Felix Hirwa Nshuti

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Summary

My research interests lie at the intersection of computer architecture, compilers, and machine learning, with a focus on building efficient systems for AI workloads. I explore how compiler optimizations, hardware-aware scheduling, and specialized architectures can accelerate deep learning model training and inference. I am an open-source contributor and maintainer with a passion for developing open-source communities.

Education

Carnegie Mellon University (CMU-Africa) — Kigali, Rwanda
Master of Science in Electrical and Computer Engineering — *May 2025 – Present*

Pandit Deendayal Energy University — Gujarat, India
Bachelor of Technology in Computer Engineering — *October 2021 – May 2025*

Projects

TransISA, a lightweight CISC-to-RISC Transpiler — Dec 2024 – May 2025
Compiler Design and Architecture Translation — *LLVM, x86, AArch64, C++, IR, CFG*

- https://github.com/fnhirwa/TransISA
- Designed and implemented a compiler pipeline using the LLVM C++ API to translate x86 assembly to AArch64 assembly via LLVM IR.
- Extracted and analyzed Control Flow Graphs (CFGs) of source programs to support instruction-level translation.

Scaling Deep learning backends with sktime — May 2024 – Aug 2024
Machine Learning with time Series — *Python, PyTorch, TensorFlow, Darts, CI/CD*

- https://fnhirwa.github.io/gsoc2024/
- Added new classification models to sktime using PyTorch (GRU and GRU-FCNN Classifiers).
- Efficiently migrated the classifier models from legacy sktime-dl to sktime main repository.
- Implemented the modular interface of darts regression models in sktime.

Extracting LLVM IR and CFG from C/C++ and Python Programs — October 2024
Structural Code Representation understanding — *Programming Languages, LLVM, IR, CFG, AST*

- https://github.com/fnhirwa/struco/
- Leveraging the powerful LLVM IR managed to extract and analyse the Control Flow Graphs of different code snippets.

Professional Experience

Contributor — May 2024 – Aug 2024
Google Summer of Code, sktime — *Remote, Remote*

- Scaled Deep Learning backends with sktime, mostly worked with Darts and PyTorch.
- Implemented the modular interface of darts regression models in sktime.
- Presented my project progress at weekly mentorship meetings.
- Facilitated the community development through sprints, discord chats, and weekly community events presentations.

Machine Learning Engineer — June 2023 – October 2023
Unify — *London, United Kingdom*

- Carried out the maintenance and development of Ivy, a unified Deep Learning framework, enhancing its functionality and performance.
- Established a framework for monitoring adherence to Array API standards, identifying key areas for improvement, and engaging with developers in continuous feedback loops to enhance compliance.

- Teamed up with the community member in the weekly paper reading group.
- Led development and maintenance of the Numpy Frontend of Ivy.
- Empowered community development through discusions, github issues and pull request reviews on open-source projects.

Machine Learning Engineer Intern September 2022 – June 2023
Unify *London, United Kingdom*
- Carried out maintenance and development of Ivy, a unified Deep Learning framework, enhancing its functionality and performance.
- Teamed up with Numpy frontend Team to setup the development pipeline.

Apprentice Software Developer April 2021 – May 2021
Rohde & Schwarz *Kigali, Rwanda*
- Developed Cybersecurity test software by using some automation libraries of Python like Selenium.
- Facilitated team to deliver quality software over time.
- Presented final product to the customer and delivered the product to production.

Volunteering Experience

Community Council Member Oct 2024 – Present
Sktime *Remote, Remote*
- Facilitating decision making and conflict resolution through mediation on the roadmap planning.
- Assisting contributors to get started with open-source and provide continous constructive feedback.
- Collaborating with external organizations and looking for funds to drive the open-source ecosystem.
- Engaging with community through discusions, github issues and pull request reviews on open-source projects.

Core Developer Sep 2024 – Present
Sktime *Remote, Remote*
- Implementing new features to sktime, pytorch-forecasting, and other related projects and continous maintenance.
- Facilitating team through research and new algorithms implementation.

Volunteeting Developer July 2022 – September 2022
Unify *London, United Kingdom*
- Implemented new feature to Ivy (a Unified Deep Learning Library).

Mentor August 2021 – April 2023
DeepLearning.AI *California, United States*
- Mentored Learners taking TensorFlow Developer Professional Certificate on Coursera by proiding assistance with issues faced during the course.

Mentor September 2021 – October 2021
AI Planet *Remote, Remote*
- Facilitated learners taking the Data Science Mini Bootcamp Series from AI Planet(formerly DPhi).
- Created learning assignments for the Python course.
- Collaborated with the team to provide constructive feedback to learners.

Co-Mentor April 2023 – August 2023
Google Summer of code *Remote, Remote*
- Volunteered as an assistant mentor for 2023 GSOC contributors working on ivy projects (https://github.com/ivy-llc/ivy).

Skills

Programming Languages: Python, C/C++, CUDA, Assembly

Deep Learning Frameworks: PyTorch, Jax, TensorFlow, Paddle

Libraries & Tools: NumPy, Pandas, Scikit-learn, OpenCV, Git/GitHub, Docker

Natural Languages: English (fluent), Kinyarwanda (Proficient)