

RESEARCH INTEREST

My research interests lie primarily in working with deep learning methodologies for integrating and analyzing extensive collections of multi-modal medical images and object detection/tracking. I began my research career back in 2009 in security on smartphone platforms, specifically Android and was working on usage control and attestation of this immensely popular smartphone software stack. During graduation, I completed and delivered some machine learning-based applications. Subsequently, my interests are developing towards machine learning and deep learning models to aid medical image analysis for tumor detection. I have hands-on experience working with radiology images and deep learning techniques, Federated Learning, Adaptive Self-Learning, Anomaly Detection, feature extraction, reinforcement and supervised/unsupervised learning. My Ph.D. research also lies in medical imaging analysis using deep learning techniques and I plan to continue my post-doc research in the same area.

AWARDS & GRANTS

- ☆ Attained the Distinction of **Level-1 Researcher** in **2024 & 2023**
- ☆ Awarded Faculty wise **Best Research & Innovator Award 2022**
- ☆ Honored as a **Level-1 Researcher** in the year **2022**
- ☆ Secured a prestigious grant from **Samsung Innovation Campus (SIC)** to offer cutting-edge Artificial Intelligence Training programs catering to undergraduates, graduates, and esteemed faculty members, **2021**.

EDUCATION

Doctor of Philosophy (Computer Science) , University of Central Punjab, Pakistan	MAY 2023
Title: <i>Adaptive Self-learning Systems for Medical Image Analyses using Hybrid-Dense Convolutional Neural Network</i>	
Supervisor: <i>Dr. Adnan N. Qureshi</i>	
Master of Science (Computer Science) , National University of Computer & Emerging Sciences, Pakistan	DEC 2012
Title: <i>Extending Java Pathfinder(JPF) with Property Classes for Verification of Android Permission Extension Framework</i>	
Supervisor: <i>Dr. Shakir Ullah Shah</i>	
Bachelor of Information Technology (Honors) , Punjab University College of Information Technology, Pakistan	OCT 2007
Higher Secondary School Certificate , BISE, Lahore, Pakistan	JUL 2003
Secondary School Certificate , BISE, Peshawar, Pakistan	JUN 2000

INTELLECTUAL PROPERTY & COPYRIGHT (PATENT)

1. **Holistic Campus Security** optimized detection/tracking system using Deep Learning with commodity hardware (PTZ cameras) in real-time environment.

PUBLICATION

25. Choudhry, I. A., Iqbal, S., Alhussein, M., Aurangzeb, K., Qureshi, A. N., & Anwar, M. S., & Khan, F. (2024). Privacy-preserving AI for early diagnosis of thoracic diseases using IoTs: A federated learning approach with multi-headed self-attention for facilitating cross-institutional study, Internet of Things, doi:10.1016/j.iot.2024.101296, **impact factor: 6.0**, Vol. 27, Elsevier, 101296.
24. Iqbal, S., Qureshi, A. N., Alhussein, M., Aurangzeb, K., Choudhry, I. A., & Anwar, M. S. (2024). Hybrid deep spatial and statistical feature fusion for accurate MRI brain tumor classification. Frontiers in Computational Neuroscience, doi:10.3389/fncom.2024.1423051, **impact factor: 2.1**, Vol. 18, Frontiers, 1423051.
23. Iqbal, S., Qureshi, A. N., Aurangzeb, K., Alhussein, M., Zhang Y., & Syed, I. (2024). Adaptive Magnification Network for Precise Tumor Analysis in Histopathological Images, Computers in Human Behavior, doi: 10.1016/j.chb.2024.108222, **impact factor: 9.9**, Elsevier, (2024)
22. Iqbal, S., Qureshi, A. N., Aurangzeb, K., Alhussein, M., Wang, S., Anwar, M. S. & Khan, F. (2024). Hybrid Parallel Fuzzy CNN Paradigm: Unmasking Intricacies for Accurate Brain MRI Insights, IEEE TRANSACTIONS ON FUZZY SYSTEMS, doi: 10.1109/TFUZZ.2024.3372608, **impact factor: 11.9**, (2024) IEEE.
21. Iqbal, S., Qureshi, A. N., Aurangzeb, K., Alhussein, M., Haider, S. I., & Rida, I. (2023). AMIAC: Adaptive Medical Image Analyses and Classification, a Robust Self-Learning Framework. Neural Computing and Applications (NCAA), Springer, (2023), doi: 10.1007/s00521-023-09209-1, **impact factor: 6.0**, Springer
20. Iqbal, S., Choudhry, I. A., & Lodhi, A. M. (2023), Intelligent Buffer Management Policy in Post Disaster Network Using DTN, IEEE 25th International Multi Topic Conference (INMIC), doi: 10.1109/INMIC60434.2023.10465769, IEEE.
19. Iqbal, S., Qureshi, A. N., Alhussein, M., Aurangzeb, K., & Anwar, M.S. (2023). AD-CAM: Enhancing Interpretability of Convolutional Neural Networks with a Lightweight Framework - From Black Box to Glass Box, IEEE Journal of Biomedical and Health Informatics, IEEE, doi: 10.1109/jbhi.2023.3329231 **impact factor: 7.7**, IEEE .
18. Iqbal, S., Qureshi, A. N., Alhussein, M., Mustafa, G., Aurangzeb, K., Javeed, K., & Naqvi, R. A. (2023). Privacy-Preserving Collaborative AI for Distributed Deep Learning with Cross-sectional Data, Multimedia Tools and Applications, Springer, (2023), doi:10.1007/s11042-023-17202-y **impact factor: 3.6**, Springer .

