

# Amna Elmustafa

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## Education

### Stanford University

Predoc Research Fellowship

CA, USA

Sept 2022 - Current

- **Supervisors:** Stefano Ermon, David Lobell, Irene Lo, David Rolnick
- working on research projects at the intersection of Machine Learning and Global Development

### AIMS Senegal, Facebook, and Google

Mbour, Senegal

M.Sc in Mathematical Sciences

2021 -2022

- Graduated with Distinction in Research
- **Relevant Modules:** Foundations of ML/DL, Computer Vision, NLP, Optimization, Geometric DL, RL.

### Khartoum University

Khartoum, Sudan

B.Sc Electrical and Electronics Engineering

Sept 2013 - Sept 2018

- Graduated with Distinction
- **Relevant Modules:** Linear Algebra, Statistics and Probability, Data Structures.

## Publications and PrePrints

Bird Distribution Modelling using Remote Sensing and Citizen Science data

Mélisande Teng, **Amna Elmustafa**, Benjamin Akera, Hugo Larochelle, David Rolnick

arXiv preprint arXiv:2305.01079, **Best Paper Award** at ICLR workshop on Tackling Climate Change with Machine Learning (2023). 2023

HarvestNet: A Dataset for Detecting Smallholder Farming Activity Using Harvest Piles and Remote Sensing

Jonathan Xu\*, **Amna Elmustafa**\*, Liya Weldegebriel, Emnet Negash, Richard Lee, Chenlin Meng, Stefano Ermon, David Lobell

arXiv preprint arXiv:2308.12061 (2023). 2023

Understanding economic development in rural Africa using satellite imagery, building footprints and deep models

**Amna Elmustafa**, Erik Rozi, Yutong He, Gengchen Mai, Stefano Ermon, Marshall Burke, David Lobell

Proceedings of the 30th International Conference on Advances in Geographic Information Systems, 2022

A comparative study on human loco-motor activity recognition using wearable sensors

**Amna Abdallah**, Rawan S Abdulsadig, Magdi Amien

2019 International Conference on Computer, Control, Electrical, and Electronics Engineering (ICCCEEE), 2019

## Work/Teaching Experience

### Mila-Quebec AI Institute

Research Intern

Remote

2022 - Current

- Supervisors: David Rolnick

### AMMI-African Master of Machine Intelligence

Teacher Assistant

Senegal

Jan 2022 - July 2022

- Courses: Foundation of ML, DL, CV, NLP

### EPFL-ML and Optimization Lab

Research Intern

Remote

July 2022 - Sept 2022

- Supervisors: Annie Mary Hartly

### Omdena

Junior ML Engineer

Remote

June 2021 - August 2021

- Used NLP tools to predict business opportunities from meeting minutes and agendas before an RFP is posted

### Techno-Tec for IT solutions and services

Software Engineer

Sudan

June 2020 - December 2020

- Leader of back-end systems for web services team

### MT for Industrial Supplies and Services

Application Engineer

Sudan

May 2019 - June 2020

- Designed/implemented automation systems for oil/gas industry

### Khartoum University

Teaching Assistant

Sudan

Nov 2019 - March 2020

- Co-Instructor of Java language Lab

## Selected Projects

### Mapping Smallholder Farming Activity Using Harvest Piles and Remote Sensing in Ethiopia

CA, USA

Predoc research project

Sept 2022 - Aug 2023

- Used satellite images to detect harvest piles as a more accurate estimate for croplands in Ethiopia

### Masked Diffusion Models are Versatile Visual Learners

CA, USA

Predoc research project

Oct 2022 - Mar 2023

- Developed a general framework for discriminative(self supervised models) and generative models(diffusion models) using MAE as a backbone for both models

### Bird Distribution Modelling using Remote Sensing and Citizen Science data

Remote

MILA Internship

Mar 2022 - Current

- Mapped US bird species to their habitats by predicting species encounter rates from satellite images.

### PhantoMedicus: A data simulator to benchmark Clinical Decision Support Networks

Remote

EPFL Internship

Jul 2022 - Sept 2022

- Used Bayesian networks and Decision Trees to simulate and generate patient-level consultation data

### Hyper Parameters Optimization with RL

Senegal

Master Coursework

Sept 2021

- Built an Environment for learning best NN hyperparameters for regression/classification tasks using policy gradient

### Cassava images dataset classification

Senegal

Master Coursework

Apr 2021

- Achieved 91% in classifying cassava plants as belonging to one of 4 various disease classes or healthy using Resnet50 architecture.

### Tabular data prediction using SAINT model architecture

Senegal

Paper re-implementation

Aug 2021

- SAINT model performs attention over both rows and columns. It also uses contrastive self-supervised pre-training.
- Implemented the model architecture and conducted experiments on different datasets.

## Skills

**Programming** Python (Pandas, PyTorch, NumPy, Scikit-learn. etc.), C/C++, HTML/CSS, JavaScript, Matlab

**Miscellaneous** Linux, Shell (Bash/Zsh),  $\text{\LaTeX}$ (Overleaf/R Markdown), Microsoft Office, Git.

**Soft Skills** Technical Writing, Teamwork, Critical Thinking, Documentation, Engaging Presentation.

**languages** English: Professional proficiency, Arabic:Native proficiency

## Achievements

2023 **Best paper**, at ICLR workshop Tackling Climate Change with Machine Learning. Rwanda

2022 **Scholarship**, One out of two current Sudanese grad students came straight from Sudan to Stanford with a full scholarship. USA

2022 **Acceptance**, Google AI Residency Ghana

2021 **Scholarship**, DAAD(The German Academic Exchange Service) Germany

2021 **Scholarship**, AMMI Master Scholarship (6% acceptance rate), sponsored by Facebook and Google. Senegal

2018 **Top 5%**, Best Performing students in the undergraduate program Khartoum

## Activities

**WIMLDS** Women in machine learning and data science, Sudan chapter Volunteer/ discussion panelist

**IEEE Sudan** Institute of Electrical and Electronics Engineering, Sudan chapter Volunteer

**ArabWIC** Arab women in computing, Sudan chapter social media coordinator