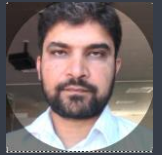


Khan Muhammad



Assistant Professor Mining Engineering UET Peshawar

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Insightful Assistant Professor with 12+ years of proven expertise of Academic, Research, Innovation, Industrial consultancy, undergraduate and postgraduate level teaching, and acquisition of successful Research Grants. Expert in Geostatistical and Artificial Intelligence-based Mineral Resources Modelling, Lithological Mapping, Production Scheduling and Data Mining/AI-based solutions for the Geosciences and minerals Industry. Proven history of helping both students and professors achieve academic goals. Supervised BSc and MSc theses and authored/co-authored over 15 articles in peer-reviewed journals.



Skills

- Mineral Resource modelling: NETPROMINE, MINESIGHT, DATAMINE, VULCAN ◆◆◆◆◆ Excellent
- Remote Sensing, Geological Mapping with Google Cloud Computing, Python ◆◆◆◆◆ Excellent
- Artificial Intelligence and Data Mining, MATLAB ◆◆◆◆◆ Excellent
- Mine Design and Production Scheduling ◆◆◆◆◆ Excellent
- Mineral Economics, Operations Research ◆◆◆◆◆ Excellent
- Curriculum Development and Delivery Outcome Based Education (OBE) and 4MAT Principles ◆◆◆◆◆ Excellent
- NumPy, pandas, scikit-learn, sklearn, skopt, shap; and matplotlib libraries of Python. ◆◆◆◆◆ Excellent



Work History

Feb 2010 - Assistant Professor

Current

University of Engineering and Technology Peshawar, Peshawar, Khyber Pakhtunkhwa

- Principal Investigator (since Feb, 2019) of the Intelligent Information Processing Lab at UET Peshawar as part of National Centre of AI (9 labs consortium of 6 Universities across Pakistan) the 1 Billion PKR project.
- Serving as Director Gems and Jewellery Centre of Excellence at UET Peshawar, a diploma awarding institute in gemology and lapidary at UET Peshawar
- Over the years through hard work, pursuing research and development was able to make a team of researchers with Mining and Earth sciences background to apply Artificial Intelligence for solving problems in the Mining industry.
- Development of cost-effective Mineral Resource Estimation Models using multi-source data (e.g. Geophysical, remote sensing and geochemical data).
- Lead research agenda in AI for Mining and Minerals Engineering to publish in peer-reviewed journals.
- Collaborated with colleagues on National level (through Higher Education Commission Pakistan) on curriculum revision, evaluation of course syllabi and lesson plans for Outcome-based Mining Engineering curriculum.
- Acquired research grants through academic proposals meeting industrial demands, providing opportunities by enabling young minds to meet industrial demands.
- Handled department academic administration positions, including administrative affairs at University level.
- Mentored students and communicated internship and employment opportunities.
- Contributed to campus activities to promote positive university image.
- Applied innovative teaching methods to encourage student learning objectives.
- Revised course objectives, course materials, instructional and assessment strategies for undergraduate and postgraduate courses for Mining Engineering.
- Contributed to planning appropriate and engaging lessons for both classroom and distance learning applications.
- Assisted professors and school administrators with continuous development, review, planning and outcomes evaluation to measure Undergraduate and Postgraduate program performance.

**Jul 2009 -
Jan 2010**

Assistant Professor

University of Engineering and Technology, Peshawar, Pakistan, Pakistan

- Used variety of learning modalities and support materials to facilitate learning process and accentuate presentations, including visual, aural and social learning modalities.
- Took attendance, graded assignments and maintained student records to assist teachers with administrative tasks and maintain smooth daily operations.

- Evaluated student progress through analysis of test scores and homework completion.
- Collaborated with colleagues on curriculum revision, evaluation of course syllabi and lesson plans for undergraduate curriculum.
- Mentored students and communicated internship and employment opportunities.

**Sep 2005 -
Jun 2009**

Lecturer

Dept of Mining Engineering, Peshawar, Khyber Pakhtunkhwa

- Evaluated and revised lesson plans and course content to facilitate and moderate classroom discussions and student-centered learning.
- Used variety of learning modalities and support materials to facilitate learning process and accentuate presentations, including visual, aural and social learning modalities.

