

DR. MUHAMMAD ISHAQ

Associate Professor of Computer Science | AI · Knowledge Graphs · Biomedical Informatics · Neuro-Symbolic AI

★ Anthropic Claude Top 100 Scientist | Agri Environment Team

HEC Approved PhD Supervisor | NCEAC Accreditation Focal Person | Founder of 4 Degree Programmes

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Google Scholar: Dr. Muhammad Ishaq | GitHub: ishaqafridi | LinkedIn: ishaqafr

PROFESSIONAL SUMMARY

Computer scientist with 20+ years building AI systems at the intersection of formal knowledge representation and modern deep learning. Recognised as an Anthropic Claude Top 100 Scientist (Agri Environment Team, 2026). Pioneer of Pakistan's first BS Artificial Intelligence, BS Bioinformatics, MS Data Science, and PhD Computer Science programmes at the University of Agriculture Peshawar. Leads internationally published research in biomedical knowledge graphs, transformer-augmented GNNs, agentic AI, explainable AI, precision medicine, and precision agriculture. Secured competitive national and international research funding across multiple HEC NRPU and bilateral grants. Published 30+ peer-reviewed articles across IEEE, Nature/Springer, PLOS, BMC, and Elsevier; 34 active manuscript submissions; 9 papers under review (2026). Supervised 20+ PhD, MSc, and MPhil researchers. NCEAC Accreditation Focal Person. QEC Grade A (>80%) for three consecutive years.

KEY METRICS AT A GLANCE

30+ Peer-Reviewed Publications **34** Active Manuscript Submissions **9** Papers Under Review (2026)

Competitive Grants Secured (National + International) **20+** Graduate Researchers Supervised **4** Degree Programmes Founded

Anthropic Top 100 Scientist (Agri Environment · 2026) **14+** Coursera Certificates Earned **20 yrs** Research Experience

EDUCATION

PhD Computer Science — Harbin Engineering University, China | 2012 | HEC/CSC Scholar

Post-Doctoral Research — Catholic University of Daegu, South Korea | 2013

MSc Information Technology — Kohat University of Science & Technology, Pakistan | 2005

BSc Computer Science — University of Peshawar, Pakistan | 2002

PROFESSIONAL EXPERIENCE

Associate Professor & BS-AI Programme Coordinator | *University of Agriculture, Peshawar — ICS-IT* | 2018 – Present

- Principal Investigator, PakBioKG (HEC NRPU, approved 2025–2028) and two completed HEC/AUP projects; selected as Anthropic Claude Top 100 Scientist (Agri Environment, 2026)
- Founded and convened BS Artificial Intelligence, BS Bioinformatics, MS Data Science, and PhD Computer Science — Pakistan's first such programmes at an agriculture university
- HEC Approved PhD Supervisor; active doctoral cohort spanning CS, Bioinformatics, and Animal Biotechnology
- NCEAC Accreditation Focal Person; achieved full accreditation of all BS Computing programmes
- QEC Grade A (>80%) for three consecutive years; 32 course offerings undergraduate through doctoral level
- Invited Fellow, Reasoning Web Summer School, OsloMet 2023 (fee waived + travel award)

Assistant Professor, Health Informatics | *Qassim University, Saudi Arabia* | 2016 – 2018

- Led health-informatics research hub; published 4 peer-reviewed articles on EHR interoperability and clinical decision support

Associate Professor & Chairman, Computer Science & IT | *University of Sargodha, Pakistan* | 2014 – 2016

- Led departmental research output growth of 35%; established cloud-computing laboratory serving 150+ students

Visiting Faculty | *Institute of Management Sciences, Peshawar* | Various periods

- Curriculum development in computational biology and AI-driven health informatics; mentored 8 MSc projects

Assistant Professor, Computer Science: IQRA National University, Pakistan

2012-2015

Redesigned curriculum to incorporate data science; achieved a 92% graduate placement rate.

Lecturer (E-Learning)

2006-2008

Virtual University of Pakistan

Built e-learning assets for 500+ learners, achieving a 94% course-completion rate.

System Engineer / Lab In-Charge

Brains University / FATA Education Foundation, Pakistan

2003-2006

Delivered network administration and Cisco CCNA training in a resource-constrained, first-generation-access educational setting in the tribal districts of Khyber Pakhtunkhwa.

