Chinmaya **DEVARAJ**

Ph.D. Graduate | Computer Vision | University of Maryland College Park

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I am a **Ph.D. candidate** in Electrical and Computer Engineering at the University of Maryland College Park, advised by **Prof. Yiannis Aloimonos and Dr. Cornelia Fermuller**. My broad field of research is **Computer vision and Generative AI**. I have contributed to pioneering projects in **text-image generation, video-text models, and zero-shot action recognition,** holding a patent and multiple publications. My research topics include **Multimodal language modeling, video representation learning, vision-language models, LLMs, and action recognition.** I am seeking full-time roles in the industry to leverage my expertise for transformative advancements in AI and technology.

EDUCATION

Present	**Ph.D.**	Electrical and Computer Engineering, University of Maryland, College Park
2022	**MS**	Electrical and Computer Engineering, University of Maryland, College Park
2015	**B.Tech.**	Electrical Engineering, National Institute of Technology, Karnataka, Surathkal India

PUBLICATIONS

1. **Chinmaya Devaraj**, Cornelia Fermuller, Yiannis Aloimonos. Diving DeepWith Video-Text Models in Representing Motion . Accepted **ACL Findings 2024**. **Link.**
2. **Chinmaya Devaraj**, Cornelia Fermuller, Yiannis Aloimonos. Incorporating Visual Grounding In GCN For Zero-shot Learning Of Human Object Interaction Actions. **CVPRW 2023** **Link.**
3. Eadom Dessalene*,**Chinmaya Devaraj***, Michael Maynord*, Cornelia Fermuller, and Yiannis Aloimonos. Forecasting action through contact representations from first person video. **TPAMI 2021** (* Indicates equal contribution) **Link.**.
4. **Chinmaya Devaraj**, Cornelia Fermuller, Yiannis Aloimonos. Introducing Meta-Verbs into Graph Convolutional Networks for Zero-shot Action Recognition. **CVPRW** 2021
5. Eadom Dessalene, Michael Maynord, **Chinmaya Devaraj**, Cornelia Fermuller, and Yiannis Aloimonos. "Egocentric object manipulation graphs." arXiv preprint. Link.
6. **Chinmaya Devaraj**, Aritra Chowdhury, Arpit Jain, James R. Kubricht, Peter Tu, and Alberto Santamaria-Pang. From Symbols to Signals : Symbolic Variational Autoencoders.**ICASSP 2020.** **Link**.
7. James Kubricht, Alberto Santamaria-Pang, **Chinmaya Devaraj**, Aritra Chowdhury, and Peter Tu. Emergent Languages from Pretrained Embeddings Characterize Latent Concepts in Dynamic Imagery. International Journal of Semantic Computing . (2020) Link.
8. Alberto Santamaria-Pang, James R. Kubricht, **Chinmaya Devaraj**, Aritra Chowdhury, and Peter Tu. Towards semantic action analysis via emergent language. IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR) 2019. Link.
9. Chengxi Ye, **Chinmaya Devaraj**, Michael Maynord, Cornelia Fermüller, Yiannis Aloimonos. "Evenly Cascaded Convolutional Networks." The 1st International Workshop on Big Visual Dataset Construction, Management and Applications, IEEE BigData 2018. **Best Student Paper Award.** Link.

PATENTS

1. Alberto Santamaria-Pang, Peter Henry Tu, James KUBRICHT, Aritra Chowdhury, Arpit Jain, Chinmaya Devaraj. *System and methods for artificial intelligence explainability via symbolic generative modeling. US Patent 2021*

SKILLS

Deep Learning frameworks	Pytorch, TensorFlow, TFLearn, Keras
Languages	Python, C, MATLAB
Deep Learning Architectures	CNNs, RNNs, LSTMs, Transformers, VAE, GANs
Domain Skills :	Computer Vision, Machine Learning, Data collection, Multi-model Learning, Generative AI, Reinforcement Learning, Vision+Language Models, Natural Language Processing, Generative Pre-trained Transformers (GPT), Graph Neural Networks, Video Understanding, Representation learning, Video-text models, Motion understanding, Zero-shot recognition, Action Recognition, Action anticipation

PROFESSIONAL EXPERIENCE

Research intern
June-Aug 2019

GE Research | Computer Vision and Machine learning team, Niskayuna, NY

- Designed and evaluated text-guided image generation to understand emergent languages in videos and images.
- Developed symbolic variational autoencoder to reconstruct images from symbols.
- Developed domain adaption methods using symbolic variational autoencoder.

Emergent language | Variational Autoencoders | Text-Image Generation | AI generated Images | Explainable AI

Research intern
June-Aug 2017

Honda Research Institute , Mountain View, CA

- Designed and evaluated deep neural network to model driver's visual attention and driver's behavior information from driving data.
- Improved computation speed by 10X by designing efficient methods to process driving data

object segmentation | Visual attention | Efficient deep learning

Research Experience

Aug 2016
-Present

Ph.D. Researcher, Advisors : Prof. Yiannis Aloimonos and Dr Cornelia Fermuller, UMD, MD

- Developed framework for zero shot action recognition and transfer learning of actions across activity datasets using knowledge graphs and vision language models.
- Developed framework for representing motion in videos in video-text models.
- Developed Evenly Cascaded Neural networks an efficient neural network for image classification.
- Co-developed framework to anticipate future egocentric actions.
- Co-developed a novel CNN-LSTM architecture to perform multimodal fusion and hallucination of sensor data and video data.

Action recognition | Multimodal Learning | Vision-language models | LLMs | Finetuning

June
-Aug 2016

Visiting Student Researcher, Telluride Neromorphic Workshop, Colorado

- Developed algorithm that uses foreground, background information obtained from event-based signals of dynamic vision sensor (DVS) camera to segment objects in video.

Event based camera | video object segmentation

Selected Ph.D. Projects

MAVL : Using Moments in Actions in Vision Language Models.
Jan 2024- Current.

- Prompted off-the-shelf GPT-4 with instructional activity steps to generate finer steps describing the subactions and the characteristic motion involved in fine-grained actions.
- Developed method to perform zero-shot action recognition of fine-grained activities using video-text models.
- We validated our method on two fine-grained action datasets and showed that the network outperforms other baselines.

Leveraging Motoric Information for Recognizing Manipulation Actions.
Sept 2016- March 2017

- Developed an approach for visual recognition and temporal segmentation of fine-grained manipulation actions based on a recurrent neural network architecture.
- During training, a hallucination structure is learned from visual and motoric data, and this mirroring structure helps recognition during the testing phase when only visual data is present.
- We validated our method on two multimodal fine-grained action datasets, and showed that the network outperforms vision-only approaches.

Awards

1. Winner of EPIC-kitchens action anticipation challenge CVPR 2020
2. Selected among 8 teams globally at Amazon Simbot Challenge 2022 with an award amount of $250000
3. Received NSF Neuropac Fellowship for academic year 2023-2024 with award amount of $21000

Service and leadership

1. Serving as reviewer for major computer vision conferences CVPR[20,21,23], ICCV[21], NLP conferences NAACL[2024], and journals (CVIU, RA-L).
2. Founder of SKY at UMD club at UMD dedicated to promoting mental and physical well-being in UMD community. Impacted over 2000 students and faculty through breathwork and meditation programs.