**Sep 2003 -
Sep 2005**

Research Assistant

Peshawar, Khyber Pakhtunkhwa

- Project Title "Development of Cutoff grade optimization software with consideration of dynamic metal pricing, cost escalation and stock piles".
- Reviewing related research papers, Understanding programming concepts.
- Helped team meet regulatory requirements by coordinating documentation and filings.
- Gathered, arranged and corrected research data to create representative graphs and charts highlighting results for presentations.

**Jan 2001 -
Jan 2003**

Network Administrator

Brains Postgraduate College of Information Technology, Peshawar, Pakistan, Pakistan

- Teaching "networking essentials" at bachelors, Diploma level students.
- Established college Local area network for 120 computers.
- Management, troubleshooting of college local area network leading a team of internees.
- Performed day-to-day LAN and WAN administration, maintenance and support.
- Configured networks for smooth, reliable operation to meet business processes and objectives.

**Jan 1999 -
Jun 1999**

Site Engineer

Raja Habib Soapstone Mines, Sherwan, Abbottabad, Pakistan

- Conducted project site visits to meet with labour staff, evaluate progress and discuss operational issues.
- Performed quality control procedures on underground supports equipment and materials.
- Oversaw quality control and health and safety matters for Monitoring underground Mining operation, safety and production .
- Recorded daily events and activities in site diary to evaluate process and improve productivity.



Education

Oct 2005 - PhD.: Earth Resources

Jun 2009 *Camborne School Of Mines, University Of Exeter - Cornwall, UK*

Thesis Title:

- Thesis: "Modelling Uncertainty in Mineral Resource Estimation: Application of Fuzzy pattern recognition algorithms"

Mar 1994 - Bachelor of Science: Mining Engineering

Mar 1999 *University Of Engineering And Technology - Peshawar, Pakistan*

- Final Year Thesis: Rock Mass Classification and Support Recommendations for Gandhaf Irrigation tunnel.
- Secured 3rd among 20 students in class



Teaching

Postgraduate: Spatial Data Analysis and Reserve Estimation, Advance Geostatistical Computer Application in Mining and Advanced Programming, Operations Research, Coal Preparation

Undergraduate: Probability and Statistics, Geostatistical Ore Reserve Estimation, Mine Economics, coal Preparation, Underground Mine Design.



Professional Contributions in various Bodies

- Member Mineral Policy formulation for the Govt of Khyber Pakhtunkhwa Pakistan
- Secretary/Member of OBE based National curriculum Revision committee 2018, for Mining Engineering Higher Education Commission, Pakistan.
- Member Board of Studies Mining Engineering UET Peshawar
- Postgraduate Advisor Dept. of Mining Engineering, UET Peshawar
- Semester Coordinator for Undergraduate Studies, Dept. of Mining Engineering, UET Peshawar
- IAMG (International Association of Mathematical Geology)
- IOM3 (Institute of Materials Minerals and Mining): GradIMMM member
- Pakistan Engineering Council



Accomplishments

- Proven history of earning grants, was part of the team in establishment of two research centers US-Pak Centre for Advance studies in Energy in 2011-12 (14 million USD funding from USAID) and National Center of Artificial Intelligence (PKR 1 Billion by HEC, Pakistan) within the University
- Principal Investigator Intelligent Information Processing Lab NCAI (Project worth 1 Bn PKR) consortium of 6 Universities across Pakistan. Project 1: Development of AI based Mineral Resource Estimation. Project 2: Development of AI based production scheduling Algorithms
- Upgradation, Utilization and Value addition of KP Coal Resources (3 Million PKR)

- Project sponsored by Directorate of Science and Technology, Govt. of Pakistan)
- Product commercialization from NCAI research: 8.2 Million PKR agreement finalized with NETCAD, Turkey; Production Scheduling Algorithm for Netpromine software - under progress
- Earned reputation as Consultant for Mining Companies
 - (i.e. Pakistan Mineral Development Corporation, (PMDC) and (0.7 Million PKR)
 - Mineral Exploration and Development Organization (MEDO)), for Mineral Resource Estimation of metallic mines (6.28 Million PKR)
 - Optimization of Heap Leaching for copper deposit at Muhammad Khel North Waziristan (3.28 Million PKR)
- Collaborated with team of students by empowering them in the development of AI based solutions for Mining Industry.
- Achieved research goals while also engaging actively through participation in University affairs as an all-round academic (University Proctor, departmental discipline committees, University central purchase committee)
- Earned 4 yrs PhD scholarship award granted by University of Engineering and Technology, Peshawar, Pakistan. 2005-2009
- Achieved 3rd position in batch (20 students) on the basis of final yr B. Sc Mining Engg Examination 1999