RESEARCH AREAS & CORE COMPETENCIES

AI & Machine Learning: Knowledge Graph Engineering · Neuro-Symbolic AI · Transformer / LLM Systems · Graph Neural Networks (GNN) · Explainable AI (XAI) · Agentic AI Systems · Reinforcement Learning · Deep Learning · Evolutionary Meta-Heuristics

Biomedical & Life Sciences Informatics: Biomedical Knowledge Graphs · Multi-Omics Integration · Drug Repurposing · Precision Medicine · Computational Genomics · Health Informatics · In-Silico Analysis · Molecular Dynamics Simulation

Parallel & Systems Computing: Parallel Task Scheduling · Dynamic Programming · HPC Workflow Optimisation · IoT Security · Named Data Networks · Intrusion Detection Systems

Semantic Technologies: Ontology Engineering (OWL/RDF) · Semantic Web · SPARQL · Linked Data · Knowledge Representation

Tools & Platforms: PyTorch · TensorFlow · CUDA · Python · Node.js · SPARQL · Neo4j · MongoDB · MySQL · Nextflow · GitHub

FUNDED & ACTIVE RESEARCH PROJECTS

- PakBioKG (HEC NRPU · 2025–2028, approved): Explainable biomedical knowledge graph for Pakistani disease burden (TB, HCV, HBV, T2D, Dengue) and AI-driven drug repurposing via BioTGNN — Principal Investigator
- PERIDOT — Franco-Pakistani Hubert Curien Partnership (Campus France, under review): "Explainable AI and Multi-Omics Knowledge Graphs for Population-Specific Drug Repurposing in Pakistan" — PI, bilateral France–Pakistan precision medicine initiative
- Three-Layer Semantic Framework for Biomedical Knowledge Graph Construction (in preparation): Architecture, ontology mapping, and reference implementation for large-scale biomedical KG systems — PI
- Classified Neuro-Symbolic AI Projects (active): KG- and ontology-grounded neural reasoning systems; includes AGI-through-Ontologies open-source framework — PI
- Phyto-Precision KG System (submitted): Multi-omics + genomic KG for AI-driven crop disease resistance and precision agriculture — PI

- Recommender Systems for Plant Pathology (submitted): KG-augmented recommender pipeline for pathogen–host interaction prediction — PI
- Agri-Informatics Semantics (HEC NRPU · completed): Comprehensive semantic improvements in agricultural informatics — PI
- NLP Ontologies (AUP Endowment · completed): Ontologies in local natural language for improved semantic retrieval — PI

PEER-REVIEWED PUBLICATIONS & MANUSCRIPTS UNDER REVIEW

- Ishaq, M. (2026). VAE-XGBoost: hybrid intrusion detection system for next generation EV charging networks. *PeerJ Computer Science*.
- Ishaq, M., Fayyaz, M., Yaqoob, N., Saidan, T.S., & Saidani, O. (2026). Classification of Customer Retention Using Hybrid SVC-SDNN to Enhance Customer Relationship Management. *PLOS One*.
- Ishaq, M., & Sarmad, M. (2026). Semantic Architectures for Domain-Specific Programming AI Agents: Lessons from a JavaScript Semantic Assistant. *Scientific Reports*. DOI: 10.1038/s41598-026-55094-8.
- Asim, M., Shahid, M.A., Khan, A., Ishaq, M., Khan, J., Nisa, S.Q., Khan, M.A., & Jaghdam, I.H. (2026). Inference and Performance Analysis of Optimized YOLOv9 for Indoor Object Detection & Classification. *Computers, Materials & Continua*.
- Alhwaiti, Y., Khan, M., Asim, M., Siddiqi, M.H., Ishaq, M., Alruwaili, M., et al. (2025). Leveraging YOLO deep learning models to enhance plant disease identification. *Scientific Reports*, 15(1), 7969.
- Ishaq, M., Asim, M., Ahadullah, Cengiz, K., Konecki, M., & Ivković, N. (2025). Development of novel Urdu language part of speech tagging system for improved Urdu text classification. *Social Network Analysis and Mining*.
- Khan, M.M., Ishaq, M., Ahmad, Z., Jan, H.U., Jan, M.G., & Fatima, H. (2025). Network Traffic Classification in SDN Networks Using PCA Integrated Boosting Algorithms. *IJIST (ISSN 2618-1630)*.
- Ishaq, M., Khan, M.J., Ashraf, Z., Latif, S., Alnfai, M.M., & Alotaibi, F.A. (2025). Intelligent anomaly detection for IoT using a hybrid metaheuristic evolutionary strategy. *PeerJ Computer Science*.
- Ishaq, M. (2025). A Novel Hyper-Tuned Multilayer Perceptron with Effective Stochastic Learning Strategies for Missing Values Imputation. *Expert Systems*.
- Ishaq, M., & Ashraf, M.B. (2025). Development of a novel ANN-based approach for predicting entropy generation in electroosmotic flow of nanofluids. *Nonlinear Dynamics*, 113(16), 20633–20665.
- Ishaq, M., Khan, A., Asim, M., Khan, A., & Bangash, J.I. (2024). Comprehensive selective improvements in agri-informatics semantics. *Journal of Information Science*, 50(4), 910–923.
- Ishaq, M., Zahir, S., Iftikhar, L., Bulbul, M.F., Rho, S., & Lee, M.Y. (2024). Machine learning based missing data imputation in categorical datasets. *IEEE Access*, 12, 88332–88344.
- Zahir, S., Khan Ullah, R., Ullah, M., Ishaq, M., Dilshad, N., Ullah, A., & Lee, M.Y. (2023). Robust Counting in Overcrowded Scenes Using Batch-Free Normalized Deep ConvNet. *Computer Systems Science & Engineering*, 46(3), 2741–2754.
- Zeb, A., Lashari, S.A., Khan, A., Khan, A., Nazar, K., & Ishaq, M. (2023). Numerical solution of wavelet neural network learning weights using accelerated particle swarm optimization. *Fractals*, 31(2), 2340026.
- Sheraz, A., Bangash, J.I., Khan, A.W., Imran, M., Khan, A., Khan, A., & Ishaq, M. (2022). A dynamic swift association scheme for wireless body area networks. *Transactions on Emerging Telecomm. Technologies*, 33(2), e3724.
- Khan, A., Bukhari, J., Bangash, J.I., Khan, A., Imran, M., Asim, M., & Ishaq, M. (2022). Optimizing connection weights of functional link neural network using APSO algorithm for medical data classification. *JKSU-CIS*, 34(6), 2551–2561.
- Khan, A., Ahmad, M., Bangash, J.I., Khan, A., & Ishaq, M. (2022). Smart Control System for User Confirmation Based on IoT. *Proc. ICITA 2021 (pp. 397–416)*. Springer.

