

Azka Rehman

Linkedin: [linkedin/Azkarehman](https://www.linkedin.com/in/Azkarehman)

Github: github.com/Azkarehman

Personal-email: azkarehman2598@gmail.com

Official-email: azka@healthhub.kr

Current Residence: Seoul, South Korea



Education:

National University of Science and Technology (NUST)

2016-2020

Islamabad, Pakistan

BS in Electrical Engineering – CGPA:3.23/4.0

- **Featured Courses:** Artificial Intelligence, Computer Vision
- **Thesis:** Chest X-Ray abnormality detection using Deep learning

Language Certifications:

IELTS Academic (International English Language Testing System)

December 2021

British Council (International English Course)

Overall Score: 7.0

Research Publication:

Dual-Stage Deeply Supervised Attention-based Convolutional Neural Networks for Mandibular Canal Segmentation in CBCT Scans

Azka Rehman, Muhammad Usman, Rabeea Jawaid, Shi Sub Byon, Sung Hyun Kim, Byoung Dai Lee, Byung il Lee, Yeong Gil Shin

(In-Proceeding)

MEDS-Net: Self-Distilled Multi-Encoders Network with Bi-Direction Maximum Intensity projections for Lung Nodule Detection - [Github](#)

Azka Rehman, Muhammad Usman, Rabeea Jawaid, Shi Sub Byon, Sung Hyun Kim, Byoung Dai Lee, Byung il Lee, Yeong Gil Shin

(In-Proceeding)

Research and Development Experience:

AI Research Engineer, [Healthhub.kr](https://healthhub.kr), Seoul, South Korea

2021/01- Present

- **Research, experiment, and implement** the state-of-the-art (SOTA) ML/DL algorithms in the field of medical image analysis.
- **Development** of computer vision and deep learning based medical diagnosis solutions.
- Responsible for **integrating** the developed AI solutions with the [Healthhub DICOMLINK](#) and improving the pipeline
- Responsible for mentoring and training the fresh employees

Projects:

- Named Entity Recognition in Electronic Medical Records (NLP)– Python, Keras
 - The goal of the project is extraction of medicine names in patient discharge summaries as part of the Harvard Medical School n2c2 challenge.
 - We purposed a hybrid rule base LSTM model for medical name entity recognition. The architecture consisted of a CRF based BiLSTM neural network with rule based False positive reduction. To incorporate unknown words during inference we used FastText model.
 - Our hybrid model achieved f1 score of 92.499.
 - I contributed towards experimentation and architecture design

- **Mandibular canal segmentation in CBCT scans – Python, Keras**
 - Aims to segment the mandibular canal and efficiently visualize it to assist in surgical planning.
 - Conducted exploratory data analysis to identify scans with different HU values.
 - Researched and developed a model to localize the mandibular region.
 - Segmentation of mandibular canal using Residual UNet with multi-dimensional inputs
 - Developed different algorithms to generate two different dental arches (i.e. one for panorama view and one for parasagittal view generation).
 - Segmentation of teeth was also performed to report the minimum distance between mandibular canal and tooth is informed depending on the doctor's selected ROI.
- **KL Grade Classification using Knee Xray Images – Python, Keras**
 - To classify the Kellgren Lawrence Grade in Knee Xrays.
 - Utilized OAI
 - Conducted experiments on **convolutional neural networks** in **Keras** using distillation technique with hyperparameters tuning which resulted in improving accuracy around 7%.
 - Identified faulty data and handled class unbalancing problem which improved the performance by 3%
 - Successfully **developed and deployed** the KL Grade classification pipeline to HealthHub AI Marketplace.
- **Lung Nodule Classification based on Texture in 3D CT scans – Python, Scikit Learn**
 - Utilized LIDC-IDRI dataset
 - Malignancy of nodule depends on texture as well as other factors. In this project, the texture as well as malignancy of lung nodule was determined.
 - Statistically analyzed the HU values of different classes of nodule
 - Conducted research about the suitable Image processing technique which solves the problem of texture classification
 - Conducted research about multiple machine learning models to improve the performance of classification
- **Automatic Garment Size Estimation Using Image processing - Python, Keras**
 - Industrial Project in which target was to segment the cloth as well as get the measurements of cloths in physical measurements
 - Dataset provided by the factory involved in the project.
 - Built and improved light-weight Statistical Model for cloth segmentation which is used to determine Garment sizes with an accuracy of ~90-95%
 - Developed a technique to calculate and utilize the pixel spacing information to get measurements in physical length
 - Developed an API to integrate this solution at web end.
- **3D Segmentation of Human Spine - Python, Keras, Pytorch**
 - Conducted feasibility analysis of the project
 - Utilized Verse19 and Verse20 Public Datasets
 - Preprocessed the **3D image** data using **SimpleITK** to match the input requirements of the model
 - Implemented and trained several techniques mentioned in research papers on the subject ➤ Conducting experiments on **convolutional neural network** models in Keras with hyperparameters tuning to develop a pipeline for 3D segmentation of human spine
- **Integration of AI Modules: – Python, Flask**
 - Overcame the barrier at communication end by developing a **scalable worker (API)** pipeline to integrate the AI modules developed by AI team using Flask
 - Created and integrated SQL database with worker

- Worked closely with the AI team and communicated with Web team to integrate solutions such as mandibular canal segmentation, liver tumor segmentation, smart fit, lung nodule segmentation etc.
- **Developed RESTful APIs** to integrate HTRAMS AI module which reduced the manual work by ~70%
- **Python GUI - Python, Tkinter**
 - Development of python GUI for Hyundai Motors Clients to easily analyze the results of AI solutions
 - Developed a python GUI for internal testing of developed AI products.
- **Smartfit for Mammograms - Python, SITK**
 - Automatic alignment of different views of mammograms on [HPACS](#)
 - Utilized dataset from Healthhub Human Imaging Center database
 - Development of handcrafted image processing-based algorithm to classify different views such as CC, MLO etc
 - Development of algorithm to detect mammary papilla and align the views according to detected point.

Technical Skills:

Programming Languages: Python

Deep Learning: Keras, TensorFlow, PyTorch, ScikitLearn

Image Processing/ Medical Images: SimpleITK, OpenCV, Pydicom, Nibabel, Scikit-Image, Scipy

Leadership: Project Lead, Community Service Group Lead

Training and Certifications:

- Neural Networks and Deep learning by Andrew NG-Coursera
- Structuring Machine Learning Projects by Andrew NG-Coursera
- Image Processing with Keras in Python -DataCamp
- Advanced Deep Learning with Keras -DataCamp
- Introduction to Deep Learning with Pytorch -DataCamp
- Python for data science and machine learning bootcamp –Udemy
- NLP – Natural language processing with python – Udemy

Languages:

English | Urdu | Punjabi

Extracurricular activities: Volunteer work:

Led a 10-member team to facilitate underprivileged members of society, including laborers and daily-wage workers. Conducted Iftar drives, raised charity funds by participating in a Bake Sale. Visited Bagh Baan Old Age Home and Hassan Academy (Special Children school) and conducted an event to educate the students.

Hobbies: Badminton | Art work | Reading | Korean seasons