17. Choudhry, I. A., Qureshi, A. N., Aurangzeb, K., **Iqbal, S.**, & Alhussein, M. (2023). Hybrid Diagnostic Model for Improved COVID-19 Detection in Lung Radiographs Using Deep and Traditional Features. *Biomimetics*, Vol. 8(5), 406, doi:10.3390/biomimetics8050406, **impact factor: 4.5**, MDPI.
16. **Iqbal, S.**, Qureshi, A. N., Alhussein, M., Mustafa, Choudhry, I.A., G., Aurangzeb, K., & Khan, T. M. (2023). Fusion of Textural and Visual Information for Medical Image Modality Retrieval using Deep Learning-Based Feature Engineering, *IEEE ACCESS*, IEEE, (2023), doi:10.1109/ACCESS.2023.3310245, **impact factor: 3.9**, IEEE.
15. **Iqbal, S.**, Qureshi, A. N., Alhussein, M., Aurangzeb, K., & Kadry, S. (2023). A Novel Heteromorphous Convolutional Neural Network for Automated Assessment of Tumors in Colon and Lung Histopathology Images. *Biomimetics*, 8(4), 370, doi:10.3390/biomimetics8040370, **impact factor: 4.5**, MDPI.
14. **Iqbal, S.**, Qureshi, A. N., Aurangzeb, K., & Javeed, K. (2023). Privacy-Preserving Collaborative AI for Distributed Deep Learning with Cross-sectional Data, *IEEE 5th International Conference on Bio-engineering for Smart Technologies (BioSMART)*, Paris, France, doi:10.1109/BioSMART58455.2023.10162106, 07-09 June 2023, IEEE.
13. **Iqbal, S.**, Qureshi, A. N., Li, J., Arshad, I., & Mahmood, T. (2023). Dynamic Learning for Imbalance Data in Learning Chest X-Ray and CT Images. *HELIYON*, (2023), doi:10.1016/j.heliyon.2023.e16807, **impact factor: 3.776**, Cell Press & Science Direct, Elsevier.
12. **Iqbal, S.**, Qureshi, A. N., Li, J., & Mahmood, T. (2023). On the Analyses of Medical Images using Traditional Machine Learning Techniques and Convolutional Neural Networks, *Springer Archives of Computational Methods in Engineering*, doi:10.1007/s11831-023-09899-9, **impact factor: 8.171**, Springer Nature.
11. **Iqbal, S.**, Qureshi, A. N., Ullah, A., Li, J., & Mahmood, T. (2022). Improving the Robustness and Quality of Biomedical CNN Models through Adaptive Hyperparameter Tuning. *Applied Sciences*, 12(22), 11870, doi:10.3390/app122211870, **impact factor: 2.838**, MDPI.
10. **Iqbal, S.**, & Qureshi, A. N. (2022). A heteromorphous deep CNN framework for Medical Image Segmentation using Local Binary Pattern, pp:63466-63480, doi:10.1109/ACCESS.2022.3183331, **impact factor: 3.367** IEEE Access.
9. **Iqbal, S.**, & Qureshi, A. N., Deep-Hist: Breast cancer diagnosis through histopathological images using convolution neural network, *Journal of Intelligent & Fuzzy Systems*, pp: 1347-1364, doi: 10.3233/JIFS-213158, **impact factor: 1.739**, IOS Press.
8. **Iqbal, S.**, Qureshi, A. N., & Mustafa, G. (2022). Hybridization of CNN with LBP for Classification of Melanoma Images, *CMC-COMPUTERS MATERIALS & CONTINUA*, vol. 71(3), pp: 4915-4939, doi:10.32604/cmc.2022.023178, **impact factor: 3.860**, Tech Science, Press.
7. Shaheen, M., Ahsan, A., & **Iqbal, S.** (2021)., Data Mining of Scientometrics for Classifying Science Journals. *Intelligent Automation and Soft Computing*, vol.28(3), pp: 873-885, doi:10.32604/iasc.2021.016622, **impact factor: 1.647**, Tech Science, Press.
6. **Iqbal, S.**, Qureshi, A. N., & Akter, M. (2019, September)., Using Local Binary Patterns and Convolutional Neural Networks for Melanoma Detection, In *Proceedings of SAI Intelligent Systems Conference*, London, United Kingdom, (pp. 782-789), doi:10.1007/978-3-030-29513-4_58, Springer, Cham.
5. **Iqbal, S.**, Qureshi, A. N., & Lodhi, A. M. (2018)., Content based video retrieval using convolutional neural network, In *Proceedings of SAI Intelligent Systems Conference*, London United Kingdom, (pp. 170-186), doi:10.1007/978-3-030-01054-6_12, Springer, Cham.
4. **Iqbal, S.**, Choudhry, I. A., & Shabbir, K. (2016), Verification of Android Permission Extension Framework using SPF and JPF, *International Journal of Computer Science and Information Security*, vol. 14(10), 340.
3. **Iqbal, S.**, and Muhammad Shaheen., A machine learning based method for optimal journal classification, In *Internet Technology and Secured Transactions (ICITST)*, 2013 8th International Conference for, pp. 259-264, doi:10.1109/ICITST.2013.6750202, IEEE.
2. Shaheen, M., & **Iqbal, S.** (2013, December). Labeled clustering a unique method to label unsupervised classes. In *8th International Conference for Internet Technology and Secured Transactions (ICITST-2013)* (pp. 210-214), doi:10.1109/ICITST.2013.6750193, IEEE.
1. **Iqbal, S.**, Shah, S. U., Nauman, M., & Amin, M. (2013)., Extending java pathfinder (JPF) with property classes for verification of android permission extension framework, In *2013 IEEE 3rd International Conference on System Engineering and Technology* (pp. 15-20), doi: 10.1109/ICSEngT.2013.6650135, IEEE.