Research Interests

- Machine learning applications to multispectral data for lithological mapping.
- Block aggregation for short term production scheduling
- AI based algorithms for mineral resource estimation: ANFIS
- Bayesian learning approaches for mineral resource estimation.
- Simulated annealing based Long term Production Scheduling
- Modelling Mining operations through AI (e.g. Minimizing Backbreak, blasting fragmentation, bucket load and truck haulage time)
- Modeling productivity of Deewan Cement Quarry: application of Principal Component Analysis
- Efficiency of Water only Cyclone for fine coal cleaning (3mm – 0.5mm) from Cherat region, KP, Pakistan
- Cleaning of coarse coal product (+3mm to 15mm size) through Batac Jig.
- Economic Analysis of Coal cleaning through water only cyclone
- Sensors based mine environment monitoring and GPS based Realtime truck dispatching



Publications

Accepted

1. Elahi, F.; **Muhammad, K.**; Din, S.U.; Khan, M.F.A.; Bashir, S.; Hanif, M. Lithological Mapping of Kohat Basin in Pakistan Using Multispectral Remote Sensing Data: A Comparison of Support Vector Machine (SVM) and Artificial Neural Network (ANN). *Appl. Sci.* 2022, *12*, 12147. <https://doi.org/10.3390/app1223121472022>

2. Abid Ali Khan Danish, Asif Khan & Khan Muhammad (2022) A simulated annealing based stochastic long-term production scheduling of open-pit mines with stockpiling under grade uncertainty, *International Journal of Mining, Reclamation and Environment*. [10.1080/17480930.2022.2140543](https://doi.org/10.1080/17480930.2022.2140543)
3. Ahmed, W.; **Muhammad, K.**; Glass, H.J.; Chatterjee, S.; Khan, A.; Hussain, A. Novel MLR-RF-Based Geospatial Techniques: A Comparison with OK. *ISPRS Int. J. Geo-Inf.* 2022, 11, 371. <https://doi.org/10.3390/ijgi11070371>
4. Khan AU, Salman S, **Muhammad K**, Habib M. Modelling Coal Dust Explosibility of Khyber Pakhtunkhwa Coal Using Random Forest Algorithm. *Energies*. 2022; 15(9):3169. <https://doi.org/10.3390/en15093169>
5. Din SU, **Muhammad K**, Khan MFA, Bashir S, Sajid M, Khan A. A Fusion of Feature-Oriented Principal Components of Multispectral Data to Map Granite Exposures of Pakistan. *Applied Sciences*. 2021; 11(23):11486. <https://doi.org/10.3390/app112311486>
6. AAK Danish, Khan A, **Muhammad K**, Ahmad W, and Salman S. A simulated annealing based approach for open pit mine production scheduling with stockpiling option, *Resources Policy*, Volume 71, 2021, 102016, ISSN 0301-4207, <https://doi.org/10.1016/j.resourpol.2021.102016>.
7. Salman S, **Muhammad K**, Khan A, Glass HJ. A Block Aggregation Method for Short-Term Planning of Open Pit Mining with Multiple Processing Destinations. *Minerals*. 2021; 11(3):288. <https://doi.org/10.3390/min11030288>
8. B. Khurshid, S. Maqsood, M. Omair, B. Sarkar, I. Ahmad and **K. Muhammad**, "An Improved Evolution Strategy Hybridization With Simulated Annealing for Permutation Flow Shop Scheduling Problems," in *IEEE Access*, vol. 9, 2021, pp. 94505-94522. <https://doi.org/10.1109/ACCESS.2021.3093336>
9. Rehman H, Naji AM, Nam K, Ahmad S, **Muhammad K**, Yoo H-K. Impact of Construction Method and Ground Composition on Headrace Tunnel Stability in the Neelum–Jhelum Hydroelectric Project: A Case Study Review from Pakistan. *Applied Sciences*. 2021; 11(4):1655. <https://doi.org/10.3390/app11041655>
10. Khan MFA, **Muhammad K**, Bashir S, Ud Din S, Hanif M. Mapping Allochemical Limestone Formations in Hazara, Pakistan Using Google Cloud Architecture: Application of Machine-Learning Algorithms on Multispectral Data. *ISPRS International Journal of Geo-Information*. 2021; 10(2):58. <https://doi.org/10.3390/ijgi10020058>
11. Ahmed W, **Muhammad K**, Siddiqui, FI. Predicting Calorific Value of Thar Lignite Deposit: A Comparison between Back-propagation Neural Networks (BPNN), Gradient Boosting Trees (GBT), and Multiple Linear Regression (MLR), *Applied Artificial Intelligence*. 2020; 34:14, 1124-1136, <https://doi.org/10.1080/08839514.2020.1824091>
12. Khan, MAZ, Kamran M, **Muhammad, K**. Identification of the Optimal Operating Parameters of Locally Available Coal for Use in Pakistani Industries. *JOURNAL OF ENGINEERING AND APPLIED SCIENCES*. 2018; 37(1), 20-25. Retrieved from <http://researcherslinks.com/current-issues/IDENTIFICATION-OF-THE-OPTIMAL-OPERATING/31/5/3070>
13. **Muhammad K**, Shah, A. Minimizing Backbreak at Deewan Cement Limestone Quarry using artificial Neural Network. *Archives of Mining Sciences*. 2017; 62(4): 795-806. <https://doi.org/10.1515/amsc-2017-0055>

