UMER MAJEED
Data Scientist
AI & Web3 Engineer

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🎓 scholar.google.com/citations?
user=LrsLEJgAAAAJ
Citations: 600+

SUMMARY

An experienced Data Scientist and innovative Web3 Developer with a Ph.D. candidacy in Computer Science & Engineering. Proficient in utilizing Python, R, SQL, and JavaScript for data analysis, machine learning, and blockchain projects. Skilled in data visualization tools like Plotly and Dash, with a solid foundation in Pandas and NumPy for data manipulation. Expertise in Solidity and Node.js for blockchain technologies and DApps, with a proven track record in implementing smart contracts, DAOs, ERC-20, and ERC-721 projects. Demonstrated success in developing predictive models, conducting in-depth exploratory data analysis, and advancing federated learning and blockchain applications. Published researcher with a focus on leveraging data science, AI, and blockchain for innovative solutions. Eager to apply expertise in statistical analysis, machine learning, and Web3 development to drive impactful insights and contribute valuable insights to dynamic and collaborative teams.

SKILLS

PLs & Frameworks:	Python, R, SQL, C++, Julia, Dash, TensorFlow, PyTorch, Keras, Solidity, JavaScript, Node.js, TypeScript, React.js, Next.js
Libraries & Technologies:	NumPy, pandas, Matplotlib, Plotly, Seaborn, scikit-learn, NLTK, ggplot2, hardhat, brownie, Web3.js, ethers.js, MetaMask, Infura, Alchemy, Ethernal, Chai, Ganache, surya, openzeppelin-solidity, Truffle
Familar IDEs:	JupyterLab/ Jupyter Notebook, PyCharm, Remix, RStudio, VS Code, Google Colab
Familar OS:	Ubuntu, Windows

SELECTED PUBLICATIONS

International Journals

★ DAOs
★ ERC-721
★ Multi-Signatures Contract
★ Non-Transferable Tokens (NTTs)
★ IPFS
★ Hardhat

Umer Majeed et al., "DAO-FL: Enabling Decentralized Input and Output Verification in Federated Learning with Decentralized Autonomous Organizations," TechRxiv. Preprint, Dec 2023.
www.github.com/umermajeedkhu/DAOFLcode/tree/main/contracts
- Developed DAO Membership Tokens (DAOMTs) for governance, implementing mintable and soulbound tokens to facilitate decentralized decision-making and member management within DAOs.
- Engineered a decentralized framework for input and output verification in federated learning, leveraging DAOs and ERC-721 tokens to enhance security and transparency.

ERC-20
ERC-721
hardhat
Ethereum
Surya
IPFS

Umer Majeed et al., "FL-Incentivizer: FL-NFT and FL-Tokens for Federated Learning Model Trading and Training," IEEE Access, Jan 2023 www.github.com/umermajeedkhu/FL-Incentivizer/tree/master/
- Incentivized learners to submit local models to the federated learning server by implementing a reward system using ERC-20 tokens for participants.
- Developed a mechanism to commercialize the federated learning global model by tokenizing it as ERC-721 based dynamic NFT.

★ Structured Transparency
★ Homomorphic Encryption
★ Input Privacy
★ Output Privacy
★ Output Verification
★ Flow Governance

Umer Majeed et al., "ST-BFL: A Structured Transparency empowered cross-silo Federated Learning on the Blockchain framework," IEEE Access, Nov. 2021.
- Developed a blockchain-based framework enhancing data privacy in federated learning through structured transparency and homomorphic encryption.
- Implemented smart contracts and output verification mechanisms to ensure accountability and integrity in collaborative machine learning processes.

★ Consensus Algorithm
★ Blockchain technology
★ Blockchain Platforms
★ Smart contracts
★ Smart city

Umer Majeed et al., "Blockchain for IoT-based Smart Cities: Recent Advances, Requirements, and Future," Journal of Network and Computer Application, Vol. 181, pp.1-22, May 2021.
- Conducted a comprehensive literature review to formulate blockchain genesis, inception, and further enhancements in blockchain technology in chronological order in terms of constituent technologies, consensus algorithms, and blockchain platforms.
- Identified and discussed applications, case studies, and data-centric requirements and challenges for blockchain-enabled smart cities.

International Conferences

★ Transfer Learning
★ Federated Learning
★ TensorFlow Federated
★ Secure Aggregation
★ Time-related Statistical Features

Umer Majeed et al., "Cross-Silo Model-Based Secure Federated Transfer Learning for Flow-Based Traffic Classification," ICOIN 2021. https://doi.org/10.1109/ICOIN50884.2021.9333905
- Developed a federated transfer learning scheme for traffic classification using deep learning on multi-organizational datasets, enhancing accuracy and efficiency through knowledge transfer in a cross-silo setting.
- Ensured data privacy in federated learning by implementing a secure aggregation protocol.

