**NAGA SANDEEP RAMACHANDRUNI**

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**SUMMARY:**

**Experienced and results-driven professional with a strong background in computer vision and deep learning.**

**Skills: Computer Vision, Machine Learning, Deep Learning, Generative AI, LLM’s, Image Processing.**

**PROFESSIONAL EXPERIENCE:**

**Tech Lead (Computer vision and Machine Learning) Sep 2024 – Present**

**Sam’s Club, Dallas, Texas Remote**

* Solving the problem of person re-identification in samsclub stores.
* Improved the tracking and person re-identification accuracy by using transformers-based models and optimization using hungarian matching.
* Leading the project in ideation, development, improvement and deployment on edge devices.

**Tech Lead, Computer Vision Feb 2023- Aug 2024 Digit7.ai – Automated Checkout for Retail store, Dallas, Texas**

* Leading a team of computer vision engineers in building the retail automation store for self checkout.
* Solved the problems of cross Hand and Nearby customer resolution using Pose estimation and person tracking.
* Developed a multiprocessing framework to handle ~80 Cameras and 140 IOT weight sensors inside the store.
* Fusion of different sensors using multimodality for IOT and Camera to improve the product recognition performance.
* Created an architecture with use of OCR, OPENAI CLIP and transformer embeddings to improve product recognition.
* With this novel transformer based architecture improved the overall transaction accuracy from 60% to 95%.
* Deployed our first completely automated checkout store in JuiceBabe - Downtown Dallas.

**Founding Machine Learning Engineer June 2021 – January 2023**

**IrisAgent.com – Automated Customer Support Platform ( Bay area startup), Bengaluru, India**

* Build AI platform to analyze customer support tickets and automate the resolution, tagging and routing of those tickets.
* Finetuning GPT2 models for different customers data to improve the textual embeddings.
* Trained models for the task of similarity prediction with contrastive learning using BERT and XLM-ROBERTA.
* Heirarchical clustering of different customer support tickets for categorizing without labels.
* Customers were able to speed up 45% reponse times, 60% reduce escalations and 35% automated response.

**Senior Machine Learning Engineer( Computer Vision and NLP) June 2020 – June 2021**

**AVALARA – Tax compliance, Bengaluru, India**

Build a Deep learning Distil-bert based Heirarchical Tax code classification system which can predict cross border tax codes for retail items using product information and product images. Able to automate close to 50% of the traffic for clients Amazon and Shopify ( Close to 60k Transactions per Day).

* Achived 92% accuracy through by using Hierarchical Information though Softlabels and Hierarchical losses. Few Shot learning approaches while Long tail distribution is the key challenge in the problem.
* Identity Verification on documents using OCR via Document Processing and Face Matching.
* Star Performer Award for New Hire Category.

**Senior Data Scientist ( Computer Vision and Machine Learning) January 2020 – June 2020**

**Tekion.com ( Automotive Retail Cloud), Bengaluru, India**

* Improved the meanIOU of automated Damage detection system by using U-Net based segmentation model from 35% to 85%.

**Data Scientist ( Computer Vision and Machine Learning) June 2017- January 2020**

**CureSkin.com ( Part of Y Combinator 2017 batch) – Skin Care using visual AI, Bengaluru, India**

* Build a diagnostic system which can automatically detect several skin issues on an image of a face taken from mobile camera using Deep learning detection and classification algorithms.
* Facial Landmark detection and removing background using segmentation approaches and applying different image transformations for alignment of face for comparison.
* Build a skin issue detection model based on mask-rcnn( Tiny Object detection) as skin issues are much smaller in size.
* Improved model performance using Higher Resolution, FPN, Custom Anchor Boxes, ROIAlign and context from 0.1 to 0.55 MAP.
* The diagnostic system is a part of mobile app(CureSkin) and it is being used by more than 2k users per dayacross several parts of India.

**Machine learning Engineer ( Computer Vision and Machine Learning) April 2015- May 2017**

**Sysomos - Social Media Analytics using AI, Bengaluru, India**

* Build a visual analytics platform to detect objects, logos, scenes and food items in social media images.
* Finetunes Inception, VGG and ImageNet for use in Fast-Rcnn and Faster-rcnn for logo deteciton.
* Implemented different Data transformations, HyperParamter tuning and different architectures to improve accuracy. Process Half a million images and served 300 brands. Tools and Technologies: Tensorflow, Caffe, Python.