PUBLICATION IN PROGRESS

- ✍ **Iqbal, S.**, Qureshi, A. N., Alhussein, M., Mustafa, G., Aurangzeb, K., & Kadry, S. (2023). Ascertaining Effectiveness of Fusion of Handcrafted and Latent Semantic Features for Analyses of Medical Tomography Images. *IEEE Transactions on Emerging Topics in Computational Intelligence*, IEEE, (2023), **Major Revision**.
- ✍ **Iqbal, S.**, Qureshi, A. N., Alhussein, M., Aurangzeb, K., Bisogni, C., and Rida, I., "U-NeTrans: Revolutionizing Medical Image Analysis through Transformer and U-Net Integration", *Image and Vision Computing*, Elsevier, (2023), **Under Review**.
- ✍ **Iqbal, S.**, Qureshi, A. N., Alhussein, M., Mustafa, G., and Aurangzeb, K., "Adaptive Cross-Modal Approach for Generating Radiology Reports using Wisdom Learning", *Engineering Applications of Artificial Intelligence*, Elsevier, (2023), **Under Review**.

- ✍ **Iqbal, S.**, Qureshi, A. N., Aurangzeb, K., Alhussein, M., Zhang, Y., Naqvi, R.A., and Choudhary, I.A. "Enhancing Federated Learning Through Dynamic SelectOut Strategies in Medical Image Analysis", International Journal of Imaging Systems and Technology (IMA), Wiley, (2023), **Under Review**.
- ✍ Choudhary, I.A., **Iqbal, S.**, Aurangzeb, K., Qureshi, A. N., Alhussein, M., and Zhang, Y. "Transforming Lung Disease Diagnosis with Transfer Learning Using Chest X-Ray Images", Science Progress, SAGE, (2023), **Under Review**.

