

# Deepak Kumar

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## Education

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- **University of Massachusetts, Dartmouth** Dartmouth, MA  
*Ph.D. in Engineering and Applied Science* *Aug. 2018 - Dec. 2021*
  - Department of Computer and Information Science (Full Scholarship)
- **University of Massachusetts, Dartmouth** Dartmouth, MA  
*M.S in Data Science* *Jan. 2016 - Aug. 2018*
  - Program of Data Science
- **Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology** Karachi, Pakistan  
*B.S in Computer Science* *Aug. 2009 - June 2013*
  - Department of Computer Science (Full Scholarship)

## Research Interest

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- **Computer Vision:** Cross-View, Multi-View & Multi-Modality Action Recognition and Prediction
- **Machine Learning:** Deep Learning, Transfer Learning, Graph Attention, Knowledge Distillation, Adversarial Learning

## Experience

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- **MIND Lab, UMass Dartmouth** Dartmouth, MA  
*Graduate Research Assistant, Ph.D. Supervisor: Dr. Ming Shao* *Sept. 2016 - Present*
  - **Collaborative Knowledge Distillation for Incomplete Multi-view Action Prediction (Image and Vision Computing - Elsevier):** A corruption pattern bank based collaborative knowledge distillation method to predict human actions with missing information under multi-view setting.
  - **Finding Achilles' Heel: Adversarial Attack on Multi-modal Action Recognition (ACM-MM 2020):** Identifying the vulnerable components of multi-modality action recognition models and gauging robustness against adversarial attacks.
  - **Cross-View Action Recognition via Joint Dictionary Transfer Learning (Masters Thesis):** Feature learning using joint dictionary and transfer learning to improve the cross-view action recognition performance.
  - **Cross-Database Mammographic Image Analysis through Unsupervised Domain Adaptation (BigData 2017):** Improved the classification accuracy of unlabeled target mammogram image dataset by using different transfer learning methods to address the issue of fewer training data on target image dataset.
- **Philips Research North America** Cambridge, MA  
*Research and Development Intern, Ultrasound Applications, UII, Mentor: Balasundar Raju* *May 2020 - Aug. 2020*
  - A lightweight network was developed by compressing the larger network through Knowledge distillation to implement on embedded devices for the lung consolidation classification on ultrasound images.
- **Philips Research North America** Cambridge, MA  
*Research Intern at Ultrasound Imaging and Interventions, Mentor: Balasundar Raju* *May 2019 - Aug. 2019*
  - Developed an automated AI based method for ultrasound image quantification
- **EDUENRICH** Karachi, Pakistan  
*Data Analyst, Mentor: Tauseef Raza* *Dec. 2013 - Dec. 2015*
  - Designed and developed databases to collect data
  - Wrote complex SQL queries using complex joins, grouping, aggregation, nested sub-queries, etc
  - Performed statistical analysis and developed recommendations using R and Tableau. Worked closely with the project managers and analysts

## Teaching Experience

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- **Guest Lecturer** UMass Dartmouth  
*Department of Computer and Information Science* *Fall 2019*
  - **CIS 530 - Advanced Data Mining:** Assessed different data mining models and discussed the potential strategies to guide student in their projects

## Publications

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1. **D. Kumar**, C. Kumar and M. Shao. Collaborative Knowledge Distillation for Incomplete Multi-view Action Prediction in Image and Vision Computing, January 2021
2. **D. Kumar**, C. Kumar, CW. Seah, S. Xia, and M. Shao. Finding Achilles' Heel: Adversarial Attack on Multi-modal Action Recognition. In Proceedings of the 28th ACM International Conference on Multimedia (MM '20), October 12–16, 2020, Seattle, WA, USA
3. **D. Kumar**, C. Kumar and M. Shao. Cross-database Mammographic Image Analysis through Unsupervised Domain Adaptation in 2017 IEEE International Conference on Big Data

## Technical Skills

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**Languages** Python, Matlab, R, C/C++, Javascript, D3

**Deep Learning Tools** Keras, TensorFlow, PyTorch, Caffe

**Data Tools & Libraries** Tableau, Numpy, Pandas, NLTK

**Machine Learning** Classification, Regression, Feature Engineering, Transfer Learning

**Other Tools** L<sup>A</sup>T<sub>E</sub>X, Git

## Talk

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- Cross-view Action Recognition via Joint Dictionary Transfer Learning, 2018 New England Computer Vision Workshop, Boston, MA (Nov. 2018)
- Multi-View Action Recognition through Deep Learning, 2018 Three Minute Thesis Competition, Dartmouth, MA (April 2018)
- Cross-database Mammographic Image Analysis through Unsupervised Domain Adaptation, 2017 New England Computer Vision Workshop, Boston, MA (Nov. 2017)

## Honors and Awards

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- Received UMass Dartmouth Graduate Student Travel Grant to attend 2017 IEEE Big Data Conference
- I have been selected for feature stories of MS in Data Science of UMass Dartmouth

## Professional Services

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**Reviewer:** Journal of Electronic Imaging (JEI), IEEE Computational Intelligence Magazine, International Conference on Data Mining (ICDM), Conference on Information and Knowledge Management (CIKM), IEEE Conference on Big Data (IEEE BigData), European Conference on Artificial Intelligence, Conference on Computer Vision and Pattern Recognition (CVPR)

**Program Committee:** Association for Advancement of Artificial Intelligence (AAAI)