ERARAYA RICARDO MUTEN

PROFILE

Highly-motivated, quick learner, and persistent. A fresh graduate with two years of experience in machine learning and one year in quantum computing. Excellent at working in a team with a diverse culture as he has been doing research projects for six months abroad.

PERSONAL INFORMATION

Address
Gema Pesona Depok blok X no. 20
Depok, West Java, Indonesia 16412

Phone number
+62812-1224-2740

Email
erarayaricardo.m@students.itb.ac.id

LinkedIn
linkedin.com/in/e-ricardo

GitHub
github.com/eraraya-ricardo

SKILLS

Programming Frameworks/Packages
Keras, TensorFlow, PyTorch, OpenCV, Scikit-Learn, Scikit-Image, PySCF

Quantum Programming Frameworks
Qiskit, PennyLane, Cirq

Programming Languages
Python, MATLAB, C++, C

Software
Quantum ESPRESSO, SolidWorks

Microcontroller
Arduino, STM32 Nucleo

LANGUAGES

English (Professional Proficiency)

Indonesia (Native)

EDUCATION

B.Eng. in Engineering Physics — Aug 2016 - Present

Quantum Technology Laboratory, Institut Teknologi Bandung (ITB), Bandung

Recently finished an undergraduate thesis exploring the **variational quantum algorithm to classify the MNIST dataset**. Two methods were used to reduce the image dimension, **PCA and quantum convolution**. For the quantum convolution, I designed variational quantum circuits that work similarly to convolution filters in CNN. The reduced images are then fed to another variational circuit to classify the digits. The proposed architectures achieved up to 99.7% of testing accuracy, an improvement compared to some previous related works. **GPA: 3.94**.
Advisor: Prof. Andriyan Bayu Suksmono MT, Ph.D. and Dr. Eng. Nugraha, Ph.D.

ACHIEVEMENTS & HONORS

- Runner-up Xanadu's QHack Quantum Machine Learning Open Hackathon 2021: Event Classification with Layerwise Learning for Data Re-uploading Classifier in High-Energy Physics
- IBM Quantum Qiskit Advocate 2020
- IBM Quantum Challenge 2020: Advanced Level
- Most Outstanding Student of Engineering Physics Department & Dean's List for all semesters
- First Place in National Scientific Research Paper Competition for College Students: Sustainable Development of Machine Learning-based Smart Supply Chain System
- First Place in Interdisciplinary Engineering Idea Challenge Competition: Machine Learning-based Automated Labeling & Quality Control System for Paragon Tech. and Innovation Inc.

EXPERIENCES

Qiskit Advocate Mentorship Program — Mar 2021 - Present

IBM Quantum

Currently working on the **code implementation** of the algorithm from the *Data re-uploading for a universal quantum classifier* by Pérez-Salinas, A. et al. and *Quantum Graph Neural Networks* by Verdon, G. et al. research papers in **Qiskit framework** under supervision of Anna Phan. This code will be presented as Qiskit Textbook in the Qiskit's website.

UCLQ Quantum Tech Summer School — Sep 2020

University College London

Received **lectures** from UCLQ Quantum Science and Technology Institute members, **hands-on lab works using IBM Q Experience and D-Wave Leap platforms**, and lab tours. Materials covered:
• Qubits, Gates, QEC, Quantum Algorithms & Architectures, and Quantum Cryptography
• Lab tour: Coulomb Blockade in CMOS FET, Cold Atoms, and Optomechanics

AI Engineer Internship — Dec 2019 - Jan 2020

Nodeflux Teknologi Indonesia Inc., Jakarta

- Developed a **real-time face tracking and blemish removal system** to create a filter application for the webcam. Trained a **YOLO model** to track the face using **PyTorch**.
- Designed and coded algorithms for blemish removal using **OpenCV**. Numerical threshold in HSV color space and elliptical kernel dilations was applied to the image to detect the skin. Blemishes were detected by utilizing CLAHE and blob detection. **Achieved 85-90% of blemishes removal**.

