# Abdalgader Abubaker

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## Education

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| 2019 – 2021 | MSc, **Machine Intelligence**, African Institute for Mathematical Sciences (*Top 5*). |
| 2018 – 2019 | MSc, **Mathematics**, University of Khartoum (*Distinction*). |
| 2012 – 2017 | BSc (Hons), **Mathematics and Computer Sciences**, University of Khartoum (*First Class*). |

## Professional Experiences

**Aug. 2023 – Present**  **ML Research Engineer** at **Kera**, Remote.

I started a new position as ML research engineer for an early-staged startup called Kera. We are building an AI-powered platform and application for healthcare.

**Aug. 2021 – Feb. 2023**  **AI Resident** at **Meta**, London, UK.

I was working as full-time employee in the Modern Recommendation System (MRS) team to build a graph-based recommendation system for better user experience at Meta platforms (Facebook, Instagram, etc). My research focus was on building scalable, high-performance graph-based novel algorithm.

**Nov. 2020 – Jul. 2021**  **AI Research Associate** at **LIVIA - École de Technologie Supérieure ÉTS**, Montreal, Canada.

I joined LIVIA research group as a AI research associate to collaborate on large research project at the intersection of graph machine learning and software engineering.

**Jun. 2020 – Dec. 2020**  **AI Research Intern** at **Mila-Quebec AI Institute**, Montreal, Canada.

It was paid internship. I was working in research area comprise Meta-Learning and Graph Representation Learning (GNNs) to tackle the drug discovery challenges. I supervised by Prof. Samira E. Kahou under fund of Prof. Doina Precup.

**May 2019 – Aug. 2019**  **Software Developer** at **Financial and Banking System Co. Ltd**, Khartoum, Sudan.

I worked in the development and deployment core bank system "Meezan", as service for many banks in Sudan. It was 3 months training position.

## Academic Positions

**Jan. 2019 – present**  **Lecturer at Pure Mathematics Department, University of Khartoum**, Khartoum, Sudan.

**Nov. 2017 – Dec. 2018**  **Teaching Assistant at Pure Mathematics Department, University of Khartoum**, Khartoum, Sudan.

## Researches & Projects

**AI/ML**

**2022 – 2023**  **Pretraining Hypergraphs Neural Networks**

At Meta, I worked on developing a novel pretraining framework that leveraging the hypergraph structure to generate informative node embeddings, and use these embeddings for different downstream tasks and usecases. *This work has led to a publication and now is under review.*

**2020 – 2021**  **From Legacy System to Microserveices**

At LIVIA, I was working on a research to develop machine learning based architecture to migrate the monolithic legacy system to microservices. The framework use several ML models such as GNNs. This work accepted at *Journal of Software: Evolution and Process.*

**2020**  **Meta-Learning for Graph Representation with Application to Drug Discovery**

At Mila, I was working to develop a machine learning model to foretell the link connections in sparse graphs using graph representation methods with meta-learning paradigm.

**2020**  **Automatic Speech Recognition for Arabic Language.**

It was a mini-project aim to generate an ASR model for the Arabic language, using our own recorded 2-hours labeled dataset and pre-train using CPC self-supervision and fine-tune using CTC.

**2020**  **DNA Sequence Classification**

Using kernel methods to predicting whether a DNA sequence region is binding site to a specific transcription factor. The project was a Kaggle's challenge.

**2020**  **Cassava Disease Classification**

In this project, we used deep learning algorithms besides building a data pipeline to classify Cassava plant images, categorized in four different diseases (CBB, CBSD, CGM, CMD) and one healthy class. This project was a Kaggle's challenge.

**2019**  **Audio-Classifier**

Reproduced the paper "VERY DEEP CONVOLUTIONAL NEURAL NETWORKS FOR RAW WAVEFORMS, Wei Dai et al." by building a deep Convolutional Neural Networks (CNN) for five different architectures M3, M5, M11, M18, and M34-res on UrbanSound dataset using Pytorch.

**Cryptography**

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| 2018 – 2019 | **Zero-Knowledge Proofs** |
| | By made a research on Zero-Knowledge Proofs techniques I implemented the Prime Factorization scheme by using Java Security framework as a proof of concept. |
| 2017 – 2018 | **Secure Mailing System Using Signcryption** |
| | As graduation team-project, we built an email client that applies a Signcryption scheme to provide confidentiality and authentication. The scheme security is on a par with encryption and digital signature schemes of comparable parameters but at a lower cost using Java. |

## Journal Publications

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| 2022 | From Legacy to Microservices: a Type-based Approach for Microservices Identification using ML and Semantic Analysis, I. Trabelsi, M. Abdellatif, **A. Abubaker**, N. Moha, S. Mosser, S. Ebrahimi-Kahou, and Y. Guéhéneuc. |
| | [Paper] *Accepted at Journal of Software: Evolution and Process.* |

## Preprints

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| 2023 | Self-Supervised Pretraining for Heterogeneous Hypergraph Neural Networks, *Abdalgader Abubaker et al.* |
| 2020 | A Comparative Study of Graph Representations for Few-Shot Link Prediction, *Abdalgader Abubaker et al.* |

## Engineering Skills

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| Programming Languages/Skills | Python, Linux/Unix shell scripting, Algorithms analysis, design and optimization. |
| ML Frameworks | PyTorch, PyG, Scikit-Learn, NumPy, Pandas, Matplotlib. |
| Databases | Graph Database (Cypher Neo4j), SQL, MySQL/PostgreSQL, NoSQL, Dockers. |
| Infrastructure | GCP, AWS (SageMaker), Parallel Computing and Distributed Training. |
| MLOps | Designing ML systems, Data engineering, Model deployment. |
| OS | Linux, Mac and Windows. |
| Others | Git, LaTeX, Java (security), Matlab, HTML/CSS. |

## Awards and Scholarships

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| 2019 | Google and Facebook Full Scholarship for AMMI Program (MSc). |
| 2018 | Sudan's Ministry of Higher Education (MSc) Scholarship. |
| 2017 | IEEE-Sudan Best Project Award (1st place) - title:"Secure Mailing System Using Signcryption". |
| 2015 | Exchange Program: Beifang University of Nationalities, Ninxia, China. (given to the top 5 students) |

## Conferences & Summer Schools

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| Dec. 2022 | Learning on Graph (LoG) Meetup @ University of Cambridge, Cambridge, UK. |
| Sep. 2020 | Montreal AI Symposium, Montreal, Canada - (Virtual). |
| Aug. 2020 | Machine Learning Summer Schools-MLSS— Indonesia - (Virtual). |
| Jun. 2020 | Machine Learning Summer Schools-MLSS — Tübingen, Germany - (Virtual). |
| May 2020 | Computer Vision and Pattern Recognition (CVPR)- Volunteer (Virtual). |
| Mar. 2019 | CIMPA: Hyperplane Arrangements, Recent Advances and Open Problems - Hanoi, Vietnam. |

## Memberships & Academic Services

- Reviewer for *Journal of Software: Evolution and Process*

- Member of Black in AI Community.

- Member of Sudanese Machine Learning Community (SMLC).

## Languages

English, Arabic, and French (beginner).