Rafia Rahim

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Education

- Doctoral Student (Computer Science) | Eberhard Karls University of Tübingen, Germany | 2019 – 2023 (expected)
- Master of Science (Computer Science) | National University of Computer and Emerging Sciences, Islamabad | 2017 | **CGPA 3.90 / 4.00 (Ranked 1st / 50)**
- Bachelor of Science (Computer Science) | National University of Computer and Emerging Sciences, Islamabad | 2014 | **CGPA 3.82 / 4.00 (Silver Medalist, Ranked 2nd / 300)**

Publications and Research Activities

- **Separable Convolutions For Optimizing 3D Stereo Networks – IEEE ICIP 2021**
  In this work we present an in-depth cost analysis of major building blocks of state of the art 3D stereo networks and design and propose a set of separable 3D convolutions for stereo networks. (Link for paper & code)

- **MobileStereoNet: Towards Lightweight Deep Networks for Stereo Matching – IEEE WACV 2022**
  In this work we propose to replace the feature extraction backbone in state of the art stereo methods with light variants for better latency. (Link for paper & code)

- **Improving Super-Resolution Methods via Incremental Residual Learning (IRL) – IEEE ICIP 2019**
  IRL is a new learning setup for image-transfer networks that improves the performance of existing state of the art super-resolution networks (Link)

- **NTIRE 2018 Challenge on Single Image Super-Resolution: Methods and Results – IEEE CVPRW 2018**
  Our submission to the NTIRE 2018 challenge. In this work we proposed a dense network based architecture for super-resolution (Link).

- **End-to-End Trained CNN Encoder-Decoder Networks for Image Steganography – ECCV Workshop 2018**
  A deep learning based generic encoder-decoder network architecture for image steganography. The network is trained in an end to end manner on ImageNet dataset for automatic learning of image in image embedding for steganography. (Link)

- **Secure and Fault-tolerant Distributed Location Management for 5G Wireless Networks – IEEE Journal Access 2018**
  A distributed hash table based algorithm for secure and fault tolerant location management of cellular networks | IEEE Access 2018.

- **Densely Connected Networks for Image Super Resolution – Master Thesis 2017**
  A densely connected network architecture optimized using perceptual similarities to evaluate the impact of perceptual optimization and overcome the problems of redundant feature maps learning for image super resolution tasks. Research paper is under preparation (Link)

Awards & Acknowledgements

- **Turnitin Berkley Scholarship**
  A scholarship to participate in Full Stack Deep Learning Bootcamp, Berkeley, November 2019.

- **Travel Grants for Presenting my work**
  I have acquired multiple travel grants for presenting my work at workshops held at prestigious conferences. Specifically:
  - Women in Machine Learning Travel Grant for Presenting Poster at Neural Information Processing Conference in 2018 at Montreal, Canada.
  - Women in Computer Vision Travel Grant for Presenting Poster at European Conference on Computer Vision in 2018 at Munich, Germany.
  - Women in Machine Learning Travel Grant for Presenting Poster at Neural Information Processing Conference in 2017 Long Beach, CA, USA.
  - Women in Computer Vision Travel Grant for Presenting Poster at Computer Vision and Pattern Recognition in 2017 at Hawaii, USA.

- **Gold Medals**
  Master of Science 2017 | National University of Computer and Emerging Sciences | Islamabad
  Spring 2013 & Spring 2014 | National University of Computer and Emerging Sciences | Islamabad

- **Silver Medal**
  BS(CS) 2014 | National University of Computer and Emerging Sciences | Islamabad (Batch 2010): http://nu.edu.pk/Campus/Islamabad/MedalHolders

- **Shaheen Fellowship Scheme | Merit Scholarship For Bachelor Studies**
  Fall 2011 – Fall 2014 | BS(CS)

- **Induction in Dean's List of Honor**
  Fall 2010 – Spring 2014 | BS(CS) | http://nu.edu.pk/Campus/Islamabad/DeanLists

Research and Teaching Experience

- **June 2019 – To Date**
  Research Assistant | Kognitive Systeme Group | Tübingen, Germany

