Rakesh Chowdary Machineni, M.S

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SUMMARY

AI Researcher and Full-Stack Developer with 4+ years of experience specializing in computer vision and multimodal AI solutions. Proven track record publishing in top-tier venues (CVPR, CVIU) and developing/deploying impactful AI solutions across diverse industries, including automotive and retail.

EDUCATION

Masters in Electrical and Computer Engineering (Computer Vision Specialization) 2021 - 2023University of Michigan (GPA of 4.0/4.0) Ann Arbor, Michigan

• Research focused on developing novel learned-based Video, Point Cloud & Image Compression Models

Bachelor of Technology in Electrical Engineering Indian Institute of Technology Tirupati (CGPA of 8.9/10.0) • Hands on experience with C/C+, Python, OpenCV, ROS, Raspberry Pi, Arduino, Autonomous Bot Perception

PUBLICATIONS & PATENTS

- Bijan Sayyarrodsari, Rakesh Chowdary Machineni, Shashank Gupta, Kadir Liano "Systems and Methods for Identifying and Controlling Operational Targets", 2024 (Patent Filed).
- Rakesh Chowdary Machineni, Bijan Sayvarrodsari, Kadir Liano "Managing Noise in labels for Machine Vision at low computational cost", 2024 (Patent Filed).
- Bowen Liu, Rakesh Chowdary Machineni, Yu Chen, Shiyu Liu, Hun Seok Kim "MMVC: Learned Multi-Mode Video Compression with Block-based Prediction Mode Selection and Density-Adaptive Entropy Coding." in The IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2023.
- Rakesh Chowdary Machineni, G. E. Spoorthi, Krishna Sumanth V, Subrahmanyam G, Rama Krishna S. S. G "End-to-end deep learning-based fringe projection framework for 3D profiling of objects." Comput. Vis. Image Underst. 199: 103023 (2020).

EXPERIENCE

- Research Scientist Computer Vision | Rockwell Automation | Austin, TX July 2021 - Present
 - Designed LenzAI, a closed-loop machine vision AI software enabling seamless industrial operator use for ٠ data labeling, model training, performance monitoring, and analytics (including time-series visualization).
 - Advanced AI-driven data labeling platform using Instance Segmentation (SAM), reducing per-image annotation time by 10X.
 - Developed a Model-Health (MH) monitoring system that detected data distribution shifts to trigger an Active Learning strategy, reducing training data needs by $\sim 30\%$ while maintaining model performance, and alerting industry operators of potentially unreliable inferences (false positives).
 - Developed a novel unsupervised depth-based wrinkle detection system for automotive seat inspection resulting in 83% precision and 97% recall (publication underway).
 - Generated heatmaps using depth analysis to visualize wrinkle severity and guide operator during labeling process of seats-wrinkles (patent filed).
 - Created a Zone Transformation technique that dynamically adapts analysis (wrinkly) regions to overcome geometric seat misalignments, eliminating manual ironing-bot recalibration.
 - Engineered a real-time, video-based AI (CPU/GPU optimized) to perform dynamic state classification (e.g., • different fan speeds) and drive automated closed-loop system actuation (patent filed).
 - Deployed the scalable LenzAI vision system (Docker/Portainer) across 3+ paying customers, processing over 100,000 images monthly with **99.00%** uptime.

2015 - 2019

Tirupati, India

- Engineering seamless integration with PLCs (e.g., Rockwell, Siemens) and industrial cameras (e.g., Cognex, Keyence, GenICAM), achieving sub-50ms latency in real-time applications.
- Tools: Django, React, RTKQuery, Redis, OpenCV, PyTorch, Spark, MLLib, ONNNX, PostgreSQL

• Graduate Research Assistant | University of Michigan | Ann Arbor, MI

- Proposed Multi-Mode Video Compression (MMVC) framework with block-based prediction mode selection • and adaptive entropy coding, CVPR 2023.
- ٠ Outperformed SOTA learning-based and conventional codecs on popular benchmark datasets in PSNR & MS-SSIM metrics, specifically a 1dB PSNR and 0.02 MS-SSIM improvement at a very low, 0.1 bit-rate .
- Tools: Qualitative and Quantitative Studies, PyTorch, RAFT, Arithmetic Coding, Quantization, ConvLSTM

Computer Vision Engineer | Toshiba Software Pvt | Bangalore, India

- Designed an Item Recognition software for No Touch Checkout, enabling automated billing in grocery stores. •
- Deployed solution achieved a 98% classification accuracy in real-time speed.
- Tools: Keras, Tensorflow, fine-tuned CNN's, Jupyter, Classical Computer Vision methods, PyQt •
- Undergraduate Research Assistant | VISA Lab | Tirupati, India
 - A novel end-to-end deep learning model to profile the **3D** shape of objects from deformed fringe patterns, ٠ **CVIU 2020**.
 - Reconstructed shaped at -5dB SNR with a 0.005 RMSE surpassing traditional approaches by 10 folds.
 - Tools: PyTorch, 3D Vision, Optical Metrology, Fringe Projection Profilometry, Cuda

OTHER PROJECTS

- Stock Predictor: Built an IR system using query expansion and DistilBERT to predict relevance of text to stock price movements, achieving **0.8593** MSE. (link)
- Vision Transformer & SiamRPN++: Finetuned ViT for 99.5% CIFAR-10 and 84.65% Tiny ImageNet accuracy; implemented SiamRPN++ tracker with 51% EAO. (link)
- NLP Models: Developed RNN, LSTM, and attention-based captioning models scoring up to 18.1 BLEU on COCO; built transformer for arithmetic operations. (link)
- Image Generation & Style Transfer: Implemented GAN variants to generate MNIST-like digits; performed artistic style transfer using content, style, and TV losses. (link)
- Annotation Tool & Grad-CAM: Designed polygon annotation tool; conducted Grad-CAM analysis on ImageNet-trained ResNet50. (link)
- Object Detection: Achieved 43.63%, 35.28%, 40.51% mAP on VOC with FCOS, YOLO, and Faster R-CNN; built a simple CLIP-like model for image-text retrieval and ImageNet classification. (link)
- Depth, Panorama, Navigation: Implemented stereo rectification, ORB/RANSAC panorama stitching, and depth estimation for autonomous systems.

Aug 2018 – June 2019

July 2019 – July 2021

Jan 2022 – April 2023