**PUBLICATIONS**

* [**Relative Parts: Distinctive Parts for Learning Relative Attributes**](https://www.linkedin.com/redir/redirect?url=http%3A%2F%2Fresearchweb.iiit.ac.in%2F~yashaswi.verma%2Fcvpr14%2Fsvj_cvpr14.pdf&urlhash=yRvK)
* IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2014, April 15, 2014 Authors: [Naga Sandeep Ramachandruni](http://in.linkedin.com/pub/naga-sandeep-ramachandruni/5b/852/b26), Yashaswi Verma, C V Jawahar

**EDUCATION**

* **Masters of Science (Research), Computer Science** Thesis Advisor: **C V Jawahar** April 2015 International Institute of Information Technology, Hyderabad, AP, INDIA **Thesis Topic: Distinctive Parts for Relative Attributes.**

**TECHNICAL SKILLS:**

* **Programming/Scripting**: Python, C, C++, Java, JavaScript, Scala.
* **Libraries:** PYTORCH, TENSORFLOW, NUMPY, CAFFE, KERAS, SCIKIT-LEARN, HUGGINGFACE, **PYSPARK Tools:** MATLAB, OPENCV, CUDA, DOCKER, GIT, REDIS, MONGODB, MLOPS.
* **Cloud Platforms:** AWS, GOOGLE-CLOUD, AZURE-CLOUD.
* **Concepts:** Generative AI, Large Language Models, Transformers, Attention networks, Deep Learning, Image
* Classification, Object Detection(YOLO), Data Visualization, Semantic Segmentation, Generative adverserial Networks, Clustering, Regression, Face Detection, Attribute Detection, Supervised and Unsupervised Algorithms: Decision Trees, Optimization, Neural Networks.

**SELECTED PROJECTS:**

**Visual Integration of person into any scene using Stable Diffusion – Generative AI for Images.**

Build a system to Integrate any person into any given scene by cutting the image of person from background into another scene by using stable diffusion models and also depth estimation models. Generative scene looks more natural and coherent in the new scene. Scale and size of person is consistent with the background scene and shadow and lightning conditions are also adapted to the person.

**Technlogies used:** Stable diffusion, Depth Estimation, SegmentAnyThing. Project Page: https://github.com/rnsandeep44/image-generation

**Visual Question answering using Mistral 7B LLM and OPEN VOCAB YOLO running on Local GPU.**

Build a visual question answering system by using Mistral 7B Language Only model and function calling Open Vocabulary Yolo. The system will take the question and image from the user and analyses the image and answers questions relating to any object class as the Open Vocabulary Yolo can detect any class given that textual CLIP embedddings of that class name.

**Technologies used:** Mistral7B LLM, OpenYOLO, Transformers.

**Project Page**: https://gitlab.com/rnsandeep/onnx-yolo-world-with-mistral-llm

**Advanced CVPR Publications Retrieval System Leveraging RAG (Retrieval-Augmented Generation)**

An advanced CVPR paper retrieval system integrating RAG for query expansion, Langchain for similarity search, and ChromaDB for efficient document storage. Utilizing UnstructuredIO for PDF text extraction, the system employs RecursiveCharacterTextSplitter for text segmentation. By embedding documents into vector representations using Hugging Face's embeddings, coupled with RAG-driven query expansion, it enables precise search within the ChromaDB collection. Through this integrated approach, the system facilitates comprehensive and accurate retrieval of relevant CVPR papers, enhancing research accessibility and efficiency.

**Technologies used:** RAG, Langchain, UnstructuredIO, Hugging Face and ChromaDB.

**Skin Issue Detection: ( CureSkin.com)**

Developed a diagnostic system which can detect several skin issues like comodones, pimples, melasma, darkcircles etc., on the face using an Image taken from a mobile camera. Object detection algorithms are carefully tunes to detect these issues overcoming the problems of size, texture and domain shift. Different state of the art networks and optimization techniques were used to improve the system performance and accuracy.

**NETWORKS Used:** Resnet, Inception-v3.

**LIBRARIES:** TF-FASTER-RCNN, PYTORCH, TORCHVISION, MASKRCNN-BENCHMARK

**Generative Adverserial Networks for Deblurring Images.**

Developed a Gan for deblurring images. The algorithm uses two networks one which takes the blurred image and produces an deblurred image and the other network is responsible for discriminating between original image and deblurred image. For training images are deblurred artificially using different filters. GITHUB-LINK: https://github.com/rnsandeep/deblur\_gan NETWORKS USED: Inception-v3, GAN.

**LIBRARIES:** PYTORCH, TORCHVISION.

**ACHEIVEMENTS:**

* Microsoft Travel Grant for traveling to USA for Presenting our paper in CVPR 2014, OHIO, USA.
* Full Graduate fellowship for doing masters at IIIT Hyderabad.