- Ishaq, M., & Kwon, S. (2022). CNN-Assisted deep echo state network using multiple time-scale dynamic learning reservoirs for short-term solar energy forecasting. *Sustainable Energy Technologies & Assessments*, 52, 102275.
- Ishaq, M., Khan, A., Khan, M., & Imran, M. (2019). Current Trends and Ongoing Progress in the Computational Alignment of Biological Sequences. *IEEE Access*, 7, 68380–68391.
- Zil-E-Ali, A., Ahmed, Z., Faquih, A.E., Ishaq, M., & Aadil, M. (2018). Presentation with Personality Changes and Tinnitus to a Vascular Intervention: Rare Case of Carotid Body Paraganglioma. *J. Medical Research & Innovation*, 2(2), e000109.
- Saeed, U., Ishaq, M., Ahsan, Z., & Ali, H.Z. (2016). Peptides, Gluten, Casein and Autistic Behavior — A Review. *Autism*, 4, 07.
- Afridi, M.I. (2013). Novel hybrid genetic algorithm for progressive multiple sequence alignment. *Int. J. Bioinformatics Research & Applications*, 9(6), 614–624.
- Afridi, M.I. (2013). Cognition in a Cognitive Routing System for MANET through Learning Automata and Neural Network. *Applied Mechanics & Materials*, 421, 694–700.
- Afridi, M.I. (2012). Selection and ranking of optimal routes through genetic algorithm in a MANET cognitive routing system. *ISCID 2012*, 507–510. IEEE.
- Afridi, M.I. (2011). Novel gene finding through BLAST search; phylogenetic analysis through MEGA. *ICCSNT 2011*, 115–119. IEEE.

UNDER REVIEW / UNDER DECISION (2026)