Research Project — Sep 2019 - Nov 2019

Instrumentation, Control and Decision System (ICODES) Laboratory, ITB, Bandung

- Conducted research in utilizing **Error-state Kalman Filter** as the state-estimator and **Diagonal Recurrent Neural Network & LSTM** to make the **localization of an autonomous car** more reliable. In the absence of location data from GPS, the neural network will give displacement predictions as a replacement to the state-estimator, **reducing 70% of localization errors**.
- Gathered the data using CARLA Simulator. Trained the model using **Keras and TensorFlow**.

Summer Research Internship

Jul 2019 - Aug 2019

IHI Corporation, Yokohama

- Developed **reinforcement learning agents for solving classic control problems** in the **OpenAI Gym environment** using the **Deep Q-Learning algorithm**.
- The programs were then converted into microservices using the SRI Microservice Platform infrastructure for the company's AI platform.

Research Internship

Oct 2018 - Dec 2018

Gentiane Venture's Laboratory, Tokyo Univ. of Agriculture and Technology, Tokyo

- Did research in using **Convolutional Neural Network** to **classify several types of touch interaction** from humans by learning the data pattern from a force sensor attached to a robotic arm. Model training was done using **Keras**. The model **reached 88% real-time accuracy**.
- **Coded the robotic arm's servos using inverse kinematics in MATLAB** to make it moves according to the type of touch being predicted by the network as a response.

Laboratory and Teaching Assistant

2017 - 2020

Institut Teknologi Bandung, Bandung

- Subject covered: Engineering Drawing (2017), Introduction to Information Technology (2018), Fluid Mechanics (2019), Electric Circuits & Electronics (2019), Wave Phenomena (2020).
- Delivered academic and hands-on tutorials (software, programming languages, practicum kits). Provided students with assistance on laboratory activities, assessed quizzes and homework.

WORKSHOPS, CONFERENCES, CERTIFICATIONS, ONLINE COURSES

- Generative Adversarial Networks (GANs) Specialization by DeepLearning.AI, Coursera (Jan 2021)
- Deep Learning Specialization by DeepLearning.AI, Coursera (Jan 2021)
- The Introduction to Quantum Computing by St. Petersburg State Univ., Coursera (Dec 2020)
- Addressing LHC Challenges by Machine Learning by NRU HSE, Coursera (Dec 2020)
- Quantum Techniques in Machine Learning 2020 (attendee) (Nov 2020)
- Quantum 2020 by Institute of Physics (attendee) (Oct 2020)
- Mathematics for Machine Learning Specialization by Imperial College London, Coursera (Sept 2020)
- Qiskit Global Summer School by IBM Quantum (Jul - Aug 2020)
- Quantum Computing & Quantum Internet Professional Certification by DelftX, TU Delft (Aug 2020)
- 2nd Munich Conference on Quantum Science and Technology by MCQST (attendee) (Jul 2020)

PUBLICATION

Nazaruddin, Y. Y., Maani, F. A., Sanjaya, P. W. L., **Muten, E. R.**, Tjahjono, G., Oktavianus, J. A. (2019, November). *Localization Method for Autonomous Car Using Virtual Sensing System*. The paper was presented at the 6th International Conference on Electric Vehicular Technology, Bali, Indonesia, and published in IEEE Xplore in February 2020.

VOLUNTEER EXPERIENCES

Team Leader

Aug 2020 - Present

IBM Quantum - Indonesian Qiskit Documentation Localization Project

Founded an **Indonesian localization team for IBM Qiskit Documentation** to **escalate the importance of quantum computation in Indonesia**. We translate the documentation hoping that more people from Indonesia can engage and get interested in quantum computation.

Head of Scientific & Professional Development Division

Mar 2019 - Mar 2020

Engineering Physics Student Association, Bandung

- **Led a team of 10 members in organizing monthly scientific seminars and discussions** related to the profession as an engineering physicist. The discussion results were written as articles and put together as a yearly issue.
- At the end of the term, the division **received the Best Division of the Year** award.