# MADHAV AGARWAL

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## EDUCATION

**PhD, Computer Science** — Jan 2025 - Present
University of Edinburgh, UK

**MS by Research, Computer Science and Engineering** — Jan 2021 - June 2023
International Institute of Information Technology Hyderabad, India — CGPA: 9.17

**Bachelor of Technology (Hons.), Information Technology** — Aug 2014 - June 2018
Dr. A.P.J. Abdul Kalam Technical University, Lucknow, India — Percentage: 76.00

## PUBLICATIONS

- Understanding the Generalization of Pretrained Diffusion Models on Out-of-Distribution Data. *AAAI Conference on Artificial Intelligence (AAAI), 2024.* **(Oral)**. Sai Niranjan Ramachandran*, Rudrabha Mukhopadhyay*, **Madhav Agarwal***, C.V. Jawahar & Vinay Namboodiri. (Link)

- Audio-Visual Face Reenactment. *Winter Conference on Applications of Computer Vision (WACV), 2023.* **Madhav Agarwal**, Rudrabha Mukhopadhyay, Vinay Namboodiri & C. V. Jawahar. (Link)

- Compressing Video Calls using Synthetic Talking Heads. *33rd British Machine Vision Conference (BMVC), 2022.* **Madhav Agarwal**, Anchit Gupta, Rudrabha Mukhopadhyay, Vinay Namboodiri & C. V. Jawahar.(Link)

- Dataset Agnostic Document Object Detection. *Pattern Recognition, 2023.* Ajoy Mondal, **Madhav Agarwal** & C. V. Jawahar. (Link)

- CDeC-Net: Composite Deformable Cascade Network for Table Detection in Document Images. *25th International Conference on Pattern Recognition (ICPR), 2020.* **(Oral)**. **Madhav Agarwal**, Ajoy Mondal & C. V. Jawahar. (Link)

## WORK EXPERIENCE

**Applied Machine Learning Engineer** | VidLab7 GmbH — April 2024 - Nov 2024
- Synthetic Avatar Generation, LipSync, Voice Cloning, Deep Fake Detection

**Computer Vision Consultant** | Gradient Ascent AI — Jan 2024 - Feb 2024
- Computer Vision, Deep Learning, Image and Video Segmentation.

**Scientific Researcher** | Technical University of Munich — Sept 2023 - Dec 2023
- 3D Motion Modelling and Generation, Face and Full Body Reenactment.

**Research Fellow** | International Institute of Information Technology Hyderabad — Nov 2019 - June 2023
- Computer Vision, Deep Learning, Face Reenactment, Document Understanding

**Senior Data Scientist** | CAW Studios — Dec 2019 - Aug 2020
- Document information extraction and digitalization of the tabular data using deep learning and OCR.

**Data Scientist** | Innefu Labs Pvt. Ltd. — Jul 2018 - Sept 2019
- Smart Security and Surveillance Solutions using deep learning, deployed at multiple large-scale locations.

**Data Scientist** | Tidyquant Pvt. Ltd. — Jan 2018 - April 2018
- Predictive analytics and forecasting using Machine Learning.

## SKILLS

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|---|---|
| **Technical Skills** | Computer Vision, Deep Learning, Machine Learning, Pattern Recognition, Natural Language Processing |
| **Programming Languages** | Python, C, C++ |
| **Deep Learning Framework** | PyTorch, Keras, TensorFlow |
| **Generative AI** | Diffusion Models, Large Language Models (LLM), Attention & Transformers, GAN, NeRF, CNN |

## PROJECTS

**Image Manipulation using Diffusion Models** Image synthesis and out-of-distribution image inversion using spherical interpolation in latent space of diffusion models.

**Face Reenactment and Talking Heads** Transfer motion and expression information on a static image from a video. Proposed various novel techniques to use audio and visual modalities along with facial cues. Generate state-of-the-art synthetic avatars with lip-sync. Build a pipeline to use these methods with face super-resolution and frame interpolation for efficient transmission.

**Page Object Detection and Localization** Detect Tables, Figures, Charts, etc., in unstructured document images using a cascade architecture and deformable convolutions with high accuracy. Extended this work to incorporate NLP and OCR for end-to-end document digitalization.

**Smart Security and Surveillance Solutions** Developed AI enabled modules like Facial Recognition, Trespassing Detection, Person Count, Abandon Objects, Group Formation, Heat- Map Generation, etc. These modules have custom object detection and tracking capabilities to handle objects like Weapons, Persons, Faces, Helmets, Shoes, Safety Harnesses, etc.

**Person Attribute Recognition and Classification** Classifying the attributes of person like age, gender, clothes etc. for identifying customer behavior in retail markets and provide them with personalized experience.

**Satellite Images** Detection and classification of ships, submarines using real-time satellite images.

## ACHIEVEMENTS & EXTRA-CURRICULAR ACTIVITIES

- Graduate Scholarship from IIIT-Hyderabad to cover the full tuition fee for the MS degree.

- Coordinator in 6th Summer School of AI (2022) organized by IIIT-Hyderabad.

- Recipient of IIIT-Hyderabad's Non-Academic Award for spreading Mental Health Awareness on campus.

- Member and Student Head Coordinator (2017-18) of Big Data Centre of Excellence, R&D Lab of AKGEC, for three years (2015-2018).

- Winner of 'BigWar' event of BigDataThon'17 (24-hour hackathon on Big Data technologies) at ABESIT, Ghaziabad (April 2017).

- Organized Workshops on "Machine Learning and Neural Networks" (Feb 2018) and "Data Science" (March 2017) as a Mentor.

- Part of College Band and Media Team during undergrad.

- Active participation in organizing Tech Fest, Cultural Fest and Blood Donation Camp.

- School Topper in Computer Science, batch of 2013.