- Fruits Plant Leaf Diseases Detection using YOLOv12 Model with Flash Attention Mechanism and R-ELAN Block. *Scientific Reports (Nature/Springer)* — under decision.
- RL-DP Hybrid Scheduling: Reinforcement Learning and Dynamic Programming for Parallel Task Scheduling in Multiple Sequence Alignment. [Target: *IEEE TPDS / Bioinformatics* — in preparation]
- Building a Comprehensive Multi-Modal Biomedical Knowledge Graph: Integrating Clinical Records, Histopathology Imaging, and Multi-Omics Data for Breast Cancer Precision Medicine. *BMC Medical Informatics & Decision Making* — technical review.
- PrimerAgent: An Autonomous AI Agent for PCR Primer Design and In Silico Amplicon Validation. *Journal of Human Genetics* — technical review.
- BioNexusKG: An Integrated, Reproducible System for KG Construction, Link Prediction, and Explainable Reasoning. *Discover Computing* — technical review.
- Enhanced Early Detection of Phytophthora Infestans in Tomato Leaves through Attention-Augmented ViT-B16. *Journal of Real-Time Image Processing* — technical review.
- Reliability-Aware Graph Learning for Brain Tumor MRI: Audited Synthetic Benchmarks and Validation Protocol. *IEEE Transactions on Medical Imaging (TMI-2026-2338)* — under revision.
- Knowledge-Graph-Augmented Transformers and GNNs for Biomedical Drug Repurposing. *Journal of Computer-Aided Molecular Design* — peer review.
- Beyond Reported Accuracy: Cross-Dataset Duplication and Stress Testing of Brain-Tumour MRI Classifiers. *Machine Vision & Applications* — with editor.
- Enhancing Human Pose Estimation through Channel-Boosted and Attention-Augmented CNN. *IEEE Transactions on Human-Machine Systems (THMS-26-05-0402)* — under review.

Full list: Google Scholar (ORCID: 0000-0003-1963-5041) · 30+ published · h-index available on request

SELECTED AI SYSTEMS & OPEN-SOURCE RESEARCH PLATFORMS

- PakBioKG — Pakistan-centric multi-omics KG covering 5 disease modules (TB, HCV, HBV, T2D, Dengue) with BioTGNN drug repurposing engine

- CureKG — Precision-medicine knowledge graph dashboard: 294,515 entities, 4.23M relationships, 18 integrated biomedical data sources
- BioNexusKG — Integrated, reproducible KG system for biomedical link prediction and explainable reasoning
- AGI-through-Ontologies — Open-source KG framework for structured LLM reasoning (GitHub: ishaqafriidi)
- PrimerAgent — Autonomous agentic AI system for PCR primer design and in silico amplicon validation
- Hybrid IoT IDS — Whale Optimisation + Random Forest intrusion detection system: 99% precision, 100% recall

DOCTORAL & POSTGRADUATE SUPERVISION (ACTIVE COHORT)

- Sana Zahir (PhD-CS, in progress) — Innovative dense image generation using edge-type lightweight transformer architectures; 2 JCR articles published, 2 under review
- Zain-ul-Abidin (PhD-CS, in progress) — Security vulnerabilities and defensive frameworks for Named Data Networks (NDN); content-poisoning, interest-flooding, and privacy attacks
- Naila Niaz (PhD Animal Biotechnology, in progress) — Genome-Wide Selective Signature Analysis of Fat-Tailed Sheep
- PhD Biotechnology Student (in progress) — PrimerAgent: Autonomous agentic AI for PCR primer design and in silico amplicon validation (Journal of Human Genetics, under review)
- PhD Biotechnology Student (in progress) — Dynamic simulation and in silico toxicological analysis of environmental pollutants on aquatic animal physiology
- PhD Biotechnology Student (in progress) — OMICS-enriched precision systems for chemotherapy response prediction and personalised oncology
- Salih Zada (MSc, graduated) — You-Shan Transformer for Protein Multiple Sequence Alignment
- Muhammad Sarmad (MSc, graduated) — Semantic AI Agents → Scientific Reports (published 2026)
- Naila Yaqub (MSc, graduated) — Hybrid SVC-SDNN Customer Retention Classification → PLOS One (published 2026)
- Ahadullah (MSc, graduated) — Novel Urdu POS Tagging → Social Network Analysis and Mining (published 2025)

20+ additional supervisees across neurodegenerative disease prediction, clinical BERT, computational genomics, IoT security, and bioinformatics pipeline development.

GRANTS, FELLOWSHIPS & HONOURS

- HEC NRPUR Research Grant (PakBioKG · approved 2025)
- HEC NRPUR Research Grant (Agri-Informatics Semantics · completed)
- AUP Endowment Fund Grant (NLP Ontologies · completed)
- TWAS Fellowship — Universiti Putra Malaysia, 2015 (big-data sequence alignment)
- Invited Fellow — Reasoning Web Summer School, OsloMet, 2023 (fee waived + travel award)
- PhD Scholarship — HEC / China Scholarship Council (CSC), 2008–2012
- Post-Doctoral Fellowship — Catholic University of Daegu, South Korea, 2013
- Best Paper Award — AEPEE International Conference, 2021
- QEC Grade A (>80%) — University of Agriculture Peshawar, 3 consecutive years

ACADEMIC & PROFESSIONAL SERVICE

- Reviewer: IEEE Access · PeerJ Computer Science · Wiley Transactions on Emerging Telecomm · Springer JAIC · Oxford Bioinformatics · Elsevier Computers Biology & Chemistry · Future Generation Computer Systems · Sustainable Cities and Society