I am working on an industrial funded project for building deep learning algorithms for stereo vision. My main goal is to upgrade the legacy stereo vision algorithm (currently used by industrial partners) with a more performant deep learning method. Since this algorithm will be deployed on a targeted hardware thus it has stringent memory and real run-time constraints as well. To this end, I am following two path strategies, i.e., on one hand I am building a deep stereo vision algorithm with performance and speed constraints from scratch while on the other hand I am exploring methods for optimizing current state of the art deep stereo vision algorithms. At Kognitive Systeme, I am also part of bi-weekly Neural Network reading group.

In addition to research I also have teaching responsibilities. In the last two years I have shared teaching responsibilities for the following courses: Artificial Intelligence, Introduction to Neural Networks, Current Topics in Deep Neural Networks.

- **February 2019 – June 2019**

  Research Assistant | Werner Siemens Imaging Center | Tübingen, Germany

  During my stay at Werner Siemens Imaging Center I explored deep learning methods for medical imaging. Specifically, I worked on magnetic resonance imaging (MRI) and positron emission tomography (PET) imaging datasets and explored deep learning methods for classification and segmentation of brain tumor images.

- **January 2018 – January 2019**

  Lecturer | National University of Computer and Emerging Sciences | Islamabad

  My responsibilities included: (i) curriculum planning and designing of courses; (ii) preparation and delivery of complete course material to bachelor level students; and (iii) supervision of undergraduate projects.

- **April 2015 – June 2018**

  Research Assistant | Recognition Vision and Learning (ReVeaL) Lab | Islamabad

  My responsibilities included exploring, implementing and training cutting edge deep learning algorithms for computer vision and applying them to solve real life problems. In addition to this I was helping fellow members to build data science expertise and conducting research group reading sessions.

- **September 2014 – December 2017**

  Instructor | National University of Computer and Emerging Sciences | Islamabad

  My responsibilities included preparing, conducting and evaluating labs of programming related subjects and taking classes sometimes. I conducted the following courses: Introduction to Computing (Python, C++), Computer Programming (C++), Data Structures (C++), Design and Analysis of Algorithms and Computer Networks (C++).

Tutorials and Bootcamps

- **Full Stack Deep Learning BootCamp | Attendee | 16 – 17th November 2019**

  It's a two-day weekend program to get familiar with full "stack" development of deep learning systems. It teaches about project organization, data handling, debugging, training, managing experiments, and deploying the model to production, etc.

- **Python for Data Science Workshop | Organizer & Lecturer | August 2018**

  I organized a one-week data science workshop at National University of Computer and Emerging Sciences, Islamabad, Pakistan. I was responsible for managing all the logistics and conducting all the sessions as well as content preparation. This workshop included hands-on practice sessions on Python Basics, Scikit-learn, Matplotlib, Numpy, Pandas, BeautifulSoup and implementation of Decision Trees.

- **Data Science Boot Camp | Instructor | 9 – 13th January 2017**

  I was an instructor during a one-week workshop at National University of Computer and Emerging Sciences, Islamabad in collaboration with Higher Education Commission (HEC), Pakistan. My responsibilities included helping participants of the workshop in hands-on practice sessions (it included sessions on Scikit-learn, Matplotlib, Numpy, Pandas, BeautifulSoup, Implementation of classification pipelines and k-means) and testing different data science programs.

Tools and Technologies

Python, Python Data Science Stack (Numpy, Pandas, Scikit-learn, Matplotlib, etc.), C++, PyTorch, TensorFlow, Matlab, Linux, etc.

Skills

- I have a thorough understanding of machine learning algorithms with the ability of building them from scratch in pure Python, Numpy and C++. I also have extensive hands-on experiences of using open source libraries like Scikit-learn and TensorFlow.
- I have a good understanding of state of the art neural networks (CNN, RNN, LSTM) with ability to build them from scratch in Python, Numpy, Pytorch, TensorFlow and C++.
- Languages: English (Fluent), German (Basic), Urdu, Punjabi.

References

Available on request.