

# Vinod K Kurmi, Ph.D.

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Experience in Computer Vision, Deep Learning, Machine Learning, Domain Adaptation, Multimodal Learning, Fair Learning and NLP. Currently working on Multimodal representation learning projects.

## Employment History

- May 2021 – present    **Post-Doc Research Fellow**, KU Leuven, Belgium  
Supervisor: Prof. Tinne Tuytelaars
- Aug 2020 – April 2021    **Post-Doc Research Fellow**, CVIT, IIIT Hyderabad, India  
Supervisor: Prof. C V Jawahar
- July 2019–Nov 2019    **Tutor**, Introduction to Electronics (Lab), IIT Kanpur
- July 2018–Nov 2018    **Tutor**, Introduction to Electronics (Lab), IIT Kanpur
- May 2014– June 2014    **Senior Student Research Associate**, Computer Vision Lab IIT Kanpur

## Education

- 2014 – 2020    **Ph.D., EE, Indian Institute of Technology Kanpur, India.**  
Thesis title: *Understanding Transfer Learning between Domains and Tasks*,  
"Outstanding Ph.D.Thesis Award" by IIT Kanpur, 2021  
Supervisors: Prof. Vinay P. Namboodiri and Prof. K S Venkatesh.
- 2012 – 2014    **M.Tech, EE, Indian Institute of Technology Kanpur, India.**  
Thesis title: *Human Hand Gesture Recognition from 3D Data*,  
Supervisor: Prof. K S Venkatesh.
- 2008 – 2012    **B.E., Electronics & Telecommunication, SGSITS Indore, India.**

## Skills

- Programming Languages    Python, Matlab, Lua, C++, C and  $\text{\LaTeX}$
- Deep Learning Frameworks    PyTorch, OpenCV, Torch, Theano, Keras, TensorFlow

## Publications

### Patents





- Patent-2015    **Vinod K Kurmi**, Garima Jain, KS Venkatesh, "A Human-Hand Detection System, Apparatus and a Method Thereof", India PO No.1678/DEL/2015.

### Book Chapters








- Elsevier 2021    Indu Joshi, Ayush Utkarsh, Riya Kothari, **Vinod K. Kurmi**, Antitza Dantcheva, Sumantra Dutta Roy, Prem Kalra, , "On Estimating Uncertainty of Fingerprint Enhancement Models", DIGITAL IMAGE ENHANCEMENT AND RECONSTRUCTION, Elsevier 2021 (Accepted with minor revision).

## Publications (continued)








### Journals

- Neurocomp- 2021  **Vinod K. Kurmi**, Venkatesh K Subramanian, Vinay P. Namboodiri, “Exploring Dropout Discriminator for Domain Adaptation”, *Neurocomputing*, 2021 [PDF][IF: 4.438]
- IMAVIS- 2021  Badri N. Patro, **Vinod K. Kurmi**, Sandeep Kumar, Vinay P. Namboodiri, “MUMC: Minimizing Uncertainty of Mixture of Cues”, *Image and Vision Computing*, 2021 [IF: 3.103]
- IMAVIS-2021  **Vinod K. Kurmi**, Venkatesh K Subramanian, Vinay P. Namboodiri, “Informative Discriminator for Domain Adaptation”, *Image and Vision Computing*, 2021 [PDF] [IF: 3.103]
- Neurocomp- 2020  Badri N. Patro, Dev Chauhan, **Vinod K. Kurmi**, Vinay P. Namboodiri, “Revisiting Paraphrase Question Generator using Pairwise Discriminator”, *Neurocomputing*, 2020. [PDF] [Code] [IF: 4.438].




