Ronak Dedhiya

Senior Research Engineer – Computer Vision & AI/ML Researcher
(+91) 9619353950 • dedhiyaronak@gmail.com
ronak-dedhiya

About Me

Innovative Computer Vision Researcher with 8+ years of experience spanning segmentation, detection, vision transformers, SAM adaptation, and 3D reconstruction. Published at MICCAI and IEEE with a strong track record of developing state-of-the-art models and deploying them into real-world clinical-grade systems. Expert in PyTorch, modern vision architectures, and self-supervised learning. Skilled at driving research from ideation → prototyping → reproducible pipelines → production tools.

Core Expertise

- **Vision Research:**
  - Segmentation (UNet, SAM), Detection (YOLO), Vision Transformers (ViT, DINOv2, Masked Autoencoders), Diffusion Models
- **3D Vision:**
  - Depth Estimation, Monocular & Multi-view 3D Reconstruction, Camera Pose Estimation (VGGT, DepthAnything)
- **Machine Learning:**
  - Self-supervised Learning, Domain Adaptation, Thermal Radiomics, Multi-task Learning
- **Full-stack AI:**
  - PyTorch, TensorFlow, Python, C, .NET (WinForms), AWS, Docker, WebSockets
- **Reproducibility & Deployment:**
  - End-to-end ML pipelines, clinical-grade tools, reproducible PyTorch training, internal model zoos

Experience

Senior Research Engineer
Niramai Health Analytix — March 2019 - Present

- **Segmentation & Detection:**
  - Adapted SAM image encoder with custom decoder for full-body thermal segmentation.
  - Developed multi-task segmentation models (UNet-MobileNetV2 + attention modules) for anatomical structures, hotspot detection, and pose estimation.
- **Vision Transformers & Self-supervised Models:**
  - Trained ViT with Masked Autoencoding on 1M thermal images to learn rich features for downstream tasks (vascularity detection, hotspot classification).
  - Currently training DINOv2-style foundation model on large RGB + thermal corpus to unify modalities without labels.
- **3D Reconstruction & Depth:**
  - Leveraging VGGT and DepthAnything for 3D surface reconstruction from 2D thermal images; experimenting with unsupervised camera pose learning.
  - Developed post/pre-processing pipelines for depth-map fusion and geometry refinement.
- **Diffusion & Data Generation:**
  - Fine-tuned Stable Diffusion with LoRA/ControlNet for synthetic dataset generation in thermal imaging.

- **Full-stack Tools & Clinical Integration:**
  - Architected Full Body thermal Analysis tool with integrated image conversion, segmentation, feature extraction, and automated reporting.
  - Automated cooling graph analysis to guide clinicians on patient movement during exams.
  - Maintained reproducible pipelines and automated deployment (builds, licensing, versioning).
- **Onchocerciasis Detection (Bill & Melinda Gates Foundation Project)**
  - Developed a thermal imaging pipeline to assess viability and reproductive status of Onchocerca volvulus worms, offering a non-invasive alternative to biopsy for river blindness.
  - Built a C# WinForms acquisition tool with standardized cooling protocols, and applied video stabilization + UNet segmentation with radiomics features to classify live/dead and fertile/infertile worms.
  - Results published at IEEE EMBC 2022 and MICCAI 2022, demonstrating feasibility of thermal imaging for neglected tropical disease diagnosis.

Machine Learning Engineer
AitoeLabs - AiSight Video Analytics — June 2018 – Feb 2019

- Designed and optimized a high-performance, multi-threaded C++ application for real-time deep learning video analysis, improving detection accuracy for human tracking, loitering, masked face detection and unusual activity detection.
- Improved application reliability by identifying and resolving frequent bugs, adding new features, and optimizing resource usage to increase efficiency.

Software Engineer
Atos India Pvt. Ltd — Feb 2017 – June 2018

- Acquired skills in Linux, Java, web development, and cloud hosting through rigorous training. and leveraged these skills to develop proof-of-concept projects using AI/ML technologies for Atos internal tools.
- Collaborated with a focused group to develop and deploy machine learning models for solar plate defect detection using drones, crack detection for windmills, and to leverage cloud and edge computing.

Education

Master of Technology in Data Science **August 2021 – April 2024**
Indian Institute of Science, Bangalore *CGPA:8.90/10*
Computational and Data Science (CDS) Department
Thesis: Unsupervised 3D Breast Surface Reconstruction from 2D Thermal Images

Bachelor of Technology **August 2012 – May 2016**
Vivekanand Education Society Institute of Technology *CGPA:8.81/10*
Electronics & Telecommunication

Research Publications

- *Evaluation of Non-Invasive Thermal Imaging for Detection of Viability of Onchocerciasis Worms* IEEE EMBC, 2022.
- *Non-invasive Thermal Imaging for Estimation of the Fecundity of Live Female Onchocerca Worms* MICCAI, 2022.
- *3D-BreastNet: A Self-supervised Deep Learning Network for 3D Breast Surface Reconstruction* MICCAI, 2023.

- *Thermal Radiomics for Early Detection of Diabetic Foot Ulcers Using Infrared Thermography* MICCAI, 2024.
- *3D Breast Surface Reconstruction Using 2D Thermal Images* **[MTech Thesis]** [Under IPR] [Yet to be released].

Projects

- Thermal Image body parts segmentation
- Qualitative assessment of learned latent factors of basic VAE, conditional VAE in conjugation with β - VAE
- Training MOCO, Transformers, Domain-adaptive, Self-supervised, Diffusions models, etc
- Spark Data Analysis on YouTube trending videos
- Sample Efficient Actor-Critic with Experience Replay
- Learning Single-View & Multiple-View 3D Object Reconstruction

Courses

- Deep Learning Specialization - Coursera
- Mathematics for Machine Learning - Imperial College of London (Coursera)
- Advanced Deep Representation Learning
- Reinforcement Learning
- Linear and Non-Linear optimization
- Data Engineering at scale

Achievements

- Placed in top 14% in RSNA Pneumonia Detection Kaggle challenge
- Placed in top 3% in Digit Recognition Challenge using One-Shot Learning
- Winner at Samsung SMS Classification Hackathon
- Placed in top 5% in "Predict the Happiness" Hackerearth Challenge
- Secured AIR 1232 in GATE 2017

Honors & Awards

- Received accolades at Niramai thrice for Best Performance in team.
- Received accolades at Atos for Best Performance in team.
- Received Best Debut Award at Atos.
- Won 2nd Consolation Prize for paper presented on Cognitive Radio Networks.
- Awarded with Narotam Sekhsaria Foundation Scholarship