

# Dr. Anwar Said

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## About

I am currently an AI Research Scientist at the Institute for Software Integrated Systems, Vanderbilt University, TN, USA. Prior to that, I was a postdoc at Vanderbilt University. I received my PhD in Computer Science from Information Technology University (ITU) and was a member of Artificial Intelligence Lab. My research primarily intersects the fields of data science and machine learning, with a focus on graph representation learning, social network analysis, and graph theory with applications in Anhedonia detection, drug discovery and development, social networks and education. I actively participate in top conferences and journals in these domains, contributing through both publications and serving as a PC member and a reviewer. My works have been published in renowned venues such as NeurIPS, Neurocomputing, Applied Soft Computing, and TKDE, among others.

## Experience

- **AI Research Scientist** Oct. 2023 - Present  
Institute for Software Integrated Systems,  
Department of Computer Science,  
Vanderbilt University, TN, USA.
- **Postdoctoral Research Scholar** Mar. 2021- Sep. 2023  
Department of Computer Science,  
Vanderbilt University, TN, USA.  
Advisor: Prof. Xenofon Koutsoukos Area: Graph machine learning and its applications
- **Graph Data Scientist** May 2021 - Mar. 2022  
BUILD & CODE Germany  
As a Graph Data Scientist, my responsibilities include developing advanced machine learning models for the completion of a huge knowledge graph, which contained over 10 billion data points. It was a challenging but rewarding experience to work on a project of such a massive scale, and it allowed me to gain valuable experience in handling and processing big data. I worked on a range of advanced machine learning techniques, including Graph Neural Networks (GNNs), classical ML methods, Neo4J and Cypher.
- **C++ Programmer** Jul. 2014 - Sep. 2017  
Shaheen Foundation, Islamabad

As a C++ programmer, my role primarily revolved around the development and implementation of advanced QT applications for a diverse range of clients. I worked in close collaboration with a team of professionals, where my responsibilities involved not only the programming aspects but also requirement engineering, model prototyping, testing, and seamless deployment of high-quality solutions. My proficiency in C++ programming and extensive experience with QT allowed me to deliver bespoke solutions that met the unique and complex requirements of the clients.

## Education

- Ph.D. Computer Science** Nov. 2021
- Information Technology University, Lahore, Pakistan

- Advisors: Prof. Saeed-Ul Hassan, Prof. Mudassir Shabbir
- *Dissertation*: Novel Graph Representations for Machine Learning Applications

**M.Phil. Computer Science**

Aug. 2016

- Quaid-i-Azam University, Islamabad, Pakistan
- *Dissertation*: Discovering Community Structure of Complex Networks
- Major Area of Study: Social Network Analysis, Graph Theory
- Minor Area of Study: Artificial Intelligence

**M.Sc. Computer Science with Distinction**

Dec. 2013

- University of Swat

**Research  
Experience**

Vanderbilt University

**Postdoctoral Research Scholar**

Mar. 2022 - Present

Research Interests: Graph Machine Learning, Graph Descriptors,  
Circuit Design Completion, Data Science, Graph Theory

Information Technology University, Lahore

Sep. 2017 - Oct. 2022

**PhD Fellow**

Projects: Graph Machine Learning, Social Network Analysis, Altmetrics,  
Ethereum Network Analysis, Call Data Record Analysis, Federated Learning

**Master Student:** Quaid-i-Azam University, Islamabad

Aug. 2016 - Sep. 2017

Research areas: Community detection in social networks,  
Genetic Algorithms, Machine Learning

**Teaching  
Experience**

Information Technology University, Lahore

Teaching Assistant for:

Aug. 2018 - June 2020

- Advanced topics in social Network Analysis (Spring 2018)
- Information retrieval (Fall 2018)
- Database (Spring 2019)
- Data Science (Fall 2019)
- Data Structures (Spring 2020)

Instructor at Hira and Khyber Technical College, Kabal, Swat

2009-2011

- Physics (Undergrad/college level)
- Surveying (Undergrad/college level)
- Mathematics (Undergrad/college level)
- Chemistry (college level)

**Workshops/tutorials**

- Co-organized Data Science for Social Good (DSSG) workshop at KDD 2023 in Long Beach, CA.