RESEARCH PROJECT

- ✍ **My Antenatal Monitoring Assistant (MAMA)**, Maternal and fetal health care is a global challenge in developed and developing countries. Complications occurring during pregnancy can result in the mother's and infant's death. The significant reasons associated with such adverse outcomes are the lifestyle of the mother as well as limited knowledge regarding pregnancies.
- ✍ **Skin Cancer Detector**, developing software that can detect skin cancer from images using computer vision without the painful and time-consuming process of laboratories and reduce the cost of laboratory tests.
- ✍ **Capturing Human Action for Smart Vehicles**, developing a system that will alert the driver on such scenarios by tracking eye movements, head movements, and gestures within specific time frames.
- ✍ **Human Action Recognition System**, optimized detection/tracking system using Deep Learning with commodity hardware (PTZ cameras) in real-time environment.
- ✍ **Breast Cancer Detection**, working on R&D of breast cancer to recognize cancer from images using computer vision and deep learning model with the help of PyTorch (fb.com) and Tensor flow (google.com)
- ✍ **CMS for Graduate Student**, developing a web-based software to store/managed Graduate Data according to NCEAC and HEC requirements.

EXPERIENCE

Director

JUL 2023 - Present

Centre for Applied Data Analytics (CADA), FOIT&CS, UCP, Lahore

- * Lead interdisciplinary research group in health informatics, bioinformatics, and machine learning.
- * Developed intelligent solutions supporting evidence-based healthcare.
- * Guided and mentored undergraduate, graduate, and Ph.D. students.
- * Innovated IT and communication methodologies to enhance healthcare quality.

Researcher

SEP 2022 - SEP 2023

Beijing Engineering Research Center for IoT Software and Systems, Beijing, China

- * I manage medical image analysis models, with a particular emphasis on efficient hyperparameter tuning. In addition, I oversee research associates, plan results publications, and suggest initiatives in pertinent areas such as biomedical signal processing, AI, medical image analysis, feature recognition, and health informatics. Obtaining financing for future attempts entails actively participating in joint research and crafting project proposals.

Assistant Professor

JUL 2013 - Present

University of Central Punjab,

Lahore, Pakistan

- * **Samsung Innovation Campus** – course for undergraduate and graduate.
 - Taught the landscape of data science, and AI modeling with the foundation of mathematics, and deliver the basic concepts of probability and linear algebra using Python.
- * Designed and taught the following undergraduate Computer Science courses:
 - Object Oriented Programming (4 CHrs) (FALL 2022)
 - Programming for Big Data (3 CHrs) (SPRING 2022, 2021 & 2020, FALL 2021, 2020 & 2019)
 - Introduction to Computing (4 CHrs)– (FALL 2021, 2020, 2019 & 2014, Spring 2015, 2014 and Summer 2014)
 - Web Information Retrieval (3 CHrs) (FALL 2018, Summer 2018& 2017)
 - Web Application Development (3 CHrs) – (FALL 2018, 2016 & 2015, Summer 2017, Spring 2017)
 - Introduction to DBMS (4 CHrs) - (Spring 2019, 2018 & 2016, Summer 2016 & 2013, Fall 2015)
 - Operating Systems (4 CHrs) - (FALL & Spring 2013)
 - Programming Fundamentals (4 CHrs) - (FALL 2013)
- * Designed and taught the following graduate (MS. and Ph.D.) Computer Science and Data Science courses:
 - Tools and Techniques in Data Science (Spring 2023).
 - Research Methodology (FALL 2022).

- * To encourage students' intrinsic motivation, teachers should give them meaningful and increasingly difficult learning opportunities, such as those that require them to explore themselves, ask questions, make decisions, set goals, organize their work, put it into practice, reflect on their progress, and take the initiative in their work.
- * To get students involved in active, practical, and creative problem-based learning.
- * To give chances for students to acquire and apply contemporary technology, resources, and information to address challenges.
- * Coordination with BS students (both CS and SE) regarding timetable and course guidance (UNI/CS elective courses).
- * Student registrations, managing student dropout and withdrawal cases.
- * Managing and Controlling Midterm and Final Examination.
- * Providing guidelines regarding exams (midterm and final), coordinating with IT staff to install and configure software/hardware, during examination, providing support and help to invigilators and students.

Lecturer

SEP 2009 - APR 2013

HPS College (Govt),

Hangu, KP

- * Designed & taught Computer Science courses for B.Sc and F.Sc levels.
- * Conducted weekly lectures for programming language and physics courses, explaining complex concepts. Secured 2nd prize in the final evaluation.
- * Graded assignments and exams, held office hours for student discussions. Managed 1-hour lectures and supervised 3-hour labs.

Sr. Software Engineer

JAN 2006 - SEP 2009

iSOFT Technology

Lahore, Pakistan

- * Led and managed a project team of technical engineers (including designers and developers) to ensure timely and budget-friendly delivery of project solutions.
- * Investigate, analyze, design, develop, and implement applications for day-to-day operations, focusing on technology improvements, upgrades, and modifications.

GRADUATE SUPERVISION

I supervised master's level students studying medical image analysis.

