Natacha **Kuete Meli**

Curriculum vitae

Objective

Dedicated and results-driven research scientist. Seeking to contribute to the research in the field of quantum computing, computer vision and image processing.

Profile

Name: Natacha Kuete Meli
Gender: Female
Nationality: Cameroon
Place of birth: Galim, Cameroon
Country of residence: Germany, since October 2017
Marital status: Single

Contact

Tel: +49 176 74908938
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Address: Kleine Klosterkoppel 11, 23562 Luebeck, Germany

Language skills

French
C2
Mother tongue

English
Good

German
C1

Programming skills

Degrees

2021–2024
PhD in computational life science
University of Luebeck · Germany
Thesis: Quantum Algorithms for Binary Problems with Applications to Image Processing.
Supervisor: Prof. Dr. Jan Lellmann.
Variational quantum circuits • QUBO/Ising models • Quantum annealing.

2018–2021
Master in computational life science
University of Luebeck · Germany
Thesis: Trainable Detection Methods for Industrial Materials Testing.
Supervisor: Prof. Dr. Jan Lellmann.
Object detection • image segmentation • deep learning • R-CNN • U-Net.

2012–2015
Bachelor in mathematics and computer science
University of Dschang · Cameroon
Thesis: Backend Programming of a real estate web application in Java EE.
Supervisor: Prof. Maurice Tchoupe Tchendji.
Jave EE • HTML • PHP • UML.

Competencies

Quantum computing

- **Adiabatic quantum computing**
  Modeling and discrete optimization • QUBO/Ising models • Quantum annealing.
- **Universal quantum computing**
  Quantum circuits • variational quantum circuits • hybrid quantum algorithms • approximate quantum algorithms.

Image processing

- **Classical image processing**
  Intensity transformations • morphological operations • principal component analysis • image reconstruction.
- **Image segmentation**
  Active contour models • statistical shape models • atlas-based segmentation.
- **Image registration**
  Parametric image registration • non-parametric image registration.

Machine learning

Image classification • object detection • image segmentation.

Mathematics

Linear algebra • analysis • numerics • optimization • signal processing • image processing • graph theory • approximation theory • relativity theory • test and estimation theory • stochastic processes.

Research Interest

I specialize in quantum computing's applications to image processing. This involves developing quantum algorithms for a range of image processing tasks, both combinatorial and non-combinatorial. Quantum computing offers a powerful solution to overcome challenges posed by non-convex energies, limited storage, and high computational demands, promising more accurate and cost-effective solutions for real-world image processing problems.

MATLAB

PYTHON

C++

JAVA

LATEX

Quantum programming

D-WAVE LEAP QISKIT

TEACHING ACTIVITIES / SCIENTIFIC ASSISTANT

UNIVERSITY OF LUEBECK · Germany
Responsible for creating exercise sheets and conducting student assessments to complement lectures in the following subjects:

Quantum image processing	Winter terms 2021, 2022 and 2023
Optimization	Summer terms 2022 and 2023
Linear algebra	Summer term 2021 and winter term 2023
Seminar Numerical Optimization	Winter terms 2021 and 2022
Mathematical methods of image processing	Winter term 2021
Computer graphics	Summer term 2020

UNIVERSITY OF LUEBECK · Germany
Responsible for database maintenance, organization, and follow up of Erasmus applications as a scientific assistant at the International Office of the University of Luebeck.

Winter term 2019 - summer term 2021

REVIEWING ACTIVITIES

Participated in the following events and conferences as a reviewer:

QDSM 2023	International workshop on quantum data science and management
SSVM 2023	International conference on scale space and variational methods in computer vision
CVPR 2023	IEEE/CVF conference on computer vision and pattern recognition
BVM 2021	Bilbverarbeitung für die Medizin

CERTIFICATES

Continuously advancing my knowledge through online courses, I have earned the following certificates:

Sep. 2023
Qiskit global summer school 2023 - Quantum excellence
IBM · Online
For exploring the world of quantum computing through physics, math, and python via Qiskit, to bridge the gap between quantum theory and real-world implementation.
Quantum teleportation • iterative phase estimation • qiskit runtime.

Aug. 2023
QBronze
QWORLD · Online
For successfully completing the online training in Quantum Computing & Programming using QWorld's introductory tutorial Bronze-Qiskit in the Womanium Global Quantum Program.
Quantum entanglement • quantum search • quantum annealing.

Mai 2023
IBM Quantum Challenge: Spring 2023
IBM · Online
For understanding how to create circuits that perform mid-circuit measurements and dynamically decide what the next steps should be.
Dynamic circuits • phase estimation • Quantum teleportation • error correction.

Research skills

Oral presentation

Literature review

Academic writing

Team work

Connect

CONFERENCES

Presented research findings at the folowing conferences:

MIA 2023
Mathematics and Image Analysis
BERLIN · Germany
Poster: Iterative quantum transformation estimation.

CVPR 2022
Computer vision and pattern recognition
NEW ORLEANS · USA
Poster: An iterative quantum approach for transformation estimation from point sets.

Google scholar
• ResearchGate • ORCID
• GitHub

Students

Supervised final thesis of the following students:

Nov. 2023
Josephine Elisabeth Oettinger (B.Sc.)
University of Luebeck · Germany
Thesis: Non-Boolean quantum amplitude amplification for discret optimization.
Quantum search • Ising model • discrete optimization.

Volonteer

Worked on a voluntary basis on the following projects:

2022-2024
Mentoring-programm CyberMentor Plus
Germany · Online
Provided online mentoring to an 8th-grade students while actively promoting science to schoolgirls. Served as a STEM role model and supported STEM projects that focused on understanding online shops, mandelbrot sets and digital images.

Peer-reviewed publications

Authored or co-authored the following peer-reviewed publications:

- **Kuete Meli, N.**, Mannel, F. & Lellmann, J. A universal quantum algorithm for weighted maximum cut and Ising problems. Quantum Inf Process 22, 279 (2023). https://doi.org/10.1007/s11128-023-04025-x.
- **Kuete Meli, N.**, Mannel, F. & Lellmann, J. An iterative quantum approach for transformation estimation from point sets. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), pp. 529-537 (2022). https://doi.org/10.1109/CVPR52688.2022.00061.

Hobbys

Reading • Sewing clothes • Jogging • Watching documentaries on the universe

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