## Awards and Honors

- Recipient of the Vanderbilt University, *Postdoctoral Research Scholar Fellowship*
- Recipient of the *travel grant* for attending the “Youth in High Dimensions: Machine Learning, High-dimensional Statistics, and Inference for the New Generation” Conference, 2020, ICTP, Trieste, Italy.
- Recipient of the Information Technology University, *Ph.D. Fellowship*
- Recipient of the *Gold Medal* from University of Swat for achieving highest academic ranking

## Tools Developed

- I have developed NeuroGraph, a tool for preprocessing fMRI data and graph-based neuroimaging benchmarks. For more details, visit NeuroGraph’s website, documentation and paper
- Released an initial version (WiP) of our web-based application for benchmarking graph neural networks (2023). (Link to the app)
- Released a python package with reproducibility check by CodeOcean for our graph augmentation framework appeared in publication entitled “On Augmenting Topological Representations for Attributed Graphs”, Applied Soft Computing, 2023. (Link to the package)
- Released a python library for our graph descriptor appeared in publication entitled “DGSD: Distributed graph representation via graph statistical properties”, Future Generation Computer Systems (2021). (Link to the package)
- Released Python package for CC-GA, our community detection algorithm appeared in publication entitled “CC-GA: A clustering coefficient based genetic algorithm for community detection in social networks (2018)”. Every two weeks, this repository has an average of **100** number of clones. (Link to the package)

## Publications

1. **Anwar Said**, Xenofon Koutsoukous, PropEnc: A Universal Property Encoder for Machine Learning on Graphs, in submission to AAAI2025
2. **Said, A.**, Derr, T., Shabbir, M., Abbas, W., Koutsoukos, X., Graph Unlearning: A review. ArXiv preprint arXiv:2310.02164 2023 (In submission to ACM computing surveys)
3. Obaidullah Ahmad, **Anwar Said**, Waseem Abbas, Mudassir Shabbir, & Xenofon Koutsoukos, Control-based Graph Embeddings with Data Augmentation for Contrastive Learning, ACC 2024
4. Gupta, S., Khanna, A., Talusan, J. P., **Said, A.**, Freudberg, D., Mukhopadhyay, A., & Dubey, A. (2024, June). A Graph Neural Network Framework for Imbalanced Bus Ridership Forecasting. In 2024 IEEE International Conference on Smart Computing (SMARTCOMP) (pp. 14-21). IEEE.
5. Muhammad Ali, **Anwar Said**, Iqra Safder, Saeed Ul Hassan, Naif Radi Aljohani, Mudassir Shabbir, MSDGSD: A Scalable Graph Descriptor for Processing Large Graphs, IEEE Transactions on Computational Social Systems
6. Sandborn, M., Olea, C., **Said, A.**, Shabir, M., Volgyesi, P., Koutsoukos, X., & White, J. (2024). Towards AI-augmented design space exploration pipelines for UAVs. Artificial Intelligence: Machine Learning, Convolutional Neural Networks and Large Language Models, 1, 309.
7. **Said, A.**, Ahmad, O. U., Abbas, W., Shabbir, M., & Koutsoukos, X. (2023). Network Controllability Perspectives on Graph Representation. IEEE Transactions on Knowledge and Data Engineering.

8. **Anwar Said**, Obaidullah Ahmad, Waseem Abbas, Mudassir Shabbir, & Xenofon Koutsoukos, Improving Graph Machine Learning Performance Through Feature Augmentation Based on Network Control Theory, MED2024
9. **Said, A.**, Shabbir, M., Abbas, W., Derr, T., Koutsoukos, X., Empowering Graph Neural Networks using Subgraph Embeddings, ICMLA2023
10. **Said, A.**, Bayrak, R. G., Derr, T., Shabbir, M., Moyer, D., Chang, C., & Koutsoukos, X. (2023). NeuroGraph: Benchmarks for Graph Machine Learning in Brain Connectomics, Thirty-seventh Conference on Neural Information Processing Systems Datasets and Benchmarks Track, 2023.
11. Athar, S., Abbasi, R. A., Saeed, Z., **Said, A.**, Razzak, I., & Salim, F. D. (2023). ASBiNE: Dynamic Bipartite Network Embedding for incorporating structural and attribute information. World Wide Web, 1-19.
12. Ahmed, A., **Said, A.**, Shabbir, M., Koutsoukos, X., Sequential Graph Neural Networks for Source Code Vulnerability Identification, ACM Symposium on the Science of Security 2023.
13. **Said, A.**, Shabbir, M., Hassan, S. U., Hassan, Z. R. & Ahmed, A. On Augmenting Topological Graph Representations for Attributed Graphs, Applied Soft Computing journal, Elsevier (2023).
14. **Said, A.**, Shabbir, M., Broll, B, Volgyesi, P, Abbas, W, & Koutsoukos, X., "Circuit Design Completion Using Graph Neural Networks", journal of Neural Computing and applications (2023).
15. Sandborn, M., Olea, C., **Said, A.**, Shabbir, M., Volgyesi, P., Koutsoukos, X., White, J., What a drag! Streamlining the UAV design process with design grammars and drag surrogates, the 2022 International Conference on Computational Science & Computational Intelligence (CSCI'22)
16. Attaullah, Abbasi, R A., Khattak, A. and **Said, A.** Identifying Misinformation Spreaders: A Graph-Based Semi-Supervised Learning Approach, Multimedia Evaluation Benchmark Workshop 2022
17. Mian, A., Shah, S, Ullah, S., **Said, A.**, Heimerl, K., & Crowcroft, J. A Value-Added IoT Service For Cellular Networks using Federated Learning, computer networks (2022).
18. **Said, A.**, Janjua, M. U., Hassan, S. U., Muzammal, Z., Saleem, T., Thaipsisutikul, T., ... & Nawaz, R. (2021). Detailed analysis of Ethereum network on transaction behavior, community structure and link prediction. PeerJ Computer Science, 7, e815.
19. **Said, A.**, Hassan, S. U., Tuarob, S., Nawaz, R., & Shabbir, M. (2021). DGSD: Distributed graph representation via graph statistical properties. Future Generation Computer Systems, 119, 166-175.
20. **Said, A.**, Hassan, S. U., Abbas, W., & Shabbir, M. (2021). NetKI: A kirchhoff index based statistical graph embedding in nearly linear time. Neurocomputing, 433, 108-118.
21. Hassan, S. U., Shabbir, M., Iqbal, S., **Said, A.**, Kamiran, F., Nawaz, R., & Saif, U. (2019). Leveraging Deep Learning and SNA approaches for Smart City Policing in the Developing World. International Journal of Information Management, 102045.
22. **Said, A.**, Bowman, T. D., Abbasi, R. A., Aljohani, N. R., Hassan, S. U., & Nawaz, R. (2019). Mining network-level properties of Twitter altmetrics data. Scientometrics, 120(1), 217-235.