- ★ Diabetic Foot Ulcer Segmentation Using Context-Aware Hybrid Approach – Laiqa Imran – L1S21MSCS0003
- ★ Hybrid Approach of Feature Engineering and Convolutional Neural Network for Images Classification – Izaz Ahmad – SAP26873
- ★ Context-based Detection of Diabetic Retinopathy using Deep Learning – Shahbaz Ali – L1F21MSCS00053

ADVISING FINAL YEAR PROJECT

Inspired by a desire to encourage talent and creativity, I proudly led the supervision of over **75 Undergraduate Final Year Projects (FYPs)** focusing on Artificial Intelligence and Machine Learning.

- ★ Easy Prescription Reader – Often times we have prescriptions lying around our home and we want to check what the names of these medicines are but the writing is completely unreadable by a normal person except a physician or a pharmacy clerk. (2019)
- ★ Haroof-e-tahaji Letter Recognizer – Our objective is to create a mobile app (iOS) that will capture an image and then digitized version of the document/image. We are covering basic Haroof-e-Tahajii letters that are 38 Letters. This will help developers to make different apps related to Urdu as translation apps, billboard, scanner (Urdu PDF), Urdu editing tools which will increase the level of Urdu language.
- ★ Real Time Object Finder
- ★ Banner Curve-Text Detection
- ★ Text-2-Image Generation
- ★ Object Localization
- ★ LUNGXAMINER: Lungs Disease Detectir Through X-ray Images– we propose a lung disease detection application that utilizes Deep Learning techniques and algorithms to identify three critical diseases: Pneumonia, COVID-19, and Lung Cancer.
- ★ DERMACURE - Skin Analysis - Skin disease classification from medical images faces challenges like dataset imbalance and data security. In Medical Image Analysis (MIA), CNNs and federated learning excel, ensuring robust skin disease analysis while safeguarding data.
- ★ Visual Insight: Anthropology of Exploration of Eye.
- ★ CHESTX Generative Pretrained Transformer (CHESTXGPT)

SKILLS

Deep Learning and Computer Vision API:	Expert Level : Tensor flow, PyTorch, Keras, Open CV.
Programming Language:	Intermediate Level : Google BigQuery, Tika, Jackrabbit, Nutch (Lucene & Solr) Expert Level: Java, Python, C, C++, JavaScript, HTML, \LaTeX , AJAX, PHP, SQL, MySQL, Web Services, CSS and XML (DTD, Schema, DOM)
Version Control & Software Configuration Management:	Beginner Level: Distributed Version Control System (DVCS), Mercurial/MQ, Git/StGit & VCS (RCS, CVS, SVN, SCCS)
Software Verification:	Intermediate Level: Java Pathfinder (JPF), Simple PROMELA Interpreter (SPIN) & NuSMV.
Cloud Computing Technology:	Beginner Level: Spark/Hadoop/Mapreduce (HBase, NoSQL (MongoDB, Cassandra), Mahout (Parallel Clustering/Classification Techniques)
Quantitative Research:	Mathematical optimization, Mathematical Modeling & MySQL

EDITORIAL SERVICES

Program Committee	Served on the Program Committee of the 7th International Conference on IT Convergence and Security (ICITCS 2017) – the leading conference on Trusted & Security technologies. Served on the Program Committee of IEEE Symposium on Computer Applications & Industrial Electronics - the leading conference on computing industry technologies
Journal and Conference Reviews	Reviewed articles for several journals including IEEE ACCESS, Springer Archives of Computational Methods in Engineering, Applied Intelligence, SAGE Digital Health, Tech Science Computers, Materials & Continua, IOS Press Journal of Intelligent & Fuzzy Systems (JIFS) and Elsevier Computer Biology and Medicine

CERTIFICATES

Big Data and Hadoop , Udemy, Inc.	DEC 2016
Hadoop, MR, Hive and Spark , Udemy, Inc.	DEC 2016
Introduction to Python , Udemy, Inc.	DEC 2016
Introduction to the Biology of Cancer , Coursera, Inc.	NOV 2021

REFERENCES

Dr. Adnan N. Qureshi , Birmingham Newman University, Birmingham, UK	dranq@yahoo.com
Dr. Khursheed Aurangzeb , Department of Computer Science, College of Computer and Information Sciences, King Saud University, Riyadh, Saudi Arabia	kaurangzeb@ksu.edu.sa
Dr. Mohammad Nauman , Department of Computer Science, Effat College of Engineering, Effat University, Jeddah, Kingdom of Saudi Arabia	recluze@gmail.com