14. Abbas N, **Muhammad K**. Optimization of Operating and Design Parameters of Water only Cyclone using Cherat Coal in Pakistan. J Nucl Ene Sci Power Generat Technol. 2016; 5:2 <https://doi.org/10.4172/2325-9809.1000149>
15. **Muhammad K**, Mohammad N, Rehman F. Modeling Shotcrete Mix Design using Artificial Neural Network. Computers and Concrete. 2015; 15(2):1-20. <https://doi.org/10.12989/CAC.2015.15.2.167>
16. Usman T, **Muhammad K**. Analysis of Blasting Operation at Deewan Cement Quarry, Hattar: Principal Component Analysis. JEAS. 2013; 32(1):1-10. <http://researcherslinks.com/current-issues/MODELING-OF-BLASTING/31/5/3218>
17. **Muhammad K**, Glass HJ. Modelling Short-Scale Variability and Uncertainty During Mineral Resource Estimation Using a Novel Fuzzy Estimation Technique. Geostandards and Geoanalytical Research. 2011; 35: 369–385. <https://doi.org/10.1111/j.1751-908X.2010.00051.x>

Reviewer of 7 Scientific Journals (13 reviews):

<https://www.webofscience.com/wos/author/record/AFN-5158-2022>

Conferences

1. 5 days of Training for Geoscientists AI based solutions for Mining Industry (Dec 2021)
2. Keynote Speaker at 1st IEEE international Conference on Artificial Intelligence organized by National Centre of AI at NUST, Islamabad 5-7 April 2021 "AI products for Minerals Industry developed at Intelligent Information Processing Lab"
3. Exploration of geosciences using advanced geo-information tool Conference. Organized by GIS & Space Application in Geosciences Lab at National Centre of Excellence in Geology University of Peshawar June 25, 2021 "From AI based 2D mapping to 3D geological Modelling."
4. Invited speaker at 3rd International Symposium on Chemical and Mineral Resource Engineering (ISCMRE'21). Organized by Pakistan Institute of Engineering and Applied Sciences Islamabad Pakistan. 26 and 27 October 2021. "AI based solutions for the Minerals Industry".
5. Young geoscientists Conference, University of Exeter, UK 10 Oct, 2007 "Predicting geology using fuzzy logic"
6. UK Minerals Conference, Imperial College, London, UK 9-10 Sep, 2007 "Application of Fuzzy Logic in Mineral Resource Estimation"

References

- 1- Prof Hylke J Glass, Rio Tinto Professor of Mining and Minerals Engineering, University of Exeter, Penryn, UK. Email: H.J.Glass@exeter.ac.uk Telephone: 0044-1326 371823
- 2- Prof. Khan Gul Jadoon, Chairperson Mining Engineering, BUITEMS Quetta, Baluchistan. khan.gul@kiu.edu.pk