23. **Said, A.**, Shah, S., Farooq, H., Mian, A., Imran, A., & Crowcroft, J. (2018). Proactive Caching at the Edge Leveraging Influential User Detection in Cellular D2D Networks. *Future Internet*, 10(10), 93.
24. Imran, M., Akhtar, A., **Said, A.**, Safder, I., Hassan, S. U., & Aljohani, N. R. (2018, September). Exploiting Social Networks of Twitter in Altmetrics Big Data. In 23rd STI 2018 conference, September 12-14, 2018, Leiden, The Netherlands. Centre for Science and Technology Studies (CWTS).
25. **Said, A.**, Abbasi, R. A., Maqbool, O., Daud, A., & Aljohani, N. R. (2018). CC-GA: A clustering coefficient based genetic algorithm for detecting communities in social networks. *Applied Soft Computing*, 63, 59-70.

**Volunteering as  
PC Member/Co-  
organizer**

- (PC Member) - GTA<sup>3</sup>: The 7th Workshop on Graph Techniques for Adversarial Activity Analytics, IEEE Big Data Conference 2023, Sorrento, Italy
- (PC Member) - SIAM International Conference on Data Mining (SDM'24)
- (PC Member)- The 17th Annual Vanderbilt Postdoctoral Association Symposium 2023, TN, USA
- (Co-organizer) KDD23 Data Science for Social Good Workshop at Long Beach, USA

**Referee Services  
Conferences**

- International Conference on Machine Learning (ICML) 2020 - Present
- Neural Information Processing Systems (NeurIPS) 2021 - Present
- Knowledge Discovery and Data Mining (SIGKDD) 2023 - Present
- International Conference on Web and Social Media (ICWSM) 2023-Present
- International Conference on Learning and Representations (ICLR24)

**Referee Services  
Journals**

- PNAS 2023 - Present
- Neurocomputing 2023 - Present
- Information Sciences Elsevier 2022 - Present
- Big Data Research Elsevier 2022 - Present
- Network Science 2022 - Present
- Swarm and Evolutionary Computation (Elsevier) 2017 - Present
- IEEE Access 2019 - Present
- IEEE Transactions on Computational Social Systems 2020-Present
- ACM Transaction on Social Computing 2020-Present
- Journal of Ambient Intelligence and Humanized Computing (AIHC) 2021

