# Divyansh Aggarwal

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## Research Interests

**Face Recognition, Pattern Recognition, Computer Vision, Federated Learning, Image Translation/Manipulation, Image Generation**

## Education

- **MS in Computer Science and Engineering** — **Michigan State University (MSU), USA**
  *Advisor: Dr. Anil K. Jain, GPA: 3.94/4.0* — *2019 – Present (Expected August 2021)*

- **B.Tech. in Computer Science and Engineering** — **Indian Institute of Technology Jodhpur, India**
  *GPA: 9.53/10.0* ***(Department Rank - 1)*** — *2015 – 2019*

## Publications

1. **Divyansh Aggarwal**, Jiayu Zhou and Anil K. Jain, "FedFace: Collaborative Learning of Face Recognition Model", **IEEE International Joint Conference on Biometrics (IJCB), 2021**
2. Yichun Shi, **Divyansh Aggarwal** and Anil K. Jain, "Lifting 2D StyleGAN for 3D-Aware Face Generation", **IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021**
3. Debayan Deb, **Divyansh Aggarwal** and Anil K. Jain, "Identifying Missing Children: Face Age-Progression via Deep Feature Aging", **IEEE International Conference on Pattern Recognition (ICPR), 2020**
4. **Divyansh Aggarwal**, Elchin Valiyev, Fadime Sener and Angela Yao, "Learning Style Compatibility for Furniture", **German Conference on Pattern Recognition (GCPR), 2018**
5. Daksh Thapar, Aditya Nigam, **Divyansh Aggarwal** and Punjal Agarwal, "VGR-Net: A View Invariant Gait Recognition Network", **IEEE International Conference on Identity, Security and Behavior Analysis (ISBA), 2018**
6. Gaurav Jaswal, Ravinder Nath, **Divyansh Aggarwal** and Aditya Nigam, "FKQNet: A Biometrie Sample Quality Estimation Network Using Transfer Learning", **IEEE International Conference on Image Information Processing (ICIIP), 2017**

## Experience

- **Graduate Research Assistant** — **Pattern Recognition and Image Processing (PRIP) Lab, MSU**
  *Advisor: Dr. Anil K. Jain* — *Aug 2019 – May 2021*

  Worked on improving Face Recognition performance under aging, generating realistic 3D faces from 2D in the wild face images and developing a privacy preserving collaborative training framework for face recognition models

- **Research Intern** — **Rheinische Friedrich-Wilhelms-Universität Bonn, Germany**
  *Advisor: Dr. Angela Yao* — *May 2018 – July 2018*

  Worked on learning stylistic compatibility between furniture images and developing visual textual based embedding networks that can answer retrieval queries based on both images and text

- **Research Intern** — **Indian Institute of Technology Mandi, India**
  *Advisor: Dr. Aditya Nigam* — *May 2017 – July 2017*

  Worked on improving the performance of gait recognition under multi-view setting, developing an end to end framework for estimating the quality of knuckle images as well as other applications of computer vision in biometrics

## Skills

**Python, C++, Tensorflow, Keras, PyTorch, OpenCV, Sklearn, Numpy, Deep Learning, Machine Learning, Pattern Recognition, Matlab, Latex, Technical Writing, SQL (MySQL and sqlite)**

## Selected Projects

- **FedFace: Collaborative Learning of Face Recognition Model**
  *PRIP Lab, Michigan State University* *December 2020 – April 2021*
  - Developed FedFace, a federated learning framework for training face recognition models in a collaborative and privacy preserving manner to address the growing legal restrictions in accessing and sharing face datasets.
  - Our experiments show that FedFace can utilize face images available on $1,000$ mobile devices to enhance the performance of a pre-trained face recognition model while ensuring the privacy of the training face images.

- **Lifting 2D StyleGAN for 3D-Aware Face Generation**
  *PRIP Lab, Michigan State University* *May 2020 – November 2020*
  - Developed a self-supervised framework called LiftedGAN for disentangling the latent space of pre-trained StyleGAN into texture, shape, lighting and viewpoint and using these 3D components to render synthetic face images.
  - LiftedGAN is able to output both the 3D shape and texture while allowing explicit pose and lighting control over the generated face images from just a single 2D face image.

- **Identifying Missing Children: Face Age-Progression via Deep Feature Aging**
  *PRIP Lab, Michigan State University* *August 2019 – April 2020*
  - Developed a feature aging module that can age-progress deep face features output by a pre-trained face matcher to improve the recognition accuracy of age-separated child face images to facilitate identifying young children who are possible victims of child trafficking or abduction.
  - Moreover, we proposed a generator that synthesizes realistic age-progressed face images and can enhance the cross-age recognition accuracy of any commodity face matcher.

- **Learning Style Compatibility for Furniture**
  *Rheinische Friedrich-Wilhelms-Universität Bonn, Germany* *May 2018 – July 2018*
  - Collected a first of its kind large scale dataset of $90,000$ Furniture images along with their annotations about color, material, style etc. to facilitate research in furniture recommendation.
  - Achieved state of the art performance on learning stylistic compatibility between these furniture images and developed visual-text based embedding models which can answer retrieval queries based on both images and text.

- **VGR-Net: A View Invariant Gait Recognition Network**
  *Indian Institute of Technology Mandi* *June 2017 – July 2017*
  - Developed a two-step hierarchical 3-D Convolutional Neural Network for recognition of gait videos using only the silhouettes of the captured frames and obtained state-of-the-art results on the publicly available CASIA-B dataset.

## Achievements

- Received the **President's Gold Medal award** for best academic performance among all B.Tech. graduates, IIT Jodhpur, 2019
- Received the **DAAD WISE scholarship** to pursue research internship in Germany, 2018.
- Received **Academic Distinction Awards** for Sessions 2015-2016 and 2016-2017 for best academic performance in the department, Computer Science and Engineering, IIT Jodhpur
- Successfully **cleared KVPY examination**, 2015
- Among the top 300 students in the country to **successfully clear the National Standard Examination of Physics (NSEP)**, 2015

## Coursework

Computer Vision, Computational Foundations of AI and ML, Pattern Recognition and Analysis, Machine Learning, Design and Theory of Algorithms, Theory of Probability and Statistics, Distributed Systems, Database Systems*, Deep Learning, Artificial Intelligence