### Conferences

- AAAI-2022  **Vinod K. Kurmi\***, Rishabh Sharma\*, Yash Vardhan Sharma\*, Vinay P Namboodiri “Gradient Based Activations for Accurate Bias-Free Learning”, *Proceedings of the AAAI Conference on Artificial Intelligence, (AAAI), Vancouver BC, Canada, 2022* (\* Equal contributions). [H5-Index: 157].
- WACV-2022  H. Tiwari, **Vinod K. Kurmi**, Venkatesh K Subramanian, Yong-Sheng Chen, “Occlusion Resistant Network for 3D Face Reconstruction”, *IEEE Winter Conference of Applications on Computer Vision (WACV), Waikoloa, 2022*. [H5-Index: 62].
- ICASSP-2021  **Vinod K. Kurmi**, Vipul Bajaj, Badri N. Patro, Venkatesh K Subramanian, Vinay P. Namboodiri, Preethi Jyothi, “Collaborative Learning to Generate Audio-Video Jointly”, *IEEE International Conference on Acoustics, Speech, and Signal Processing. (ICASSP), Virtual, 2021*. [PDF] [Code][H5-Index: 96].
- WACV-2021  **Vinod K. Kurmi**, Venkatesh K Subramanian, Vinay P. Namboodiri, “Domain Impression: A Source Data Free Domain Adaptation Method”, *IEEE Winter Conference of Applications on Computer Vision (WACV), Virtual, 2021*. [PDF] [Code][H5-Index: 62].
- WACV- 2021  **Vinod K. Kurmi**, Badri N. Patro, Venkatesh K Subramanian, Vinay P. Namboodiri, “Do not Forget to Attend to Uncertainty while Mitigating Catastrophic Forgetting”, *IEEE Winter Conference of Applications on Computer Vision (WACV), Virtual, 2021*. [PDF] [Code][H5-Index: 62].
- IJCNN-2021  Indu Joshi, Ayush Utkarsh, Riya Kothari, **Vinod K. Kurmi**, Antitza Dantcheva, Sumantra Dutta Roy, Prem Kalra, “Learning Noise-aware Preprocessing Of Fingerprints”, *International Joint Conference on Neural Networks (IJCNN), Virtual, 2021* [H5-Index: 57].
- IJCNN- 2021  Indu Joshi, Ayush Utkarsh, Riya Kothari, **Vinod K. Kurmi**, Antitza Dantcheva, Sumantra Dutta Roy, Prem Kalra, “On Learning Sensor-invariant Features For Fingerprint ROI Segmentation”, *International Joint Conference on Neural Networks (IJCNN), Virtual, 2021* [H5-Index: 57].

## Publications (continued)



- WACV-2020  Badri N. Patro, **Vinod K. Kurmi**, Sandeep K., Vinay P. Namboodiri, “Deep Bayesian Network for Visual Question Generation”, *IEEE Winter Conference of Applications on Computer Vision (WACV)*, Snowmass Village, USA, 2020. [PDF] [Code][H5-Index: 62].
- BMVC-2019  **Vinod K. Kurmi**, Vipul Bajaj, Venkatesh K Subramanian, Vinay P. Namboodiri, “Curriculum based Dropout Discriminator for Domain Adaptation”, *British Machine Vision Conference (BMVC)*, Cardiff, UK, 2019. [PDF] [Code] [H5-Index: 66].
- CVPR-2019  **Vinod K. Kurmi\***, Shanu Kumar\*, Vinay P. Namboodiri, “Attending to Discriminative Certainty for Domain Adaptation”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Long Beach, California, USA, 2019 (\* Equal contributions). [PDF] [Code][H5-Index: 356].
- IJCNN-2019  **Vinod K. Kurmi**, Vinay P. Namboodiri, “Looking back at Labels: A Class based Domain Adaptation Technique”, *International Joint Conference on Neural Networks (IJCNN)*, Budapest, Hungary, 2019 (Oral Presentation). [PDF] [Code][H5-Index: 57].
- EMNLP-2018  Badri N. Patro, Sandeep K., **Vinod K. Kurmi**, Vinay P. Namboodiri, “Multimodal Differential Network for Visual Question Generation”, *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, Brussels, Belgium, 2018. [PDF] [Code][H5-Index: 132].
- COLING-2018  Badri N. Patro\*, **Vinod K. Kurmi\***, Sandeep Kumar\*, Vinay P. Namboodiri, “Learning Semantic Sentence Embeddings using Pair-wise Discriminator”, *Proceedings of 27th International Conference on Computational Linguistics (COLING)*, Santa Fe, New Mexico, USA, 2018 (\* Equal contributions). [PDF] [Code][H5-Index: 64].
- WSCG-2015  **Vinod K Kurmi**, G. Jain, KS Venkatesh, “Robust Human Gesture Recognition form 3D Data” WSCG 2015, 23rd International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG), Czech Republic, 2015. [PDF].