★ Deep Learning
★ Traffic Classification
★ Horizontal FL
★ TensorFlow Federated
★ Feature Engineering
★ Time-related Statistical Features

Umer Majeed et al., "Cross-Silo Horizontal Federated Learning for Flow-based Time-related-Features Oriented Traffic Classification," APNOMS 2020.
https://doi.org/10.23919/APNOMS50412.2020.9236971

· Developed a federated learning model for traffic classification using flow-based time-related features, enhancing privacy and data security.
· Demonstrated the effectiveness of deep learning techniques in traffic classification, showcasing advanced data analysis methodologies.

★ Federated Learning
★ Blockchain
★ MEC
★ channel-specific ledgers
★ model state trie
★ Security enhancement

Umer Majeed et al., "FLchain: Federated Learning via MEC-enabled Blockchain Network," Proceedings of the 20th Asia-Pacific Network Operations and Management Symposium (APNOMS), pp. 1-4, Sep. 2019.

· Introduced FLchain, a novel architecture that combines blockchain with Federated Learning to enhance data security and privacy through the use of channel-specific ledgers and a global model state trie.
· Showed that FLchain outperforms traditional Federated Learning methods by providing robust provenance and maintaining an immutable, auditable learning model.

Korean Journals

★ Mining Pool Selection
★ Probabilistic Approach
★ Reward Mechanism
★ Propagation Delay
★ Winning Probability

Umer Majeed et al., "Mining Pool Selection Strategy in Blockchain Networks: A Probabilistic Approach," KIISE Transactions on Computing Practices, Vol. 26, No. 6, pp. 280-285, June 2020.

· Proposes a probabilistic approach for selecting mining pools to enhance miners' income stability in blockchain networks.
· Analyzes the effects of mining strategies on propagation delay and winning probability, emphasizing the role of collaboration and reward mechanisms.

CERTIFICATIONS AND MOOCS

★ Generative AI Tools
★ Data Augmentation
★ Querying Databases
★ Feature Engineering
★ Ethics in AI
★ Data Visualization
★ Matplotlib
★ Seaborn
★ Dash / Plotly
★ Geospatial Data
★ Dashboards
★ ML Models
★ Data Pipelines
★ DDL / DML
★ Advanced SQL
★ Python Integration
★ Cloud Databases
★ CRISP-DM
★ Financial Data
★ Data Management
★ Data Integration
★ Model Building
★ Model Deployment
★ Model Monitoring
★ Cloud-Based Tools
★ Data Literacy
★ ETL
★ Big Data
★ Data Pipelines

IBM Data Science Professional Certificate - Coursera - Audit Completed with Labs
https://www.coursera.org/professional-certificates/ibm-data-science

· **Generative AI: Elevate Your Data Science Career - July, 2024** - Learn generative AI tools for data preparation and querying, engage in hands-on labs, explore real-world use cases, and understand ethical considerations in data science.
· **Machine Learning with Python - June, 2024** - Study machine learning fundamentals, including regression, classification, and clustering methods. Gain practical experience with Python libraries and complete a final project to showcase your skills.
· **Data Visualization with Python - June, 2024** - Implement data visualization techniques with libraries such as Matplotlib and Plotly, build interactive dashboards, and apply skills through hands-on projects.
· **Data Analysis with Python - May, 2024** - Develop skills in data cleaning, exploratory data analysis, and visualization. Build and evaluate ML models, and create efficient data pipelines.
· **Databases and SQL for Data Science with Python - May, 2024** - Learn SQL from basics to advanced, integrate with Python, and work with real-world datasets. Explore relational and cloud databases.
· **Data Science Methodology - April, 2024** - Apply CRISP-DM methodology to structure projects, prepare data, build and evaluate models, and understand iterative improvements.
· **Python Project for Data Science - April, 2024** - Extract and analyze stock data using Python, build dashboards to visualize trends, and demonstrate proficiency in data analysis projects.
· **Python for Data Science, AI & Development - April, 2024** - Learn Python basics, data structures, Pandas, Numpy, web scraping, REST APIs, and data collection methods.
· **Tools for Data Science - April, 2024** - Explore tools for data management, integration, visualization, model building, and deployment. Learn about popular open-source and cloud-based tools.
· **What is Data Science? - April, 2024** - Understand data science fundamentals, career paths, big data processing, ETL, and data pipelines. Gain insights into data science applications and cloud computing.