- Reviewer: HEC NRPU proposals (mammography AI, ICU remote monitoring, contactless health sensing)
- Organiser: 1st International Conference on Computing Tools, Technologies & Applications (ICTAPP-23), UAP
- Invited Keynote/Speaker: ICTAPP-23 ("DNA as Storage") · AEPEE 2022 & 2021 · NCCSIT 2019 · EMN 2017 · ICCSNT 2011
- Presiding Officer: Election Commission of Pakistan — General Elections 2018 & 2024

PROFESSIONAL CERTIFICATIONS & DIGITAL CREDENTIALS

◆ ANTHROPIC CLAUDE TOP 100 SCIENTIST ◆ | Agri Environment Team | 2026

Selected as one of Anthropic's Top 100 Scientists globally for the Agri Environment domain — recognising sustained contributions to AI-driven agricultural and environmental science research through advanced language model collaboration.

COURSERA VERIFIED CERTIFICATES

Issued via HEC–Coursera Partnership (Higher Education Commission, Pakistan)

Completed ✓

Foundations: Data, Data, Everywhere | Google | Sep 2026 | **Advanced** — *Data Literacy, Data-Driven Decision Making, Spreadsheet Analysis*

Python for Genomic Data Science | Johns Hopkins University | Aug 2026 | **Advanced** — *Python Programming, Bioinformatics Pipelines, Genomic Sequence Processing*

Data Analysis with Python | IBM | Dec 2025 | **Advanced** — *Pandas, NumPy, Regression Modelling, Statistical Analysis, Data Wrangling*

AI For Everyone | DeepLearning.AI | Oct 2025 | **Advanced** — *AI Strategy, Machine Learning Workflow, AI Ethics & Governance*

Introduction to Genomic Technologies | Johns Hopkins University | Jun 2025 | **Advanced** — *NGS Technologies, Sequencing Principles, Genomic Data Interpretation*

Databases and SQL for Data Science with Python | IBM | Apr 2025 | **Advanced** — *SQL, PostgreSQL, Python-DB Integration, Relational Database Design*

Data Science Methodology | IBM | Feb 2025 | **Intermediate** — *CRISP-DM, Analytic Approach, Data Collection Strategy, Modelling Evaluation*

Web of Data | 28DIGITAL | Jan 2025 | **Advanced** — *Linked Data, RDF, SPARQL, Semantic Web Technologies*

Getting Started with Microsoft Excel | Coursera | Jan 2025 | **Intermediate** — *Spreadsheet Design, Data Organisation, Formulas & Functions*

Tools for Data Science | IBM | Sep 2023 | **Intermediate** — *Jupyter, RStudio, GitHub, Data Science Toolkits*

What is Data Science? | IBM | Aug 2023 | **Intermediate** — *Data Science Lifecycle, Big Data, Careers & Applications*

Python Project for Data Science | IBM | May 2023 | **Advanced** — *Python Scripting, API Integration, Web Scraping, Data Dashboards*

Python for Data Science, AI & Development | IBM | Apr 2023 | **Advanced** — *Python, Pandas, NumPy, REST APIs, Data Visualisation*

SQL for Data Science | UC Davis | Mar 2023 | **Intermediate** — *SQL Querying, Joins, Subqueries, Data Filtering & Aggregation*

In Progress ☹

Ask Questions to Make Data-Driven Decisions | Google (73% complete · Est. Oct 2026) | **Advanced** — *Business Questions, Stakeholder Analysis, Structured Thinking*

IBM Data Science Professional Certificate | IBM (7/12 courses complete · ongoing) | **Advanced** — *Machine Learning, Data Visualisation, Applied Capstone, Generative AI for Data Science*

Genomic Data Science Specialization | Johns Hopkins University (2/6 complete · ongoing) | **Advanced** — *Algorithms for DNA Sequencing, Bioconductor, Command Line Genomics, Statistics for Genomics*

Learn SQL Basics for Data Science | UC Davis (1/4 complete · ongoing) | **Intermediate** — *Advanced SQL, Distributed Computing with Spark SQL, Data Science Capstone*

Additional Certifications

- Semantic Science & Ontology Engineering — NCBO / Stanford (2019) | Advanced — OWL, RDF, Protégé, BioPortal
- CCNA Routing & Switching — Cisco (2021) | Intermediate — Network Configuration, Routing Protocols, Network Security

REFERENCES

Available on request. Full publication list, research statement, and samples of supervised student work available upon invitation.