

Rabbia Hassan

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EDUCATION

MS Computer Science, School of Electrical Engineering and Computer Science (SEECS) National University of Sciences and Technology (NUST) - *Pakistan (September 2018 - January 2022)*

CPGA **3.85/4.00**, Specialization in Computer Vision, Deep Learning, Digital Image Processing, Design and Analysis of Algorithms, and Mathematical Methods.

B.E Computer System Engineering, College of Electrical and Mechanical Engineering (CEME) National University of Sciences and Technology (NUST) - *Pakistan (September 2011 - July 2015)*

CPGA **3.51/4.00**, secured NUST merit scholarship (four semesters).
Computer Science, Embedded Systems, Control Systems, Digital Signal Processing, Electronics, Digital System Design, Mathematics.

EXPERIENCE

Team Lead, Machine Vision & Intelligent Systems Lab, SEECS (NUST) [link](#) - *July 2024 – present – full time*

- Leading various cutting edge research projects including: -
 - Landmark-aware City-scale Aerial Point clouds-based Position Localization, A Dataset and a Methodology (manuscript in preparation).
 - A review article titled as “Impact of Continual Learning in computer vision applications: challenges, limitations and future scope” (Submitted to the professor for a final review).
 - Co-developed SARIMA-based forecasting models using the PRECON (Pakistan Residential Electricity Consumption) dataset for accurate short-term prediction of household electricity use. Further Enhanced the pipeline by clustering households based on consumption behaviors and physical characteristics, facilitating more effective energy planning in resource-constrained urban environments. ([Submitted to Global Energy Interconnection, currently under peer review](#)).
 - Contributed to TVFace2.0, the second version of the TVFace dataset (2.6M face images from long-form video content such as international news). Enhanced data quality by reducing cluster impurity and class count, and conducted extensive benchmarking using state-of-the-art face clustering and representation learning algorithms.

Visiting Researcher, Technical University of Munich Germany (TUM), Artificial Intelligence for Earth

Observation (AI4EO) Lab [link](#) - *September 2023 – January 2024 – on site*

- Designed and developed a preprocessing pipeline for ScanNet and S3DIS point cloud datasets, transforming their scattered raw form into clean tensors directly consumable by the neural network in the subsequent stage.
- Extended the pipeline to assign captions to local regions of the point cloud scenes by back projecting the images into the 3D point view Frustum.
- Deployed custom Dockerized environment (Ubuntu, NVIDIA drivers, Cuda Toolkit, PyTorch, Spconv) managed via [Portainer](#), ensuring reproducible, scalable execution of point cloud data pipelines and captioning models.

Research Associate, BioMedical Image, and Signal Analysis Lab, College of E&ME (NUST) [link](#) - *March 2023 – May 2023 – part time*

- Configured and installed operating system, NVIDIA drivers, Cuda Toolkit, and additional supporting libraries on the GPU server from scratch and made the server ready to be used for multiple users.
- Worked on processing of patch-wise dataset of non-melanoma skin cancer segmentation including Basal cell carcinoma (BCC), Squamous cell carcinoma (SCC), and intraepidermal carcinoma (IEC), using UNet architecture. Also explored virtual histological staining of Tissues using Generative models.

Lab Engineer, School of Electrical Engineering and Computer Science, NUST - *September 2015 – September 2024 – full time*

- Conducted labs of the following undergraduate courses of Software Engineering and BS Computer Science programs.

01

CS490: Advanced topics in Computing (LLMs)

02

CS405: Deep Learning

03

EE433: Digital Image Processing

04

CS370: Artificial Intelligence

05

CS473: Theory of Intelligent Systems

06

CS330: Operating Systems

07

CS212: Object Oriented Programming

08

CS220: Database Systems

09

CS112: Computer Programming

- Design complex Engineering problems, open ended labs, and evaluation mechanism in accordance with the content of theory.
 - Experienced in Implementation of CQI & QOBE methodologies, contributed as a member of the PEC accreditation team in both 2018 and 2022. Additionally, participated as a member of the organizing committee for the SEECs Open House.
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PROJECTS

- **Hierarchical synthetic population modeling using differentiable programming with Gumbel-SoftMax encoding (2025) -** *Python, Pytorch, Pandas, Matplotlib.*

Extended a differentiable programming neural network framework by adding new attributes (income, industry, means of transportation, economic activity, occupation, passport held, hours worked), and trained the model on extended census and survey data, producing a hierarchical synthetic population for agent-based simulations.