★ Neural Networks
★ Back-propagation
★ Hyperparameters
★ Regularization
★ Optimization
★ TensorFlow
★ Dropout
★ CNN Basics
★ Advanced Architectures
★ Object Detection
★ RNNs
★ GRU
★ LSTM
★ Attention Models
★ NLP
★ Transformers

Deep Learning Specialization - Coursera
https://www.coursera.org/specializations/deep-learning

· **Neural Networks and Deep Learning - Completed - July, 2021 -** ✱ - Gain a deep understanding of neural networks, implement architectures, and optimize through hyperparameter tuning and regularization.
· **Improving Deep Neural Networks - Completed - August, 2021 -** ✱ - Explore advanced techniques like hyperparameter tuning, optimization algorithms (Adam, RMSprop), regularization methods (dropout, batch normalization), and implement models using TensorFlow.
· **Structuring Machine Learning Projects - Completed - Oct. 2021 -** ✱ - Diagnose errors in ML systems, implement strategies like end-to-end learning and transfer learning, and set human-level performance benchmarks for complex tasks.
· **Convolutional Neural Networks - Completed - Oct. 2021 -** ✱ - Explore CNN layers, advanced architectures like ResNet, apply object detection techniques (YOLO, U-Net), and create models for applications like face recognition and neural style transfer.
· **Sequence Models - In progress** - Implement RNNs, GRUs, LSTMs, and transformers for NLP tasks like machine translation and named entity recognition, and apply attention mechanisms for enhanced performance.

★ Fundamentals
★ Cryptography
★ Consensus Protocols
★ Types of Blockchains
★ Solidity
★ Smart Contracts
★ Dapp Development
★ Truffle Suite
★ Hyperledger Fabric
★ Blockchain Security
★ Blockchain Ecosystem

Blockchain Specialization - University of Buffalo - Coursera
https://www.coursera.org/account/accomplishments/specialization/R7EPJZBHSMGH

- **Blockchain Basics - Completed - Dec. 2018 - ✹** - Understand the core principles of blockchain technology, including its structure, cryptographic security, and consensus mechanisms like PoW and PoS.
- **Smart Contracts - Completed - July, 2019 - ✹** - Learn to design, code, and deploy smart contracts using Solidity, and implement best practices for secure and efficient contract development.
- **Decentralized Applications (Dapps) - Completed - Jan. 2020 - ✹** - Develop end-to-end Dapps, integrate with front-end interfaces using MetaMask, and deploy using Truffle Suite.
- **Blockchain Platforms - Completed - Feb. 2020 - ✹** - Explore platforms like Hyperledger Fabric and Microsoft Azure, and analyze decentralized solutions like IPFS and Hashgraph.

★ Privacy Techniques
★ Federated Learning
★ Secure Multi-Party Computation
★ Differential Privacy
★ Remote Execution

Cryptography, Private & Secure AI / Data Science Courses - OpenMined
https://courses.openmined.org/courses

- **Our Privacy Opportunity - Completed - Mar. 2021** - Explore structured transparency, privacy techniques, and the privacy-transparency trade-off.
- **Foundations of Private Computation - Ongoing - Progress 80%** - Implement federated learning, secure multi-party computation, homomorphic encryption, and differential privacy.
- **Introduction to Remote Data Science - Completed - Feb. 2022** - Use remote execution tools, deploy Domain Nodes, and apply privacy-preserving techniques for distributed data science.

★ React/ Next.js
★ ICO/DAOs
★ NFTs / DEX
★ Layer 2
★ ENS/ IPFS
★ Ceramic
★ Chainlink VRFs
★ Smart contract testing
★ Smart contract Security
★ Graph's Indexer
★ Merkle Trees

Ethereum Developer Degree - learnweb3.io - in progress   opensea.io/umermajeed

- Freshman Graduate - LearnWeb3 DAO Graduates
  Fundamentals of blockchain, ethereum, solidity, web3, dApps and crypto technology.
- Sophomore Graduate - LearnWeb3 DAO Graduates
  Deep understanding of gas, mining, PoW, PoS, EVM, Solidity, React and Next.js. build full dApps with custom contracts, NFTs, DAOs, ICOs, and DEX.
- Junior - in progress - *Explore Layer 2 solutions, ENS integration, local smart contract testing, IPFS, NFTs, Ceramic, Chainlink VRF, and The Graph's Indexer.*
- Senior - in progress - *Master Web3 essentials: Merkle Trees, Flash Loans, Smart Contract Security, MEV, Gas Optimization, Metatransactions, and more.*

★ Web3
★ DAOs
★ Governance tokens
★ Smart contracts
★ Digital assets
★ Blockchain design principles

Web3 and Blockchain Fundamentals- INSEAD- Coursera - Completed -Feb, 2024
https://www.coursera.org/learn/web3-blockchain-fundamentals

- Understanding the foundational technology of Web3 and its implications for decentralized systems.
- Exploring the various types of digital assets and their roles in blockchain ecosystems.
- Identifying the design principles and challenges associated with implementing blockchain technology in real-world scenarios.

