Janmesh Ukey

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EDUCATION

Master of Science, Computer Science　　　　　　　　　　　　　　　　Aug 2022 – July 2024
University of Utah　　　　　　　　　　　　　　　　　　　　　　　*Salt Lake City, UT*
Thesis: Towards a fully automated framework for statistical shape modelling from images.

Bachelor of Technology, Engineering Physics　　　　　　　　　　　　Aug 2015 – May 2019
Indian Institute of Technology, Roorkee　　　　　　　　　　　　　　　　*Roorkee, India*

RESEARCH EXPERIENCE

Research Engineer　　　　　　　　　　　　　　　　　　　　　　Sep 2024 - Current
NERD Lab, University of Utah

- Working on 3D human pose estimation and tracking from video.
- Developing machine learning models for ARAT score measurement using accelerometer and IMU data.

Graduate Research Assistant　　　　　　　　　　　　　　　　　　Aug 2022 - July 2024
Scientific Computing and Imaging Institute, University of Utah

- Developed a deep learning architecture for Multi-Anatomy Statistical Shape Modelling from Medical Images (MRI/CT), distinguished as the first to offer correspondences in image space. Published the findings at ShapeMI, MICCAI.
- Conducted a comprehensive study to explore the effectiveness of semi-supervised, self-supervised, and unsupervised segmentation methods, alongside foundational segmentation models, for Statistical Shape Modeling.
- Designed a deep learning framework for Anatomy Localization and Statistical Shape Modelling from 3D Medical Images, achieving state of art and increasing Shape Modelling accuracy. Published the findings at MIDL.

Research Assistant　　　　　　　　　　　　　　　　　　　　　Jun 2020 – Jan 2022
Multimodal Perception Lab, IIIT Bangalore

- Constructed an image to image translation model based on pix2pixHD, using Pose Heatmap as intermediate pose representation for sign transfer (pose) between different subjects. Published the findings at ICVGIP.
- Formulated an approach to enhance hand outputs by introducing a dedicated hand generator, considering the motion continuity, and incorporating a refinement network to optimize structural integrity.

WORK EXPERIENCE

Machine Learning Engineer　　　　　　　　　　　　　　　　　　Oct 2021 – Aug 2022
Reliance Jio Infocomm

- Developed an iterative optimization method for estimating 3D body shape and pose from a Multi-View RGB setup. Enhanced body shape estimates by 30% using differential rendering.
- Built scene interaction models in Unity with TensorFlow, enabling agents to perform realistic human motions based on control signals.
- Automated distributed processing synthetic 3D data generation with Blender's Python API, enhancing dataset scalability by 40%.

Software Engineer - Computer Vision　　　　　　　　　　　　　　　Jun 2019 – Sep 2021
AjnaLens

- Crafted a cross-platform Unity SDK featuring robust SLAM integration, enhanced visual rendering, and efficient input handling for seamless development on the AjnaLens AR Headset.
- Created a mesh-based reconstruction module using depth data for spatial mapping. Boosted spatial understanding with semantic segmentation models for scene comprehension.
- Enhanced AR Headset functionality by developing a monocular RGB-based 6D object pose estimation system for real-time object tracking.

PUBLICATIONS

- Janmesh Ukey, Tushar Kataria, and Shireen Y. Elhabian. MASSM: An end-to-end deep learning framework for multi-anatomy statistical shape modeling directly from images, *arXiv preprint arXiv:2403.11008* (Accepted - ShapeMI, MICCAI)
- J. Ukey and S. Elhabian. Localization-aware deep learning framework for statistical shape modeling directly from images. In *Medical Imaging with Deep Learning*, 2023
- Krishna S*, Janmesh U*, Jayagopi D. "GAN Based Indian Sign Language Synthesis",12th *Indian Conference on Computer Vision, Graphics and Image Processing* (ICVGIP), Jodhpur, India, December 2021.
- J. S. K. Patibandla, S. K. Adhikary and J. Ukey, "Augmented Reality for Assistive Maintenance and Real-Time Failure Analysis in Industries," 2020 2nd *International Conference on Innovative Mechanisms for Industry Applications* (ICIMIA), Bangalore, India, 2020, pp. 149 - 153.

TEACHING EXPERIENCE

Fundamental of Text Processing Spring 2024

Department of Biomedical Informatics, University of Utah

- Assisted professor in leading discussion sections, designing assignments and grading class participation for the graduate level course on Natural Language Processing in Biomedical domain.

SKILLS

Python	C#	Kotlin	TensorFlow	Git	Matlab	CSS
C++	Java	SQL	OpenCV	Unity	AWS	
C	Javascript	PyTorch	Docker	Blender	HTML	

INTERNSHIPS

Student Assistant Summer 2018

Inter-University Centre for Astronomy and Astrophysics, Pune

- ASTROSAT/UVIT Grating Spectroscopy for HZ4(White Dwarf) and NGC-40 Planetary Nebula.
- Formulated a calibration model from UVIT (Ultra Violet Imaging Telescope) Satellite Image data for calculating effective area for Flux Calibration.

PROJECTS

Scene Text Recognition *Fall 2023*

- **Aim** - Developing a Deep Learning framework to extract text from images.
- Designed a neural network architecture that utilizes a Vision Transformer as an encoder and LSTM as a decoder for scene text recognition.
- Designed a neural network architecture that utilizes a Vision Transformer as encoder and a pretrained language model (BERT-Mini) as decoder for scene text recognition.

Road Object Detection *Spring 2023*

- **Aim** - Implement Road Object Detection for Autonomous Vehicle Navigation.
- Developed a two-stage Faster R-CNN-based neural network architecture for object detection and evaluated the performance across different backbones.
- Developed a one-stage Retina-Net based neural network architecture for object detection and evaluated the performance across different backbones.

High Performance Computing *Jan 2019 - April 2019*

- **Aim** - Explore how parallel computation can help in solving complex physics problems.
- Designed an algorithm based on Nilsson Model, to calculate single energies of a particle as a function of deformation.
- Used OpenMPI and python parallelisation modules to explore various ways of computing in parallel and decrease the computational time of the complex Nilsson Model problem.
- Investigated the performance of different parallel algorithms for Nilsson Model problem on different machines (Intel Xeon 64 cores, Intel i9 8 cores and Intel i5 4 cores).

Geant4 BC501A Neutron Scintillator Stimulation *Summer 2017*

- **Aim** - Modelling of BC501A Neutron Scintillator using Geant4.
- Performed simulation for various fluxes of high energy neutrons in a cylinder of diameter 6 cm and height 6 cm filled with BC501A liquid for final results and water for trial and calculated neutron energy distribution from measured responses.
- The neutron energy distribution calculated was checked to be in sync with the experimental results.