- **Residual learning with annularly convolutional neural networks for classification and segmentation of 3D point clouds** - *Python, TensorFlow, CUDA programming, C++, shell. OpenCV, sklearn, Point Cloud Library, MATLAB*

A 3D Residual Network with enhanced Point based Convolution for Classification and Segmentation of raw Point clouds: **MS-Thesis (2020-2021)** (Publication accepted by journal of Neurocomputing- Impact factor 6.5) [DOI: 10.1016/j.neucom.2023.01.026](https://doi.org/10.1016/j.neucom.2023.01.026)

- **ISchool: A cross platform Raspberry Pi based intelligent learning system, and an android app** - *Python, JAVA, Tesseract, Sphinx-3, C++*

The main features that we developed included, “to teach how to write” (leveraging OCR based on Tesseract) and “to teach how to read” (leveraging Speech Recognition based on Sphinx-3). We also incorporated fundamental level of AI algorithms to dynamically manage the lessons across various learning levels and learning areas in database. **Final Year Project (2014-2015).**

- **Comparative analysis of various Machine Learning and Deep Learning Algorithms on Fashion-MNIST dataset.** - *Python, PyTorch, sklearn, pandas, Matplotlib, NumPy, Google-Colab.*

Implemented several techniques including K-Nearest Neighbor classifier, Artificial Neural Network, Convolutional Neural Network, GoogLeNet, VGGNet, InceptionNet, Resnet and Principal Component Analysis. **Semester Project (Machine Learning 2019).**

- **Algorithmic Analysis of Skip-List's performance** - *Python, pandas, Seaborn, Matplotlib.*

Implementation of Skip-List from scratch and computing/logging its Running Time after 1000 insertions in successive iterations: **Semester Project (Advanced Algorithm Analysis, 2020).**

PUBLICATIONS

- Residual learning with annularly convolutional neural networks for classification and segmentation of 3D point clouds. (*first author*)
 - [Neurocomputing](https://doi.org/10.1016/j.neucom.2023.01.026), Published, 14 March 2023, Impact factor 6.5 <https://doi.org/10.1016/j.neucom.2023.01.026>
 - Modeling and Clustering of Residential Electricity Consumption for Short-Term Forecasting Using Seasonal Autoregressive Integrated Moving Average (SARIMA). (*second author*)
 - [Global Energy Interconnection](https://drive.google.com/file/d/1oGcuLAZDe9YYhM6bgtXlwchsNhILDGge/view), Submitted, 26 May 2025, Impact factor 1.9 <https://drive.google.com/file/d/1oGcuLAZDe9YYhM6bgtXlwchsNhILDGge/view>
 - Impact of Continual Learning in Computer Vision Applications: Challenges, Limitations and Future scope (A review) (*second author*)
 - [Pattern Recognition](#), manuscript ready, planned submission, July 2025.
 - Landmark-aware City-scale Aerial Point clouds-based Position Localization, A Pioneering Dataset and a Baseline Methodology. (*first author*)
 - Development complete, manuscript in preparation, planned submission July 2025.
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CERTIFICATIONS

- Generative AI for everyone ([certificate](#)) - *issued in April 2024, DeepLearning.AI, Coursera.*
- Generative AI with Large Language Models ([certificate](#)) - *issued in March 2024, DeepLearning.AI, Amazon Web Services (AWS), Coursera.*
- Mathematics for Machine Learning and Data Science ([certificate](#)) - *issued in October 2023, DeepLearning.AI, Coursera.*
- Probability for Machine Learning and Data Science ([certificate](#)) - *issued in October 2023, DeepLearning.AI, Coursera.*
- Calculus for Machine Learning and Data Science ([certificate](#)) - *issued in April 2023, DeepLearning.AI, Coursera.*
- Linear Algebra for Machine Learning and Data Science ([certificate](#)) - *issued in March 2023, DeepLearning.AI, Coursera.*
- Convolutional Neural Networks ([certificate](#)) - *issued in March 2023, DeepLearning.AI, Coursera.*
- Neural Networks and Deep Learning ([certificate](#)) - *issued in July 2023, DeepLearning.AI, Coursera.*

- Python Data Structures ([certificate](#)) – *issued in March 2023, DeepLearning.AI, Coursera.*
 - Programming for Everybody (Getting Started with Python) ([certificate](#)) – *issued in October 2022, DeepLearning.AI, Coursera.*
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SKILLS

- **Programming:** Python, C++, C, MATLAB, Shell scripting.
 - **Machine Learning:** PyTorch, TensorFlow, Keras
 - **Digital Image Processing:** OpenCV, Open3D, NumPy, sklearn, SciPy, Pillow, Matplotlib, Pandas.
 - **Development:** Docker Containers, NVIDIA Cuda Toolkit, GitHub.
 - **Operating Systems:** Ubuntu, Windows
 - **Tools:** Anaconda, Jupyter Notebook, Google-Colab, Visual Studio, PyCharm, Point Cloud Library, Portainer.
 - **Research:** LaTeX, Elicit, Zotero, Mendeley, Overleaf, Connected Papers.
 - **Soft skills:** Analytical and Mathematical skills, Research, Problem Solving, Teaching, Communication, Perseverance and Persistence.
 - **Languages:** Urdu, English, German.
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SOCIETIES & CLUBS

[Vice Chairperson](#) - IEEE Teach and Learn wing CEME NUST (2014/2015) | [Director Promotions](#) - ICT COMPPEC CEME NUST (2014) | [Deputy Director Promotions](#) - EME OLYMPIAD CEME NUST (2013) | [Event Organizer](#) – Technical Events, EME OLYMPIAD CEME NUST (2013) | [Lab Head](#) – ICT COMPPEC CEME NUST (2012) | [Event Organizer](#) – Robonoid workshop, TECH HUNT, and MINNUTE TO WINNIT COMPETITION CEME NUST (2012).