★ Python Syntax
★ Python automation
★ Code reuse
★ Refactoring
★ error handling
★ Problem solving framework

Crash Course on Python- Google - Coursera - Completed - March, 2020
www.coursera.org/account/accomplishments/verify/FEZNE2LWZJC2

- Comprehensive introduction to programming and Python basics for automation tasks in IT roles.
- Covers syntax, data types, loops, and advanced string manipulation with hands-on exercises.
- Equips learners with skills to write Python scripts and solve complex programming challenges effectively.

★ AI Terminology
★ AI Strategy
★ Machine Learning Workflow
★ Data Science Workflow
★ Ethical AI
★ AI and Society

AI For Everyone - Andrew Ng - Coursera - Completed - Dec. 2019
https://www.coursera.org/account/accomplishments/verify/E9QHLH2A529C

- A non-technical introduction to AI, covering key terminology, ethical considerations, and practical AI strategy.
- Insights into building AI/data science workflows, recognizing AI opportunities, and working with AI teams effectively.
- Discusses the societal and ethical implications of AI, including bias, adversarial attacks, and impacts on jobs and developing economies.

★ Business Networks
★ Hyperledger Composer
★ Hyperledger Fabric
★ Access Control
★ Network consensus

IBM Blockchain Foundation for Developers- IBM- Coursera - Completed -Aug, 2018
www.coursera.org/account/accomplishments/verify/6GA4B4BZQFK7

- An overview of blockchain and distributed ledger systems in a business environment. It covers important concepts, key use cases, and the transfer of assets in a blockchain network.
- The structure and components of Hyperledger Composer and Fabric, and how to model, build, and interact with a blockchain application.
- Roles and responsibilities of those involved in building and maintaining a blockchain business network.

- ★ Python Basics
- ★ Data Types
- ★ Data visualization
- ★ pundas
- ★ numpy
- ★ seaborn
- ★ matplotlib
- ★ EDA
- ★ SQL
- ★ Statistical Thinking
- ★ Statistical Analysis
- ★ Relational Database
- ★ SQL JOINs
- ★ SQL Aggregation
- ★ Git/ Github
- ★ Command line
- ★ CLI piping

Datacamp

https://www.datacamp.com/portfolio/umermajeed

- · Introduction to Python - Completed - 2017
- · Intermediate Python - Completed - 2017
- · Data Types for Data Science in Python - Completed - 2017
- · Python Data Science Toolbox (Part 1) - Completed - 2017
- · Python Data Science Toolbox (Part 2) - Completed - 2017
- · Statistical Thinking in Python (Part 1) - Completed - 2017
- · Statistical Thinking in Python (Part 2) - Completed - 2017
- · Introduction to Version Control with Git - Completed - 2018
- · Intermediate SQL Queries - Completed - 2017
- · Introduction to Shell - Completed - 2018
- · Introduction to Data Visualization in Python - Completed - 2017
- · Intermediate Data Visualization with Seaborn - Completed - 2018

EDUCATION

2017 - Present	**Master & Ph.D. (Combined) in Computer Science & Engineering**	**CGPA 4.11/4.3**
	Department of Computer Science & Engineering, Kyung Hee University, Yongin, South Korea	
2011 - 2015	**BS Electrical (Telecommunication) Engineering**	**CGPA 3.83/4.00**
	National University of Sciences & Technology (NUST), Islamabad, Pakistan	

EXPERIENCE

2015 – 2016   **PHP developer**   **Artologics, Islamabad, Pakistan**

- · Developed robust back-end applications using Core PHP and CodeIgniter framework.
- · Implemented jQuery and JavaScript to facilitate smooth communication between the user interface and server-side components via AJAX requests, enhancing the interactivity of web application.
- · Employed SQL queries to interface with MySQL databases, ensuring data integrity and reliability while developing robust solutions for efficient data management.

```
PHP / SQL / CodeIgniter / jQuery / AJAX / JavaScript / APIs
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BADGES

Founder's Badge - LearnWeb3 Badges

www.opensea.io/assets/matic/0x60f028C82f9f3bF71eOC13fE9e8E7f916b345C00/262556

The founder's badge was airdropped to students who were early adopters of LearnWeb3.

LANGUAGES

English - Proficient (written and verbal), **Urdu** - Native, **Korean** -Beginner (TOPIK Level 2)