## Workshops

- WACV-XAI-2021  Indu Joshi, Riya Kothari, Ayush Utkarsh, **Vinod K. Kurmi**, Antitza Dantcheva, Sumantra Dutta Roy, Prem Kalra, “Explainable Fingerprint ROI Segmentation Using Monte Carlo Dropout”, *Workshop on Explainable and Interpretable Artificial Intelligence for Biometrics at WACV 2021*. [H5-Index: 54]
- ICCV-CLVL-2019  Badri N. Patro\*, **Vinod K. Kurmi\***, Sandeep Kumar\*, Vinay P. Namboodiri, “Learning Semantic Sentence Embeddings using Pair-wise Discriminator”, **ICCV Workshop (CLVL)**, Seoul, South Korea, 2019. (4 page paper) (Spotlight) (\* Equal contributions) [H5-Index: 51].
- ICCV- CLVL-2019  Badri N. Patro, Sandeep Kumar, **Vinod K. Kurmi**, Vinay P. Namboodiri, “Multimodal Differential Network for Visual Question Generation”, **ICCV Workshop (CLVL)**, Seoul, South Korea, 2019. (4 page paper) (Spotlight) [H5-Index: 51].

## Publications (continued)

### Preprints

- arXiv preprint 2021     Shanu Kumar, **Vinod K Kurmi**, Praphul Singh, Vinay P Namboodiri, “Mitigating Uncertainty of Classifier for Unsupervised Domain Adaptation”, *arXiv:2107.00727*. [PDF].
- arXiv Preprint 2021     Blessen George, **Vinod K Kurmi**, Vinay P Namboodiri, “Prb-GAN: A Probabilistic Framework for GAN Modelling”, *arXiv:2107.38345*01.


### Travel Grants

- Dec 2019     Awarded **TCS** Travel Grant for NCVPRIPG 2019.
- July 2019     Awarded **Microsoft** Travel Grant for IJCNN 2019.
-  Awarded **EE, IIT Kanpur** Travel Grant for IJCNN 2019.
- June 2019     Awarded **Google** Travel Grant for CVPR 2019.
-  Awarded **Microsoft** Travel Grant for CVPR 2019.

### Awards and Achievements


- 2021     **Outstanding Ph.D.Thesis Award 2021** by IIT Kanpur
-  ICCV 2021 Doctoral Consortium
- 2020     **DAAD AI Post-Doc Net Fellow**
-  NeurIPS 2020 Financial Assistance Award
- 2019     **Qualcomm Innovation Fellowship** 2019 Finalists
- 2017     **Among top performers**, and awarded by cash prize at “Summer school of Machine Learning” at Centre for Visual Information Technology (CVIT) Hyderabad.
-  **Among top performers**, and awarded by cash prize at “Summer school of Deep Learning” at Centre for Visual Information Technology (CVIT) Hyderabad.
- 2015     **TCS Research Fellowship** Award for 4 years (2015-2019).
- 2014     Recipient of **MHRD** PhD Fellowship.
-  Qualified for **Junior Research Fellowship (JRF)** of CSIR -NET.
- 2012     Recipient of **MHRD** Post-Graduate Fellowship.

### PhD Research Work

- Jan 2014-June-2020     **Understanding Transfer Learning between Domains and Tasks**,  
*Prof. K S Venkatesh and Prof. Vinay P. Namboodiri*  
Analyzed and tackled the different problems of faced in domain adaptation. We proposed variety of techniques such as improved discriminator and considering distribution based adaptation. By obtaining uncertainty and through these localized adaptation has been proposed. In next work, we proposed a attention and uncertainty based models for task incremental learning. We tackled the domain adaptation problems without avail the source data.

## Masters Research Work


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- July 2013-June-2014        **Human Hand Gesture Recognition from 3D Data,**  
*Prof. K S Venkatesh*  
The objective was to develop efficient algorithms to detect hand gestures in varying light conditions, irrespective of background clutter. The hardware used was Kinect sensor from Microsoft. Human hand constellation identified from the 3D data to identify the hand. The proposed algorithm and system works in varying light conditions, background clutter and any human pose.