Co-mentoring	<b>Vanderbilt, University</b>	2022-present
	<ul style="list-style-type: none"> <li>● Hassan Mustafa, BS Computer Science</li> <li>- Communicability with Graph Neural Networks</li> <li>● Chengye Hao, BS Computer Science</li> <li>- Software vulnerability identification using graph machine learning</li> <li>● Yifan Wei, BS Computer Science</li> <li>- Anomaly detection and cloud security with graph neural networks</li> </ul>	
	<b>Quaid-i-Azam University, Islamabad</b>	
	<ul style="list-style-type: none"> <li>● Attaullah, M.Phil. Computer Science</li> <li>- Co-authored “Identifying Misinformation Spreaders: A Graph-Based Semi-Supervised Learning Approach” Multimideia Eval 2022</li> <li>● Sajjad Athar M.Phil. Computer Science</li> <li>- Co-authored “ASBiNE: Dynamic Bipartite Network Embedding for Incorporating Structural and Attribute Information” ES2021</li> </ul>	2022  2021
	<b>Information Technology University, Lahore</b>	
	<ul style="list-style-type: none"> <li>● Muhammad Ali, Master in Computer Science</li> <li>- Co-authored “MSDGSD: A Scalable Graph Descriptor for Processing Large Graphs” ITCSS 2022</li> <li>● Ammar Ahmed, Bachelor of Computer Science</li> <li>- Co-authored “Sequential Graph Neural Networks for Source Code Vulnerability Identification” HotSoS2023</li> <li>● Muhammad Huzaifa, Bachelor of Computer Science</li> </ul>	2022  2020  2019
	<b>Invited talks/guest lectures/presentations</b>	
	<ul style="list-style-type: none"> <li>● Gave a hands-on tutorial session on “reproducible project management” at the BrainHack event hosted at Vanderbilt University (Jan. 2024)</li> <li>● Presented our entitled “Enhanced Graph Neural Networks with Ego-Centric Spectral Subgraph Embeddings Augmentation” at ICMLA23 (Dec. 2023)</li> <li>● Presented our latest work entitled “NeuroGraph: Benchmarks for Graph Machine Learning in Brain Connectomics” at NeurIPS23 (Dec. 2023)</li> <li>● Presented our work on NeuroGraph tool at KDD2023 Graph learning workshop (June 2023)</li> <li>● Gave a guest lecture at Institute for Software Integrated Systems at Vanderbilt on “the design of NeuroGraph CWL workflow” (October 2023)</li> <li>● Gave a guest lecture at Tennessee State University on “Machine Learning at the Forefront of Molecular Analysis” (march 2023)</li> <li>● Graph Machine Learning in Circuit Design Completion</li> <li>● Presented our paper entitled “Sequential Graph Neural Networks for Source Code Vulnerability Identification” at HotSoS23.</li> <li>● Graph Neural Networks for Knowledge Graph Completion</li> <li>● On the Analysis of Cryptocurrency Networks</li> </ul>	2022       2022  2021
	Vanderbilt Postdoctoral Association Symposium	
	Blockchain Lab, ITU	

	<ul style="list-style-type: none"> <li>• Community Detection in Social Networks Intelligent Machine Lab, ITU</li> </ul>	2020
	<ul style="list-style-type: none"> <li>• Network Analysis for Social Good STI conference 2020</li> </ul>	2020
<b>Certification (courses)</b>	<ul style="list-style-type: none"> <li>• Responsible Conduct of Research course (RCR) (Vanderbilt) 2022</li> <li>• RCR training (Vanderbilt) 2022</li> <li>• Social Network Analysis (Vanderbilt)</li> <li>• Deep Learning (Coursera)</li> <li>• Machine Learning (Coursera)</li> <li>• Probability Theory (Coursera)</li> <li>• Linear Algebra (Online MIT)</li> <li>• Graph Machine Learning (Online Stanford)</li> <li>• Social Network Analysis (Online Stanford)</li> <li>• 1-year survey diploma (KPK TTB)</li> <li>• MS Office (SDC Peshawar)</li> <li>• AutoCAD (SDC Peshawar)</li> </ul>	
<b>Volunteering</b>	<ul style="list-style-type: none"> <li>• Volunteer services for Islamic Center of Nashville during Ramadan (2023)</li> <li>• Member of VPA Symposium planning committee (2023)</li> <li>• Volunteer at ICML 2021</li> <li>• Volunteer at NeurIPS 2022</li> <li>• Intro to CS @ Govt. Middle School Dhero (middle school students)</li> <li>• Intro to AI @ Govt. High School Kabal (high school students)</li> <li>• Intro to OOP @ Govt. JPG Swat (undergraduate students)</li> <li>• Volunteer flood relief in Swat</li> <li>• Volunteer with “save the children” NGO, Swat</li> <li>• Volunteer earthquake relief in Abbottabad</li> </ul>	2020 2019 2019 2011 2010 2005
<b>Programming Tools</b>	<ul style="list-style-type: none"> <li>• Python, Networkx, TensorFlow, Scikit-learn, PyG, PyTorch, Deep Graph Library, Multiprocessing, SQL, Neo4J, Cypher, C++, AWS, Jira, iGraph, Message Passing Interface (MPI), Socket Programming, Tableau, Docker, MLOps, Streamlit</li> </ul>	
<b>Research Impact</b>	Number of citations: 354 Impact factor: 85	