks (Microsoft Excel, Tableau) that involved customer segmentation and clustering exercises for customers

SYNERGISTIC ACTIVITIES
Program Committee
- AAAI-25

Reviewer
- Conferences: ECCV-24, ICML, ICLR-24, ICLR-25, NeurIPS-24, WACV-24
- Journals: Journal of AI Research(JAIR), River Publishers, IEEE-GRSS

Invited Talks
- International 7-in-1 Symposium , CGC, Herning, Denmark
  Volume analysis for Dynamic Environments   Jun 2021

PUBLICATIONS
Learn and Search: An Elegant Technique for Object Lookup using Contrastive Learning
Chandan Kumar; Jansel Herrera-Gerena, John Just, Matthew Darr, Ali Jannesari   Mar 2024
Unsupervised learning based object detection using Contrastive Learning
Chandan Kumar; Jansel Herrera-Gerena, John Just, Matthew Darr, Ali Jannesari   Feb 2024
Discerning Self-supervised Learning and Weakly Supervised Learning
Chandan Kumar; Matthew Darr, Ali Jannesari (ICLR 2024)   Feb 2024
Optimal Deep Learning model for UAVs: A Case Study
Chandan Kumar; Ali Jannesari (WMPC 2023)   Nov 2023
Deep Learning and Pattern-based Methodology for Multivariable Sensor Data Regression
Jiztom Kavalakkatt Francis; Chandan Kumar; Jansel Herrera-Gerena; Kundan Kumar; Matthew J Darr
(ICMLA 2022)   Dec 2022
Efficient Volume Estimation for Dynamic Environments using Deep Learning on the Edge
Chandan Kumar, Yamini Mathur and Ali Jannesari (PAISE @ IPDPS 2022)   Mar 2022
Pattern Based Multivariate Regression using Deep Learning (PBMR-DP)
Jiztom Kavalakkatt Francis, Chandan Kumar, Jansel Herrera-Gerena, Kundan Kumar, Matthew J Darr
(LXAI @ CVPR 2022)   Feb 2022
Efficient Object Detection Model for Real-Time UAV Applications
Subrahmanyam Vaddi, Dongyoun Kim, Chandan Kumar, Shafqat Shad, Ali Jannesari
(Computer and Information Science)   Jan 2021

PROJECT SUMMARY
Hand Landmark Detection Algorithm   May 2024 — Present
Iowa State University   *Ames, IA*
Developed a hand landmark detection algorithm to identify different points on the hand and calculate the width of the palm, thumb, and fingers in real-time. This would identify the exact glove sizes for persons participating in critical operations.

Unsupervised Object Detection Algorithm   **Jan 2022 — Present**

Iowa State University   *Ames, IA*

Designing and developing an object detection algorithm using unsupervised learning.

Developing a Deep Learning algorithm using unsupervised learning for object discovery and image retrieval.

Real-time Volumetric Analysis   **Aug 2021-Mar 2022**

Using Deep Learning techniques to detect, track and determine the volume of an object in real-time using a drone designed and developed by us.

Visualization using Mono and Stereo Cameras   **Jan 2019-Aug 2021**

Developed an IoT-based framework created utilizing Nvidia AGX Xavier to implement ML techniques to impart intelligence to farm equipment and machines.

Created a web-based framework using HTML, CSS, JS, and Python that responds to machine protocols and triggers assisting the operator/driver.

Skills

Tools and Languages	Python, Pytorch, OpenCV, CUDA, Numpy, Pandas, Matplotlib, Databricks, Alteryx, Ignition, QGIS, Docker, AWS, JAVA, Jenkins, IoT, HTML/CSS, AngularJS, NodeJS, Git, Unix

Honors and Awards

Grants

Co-PI, CIS220069, $174,090 grant for Unsupervised Object detection , ACCESS supported by NSF   Jul 2022

Co-PI, CIS220069, $8,000 extension grant for Unsupervised Object detection , ACCESS supported by NSF   Jul 2023

Honors

Recipient of Intel Edge AI Scholarship, Udacity   Dec 2019

Recipient of PyTorch Scholarship Challenge, Udacity   Oct 2018