## Research Projects

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### Industrial Projects








- July 2013-June 2014        Gesture Recognition System of Smart TV (**Samsung-IITK collaboration Project**)

### Academic Projects

- 2015        Gaussian Process based Hallucination of Features for Object Classification (Machine Learning in Computer Vision)
-     Study of Clustering and Classification Technique for Analytical Datasets (Convex Optimization)
-     Indoor Positioning Using UWB-IR Signals in the Presence of Dense Multipath with Path Overlapping (Statistical Signal Processing)
- 2014        Cooperative MIMO Multicell Networks (Wireless Communications)
- 2012        GPS based Vehicle Tracking System (B.E. Project)

## Teaching Assistantship





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- July 2017-Nov 2017        **Teaching Assistant**, Signal, Systems and Networks
- Jan 2017- May 2017        **Teaching Assistant**, Introduction to Electronics
- July 2016- Nov 2016        **Teaching Assistant**, Introduction to Electronics
- Jan 2016- May 2016        **Teaching Assistant**, Department Post-Graduation Committee
- July 2015- Nov 2016        **Teaching Assistant**, Computer Vision Lab
- Jan 2015- May 2015        **Teaching Assistant**, Department Post-Graduation Committee
- July 2012- May 2014        **Teaching Assistant**, Department Post-Graduation Committee

## Miscellaneous Experience

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### Professional Services

- 2019-2021        Served as a reviewer for IEEE Transactions on Neural Networks and Learning Systems (TNNS), Pattern Recognition (PR), and IEEE Transactions on Image Processing (TIP) .
- 2018-2021        Served as a reviewer for conferences AAAI, ICLR, CVPR, BMVC, ICASSP, ECML-PKDD, WACV, ICVGIP, NCVPRIPG, ICME and Workshop on ML4H at NeurIPS.
- 2019        Member of International Neural Network Society (INNS)
- 2019-2021        Member of Computer Vision Foundation (CVF)

## Miscellaneous Experience (continued)

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### Talks/Seminars

- 2019
  - Delivered oral presentation on 'Attending to Discriminative Certainty for Domain Adaptation' in **NCVPRIPG** at Hubli (India).
  - Delivered oral presentation on 'Looking back at Labels: A Class based Domain Adaptation Technique' in **IJCNN** at Budapest (Hungary).
  - Presented poster on 'Attending to Discriminative Certainty for Domain Adaptation' in **CVPR** at Long Beach, CA (USA).
  - Delivered talks on '**Bayesian Models for Domain Adaptation**' in 'QINF' at Qualcomm, Bangalore (India).
  - Delivered talks on '**Basics of Python and PyTorch**' in "ITEC course on AI" at IIT Kanpur (India).
- 2018
  - Presented poster on 'Learning Semantic Sentence Embeddings using Pair-wise Discriminator' in **Amazon Research Day** at Bangalore (India).
  - Delivered talks on 'Computer Vision and Image Processing' in "TEQIP training session" at IIT Kanpur (India).
  - Delivered talks on '2D and 3D Vision for Robotics' in "TEQIP short term course on Introduction to Robotics" at IIT Kanpur (India).
- 2017
  - Presented poster on 'Domain Adaptation on Computer Vision' at Electrical Engineering **IIT Kanpur Research Day**.
  - Delivered State-of-the-Art seminar on 'Domain Adaptation and Modality Hallucination' at Electrical Engineering **IIT Kanpur**.

### Workshops and Conferences Attended

- 2020
  - Participated in **DAAD AI Post-Doc Net Tour**, Virtual.
  - Attended **NeurIPS 2020**, Virtual.
- 2019
  - Participated in **NCVPRIPG 2019** at Hubli, India.
  - Participated in **IJCNN 2019** at Budapest, Hungary.
  - Participated in **CVPR 2019** at Long Beach, USA.
  - Participated in **Amazon Research Day 2019** at Bangalore sponsored by Amazon, India.
- 2018
  - Participated in **Amazon Research Day 2018** at Bangalore sponsored by Amazon, India.
- 2017
  - Attended Summer School on **Advance Computer Vision using Deep learning** at IIIT Hyderabad, India.
  - Attended summer School on Machine Learning at IIIT Hyderabad
- 2016
  - Attended Mysore Park Workshop on **Vision, Language and AI** at VLAI 2016, Mysore, India.
  - Attended Summer School on Deep Learning at IIIT Hyderabad, India.

## References

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Available on Request