Acquah Hackman, Ph.D

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Summary

Greetings! I'm Dr. Hackman, a computer science enthusiast with an insatiable curiosity for data science. I obtained my Ph.D. degree from National Chiao Tung University, where I also completed a one-year postdoc fellowship. For both my Ph.D. and fellowship, I was supervised by Prof. Vincent S. Tseng. Prior to this, I earned my master's in computer science from Yuan Ze University and my bachelor's in computer science from The University of The Gambia. My Ph.D. dissertation is titled A Study on Trend Analysis in High Utility Itemset Mining. My research interests include data mining, machine learning, medical AI, deep learning, generative AI, and data analytics. Currently, my research is focused on the medical field, aligning with my current job position. In this role, I aim to develop medical AI models that can make a positive impact on the healthcare sector.

Experience

Data Scientist - Changhua Christian Hospital 2022 - Present

- Developing deep learning and machine learning models.
- Applying computer vision techniques to medical imaging data for patient diagnosis and improving patient care.
- Creating data pipelines for model development.
- Playing a key role in Machine Learning Operations (MLOps), including model deployment, monitoring, and continuous improvement.
- Conducting exploratory data analysis to uncover insights and trends, contributing to academic publications and industry conferences.
- Attending meetings and providing constructive suggestions to colleagues.
- Supervise all active projects.

Postdoctoral Researcher - National Yang Ming Chiao Tung University 2021 - 2022

- Conducted academic research.
- Assisted my supervisor in publication efforts.
- Ensured the smooth flow of lab operations.

Computer Science Lecturer - The University of The Gambia 2014 - 2015

- Prepared and delivered computer science lectures.
- Analyzed and recorded student performance.
- Provided guidance to students on academic research.

Graduate Assistant - The University of The Gambia 2010 - 2012

- Aided lecturers in effectively conducting their classes.
- Developed a web application for generating student transcripts.

Education

National Chiao Tung University, Electrical Engineering and Computer Science *Hsinchu, TW*
2015 - 2021
Doctorate in Electrical and Computer Science, Ph.D.

Yuan Ze University, *Taoyuan, TW*
2012 - 2014
Masters in Computer Science, MSc.

The University of The Gambia, *Brikama, GM*
2007 - 2010
Bachelor in Computer Science, BSc.

Skills

- Programming Languages:
- Tech and Tools:
  - Machine learning and deep learning frameworks:

- Extensive experience with **Open-source Large Language Models**.
- Proficient in **Scikit-learn** for its versatility in machine learning tasks.
- Extensive experience with **Tensorflow**, leveraging its robust ecosystem for deep learning projects.
- Familiarity with **PyTorch**, having applied its flexibility and dynamic computational graphs in a few projects for machine learning applications.
  - MLOps/DevOps:
    - Proficient in **Docker** for efficient containerization, streamlining deployment workflows.
    - **Redis** and **Celery** for backend process execusion and management.
    - Experience with **Git** for version control, ensuring collaborative and organized development processes.
    - Working understanding of **Kubernetes**, utilizing its orchestration capabilities for scalable and resilient deployments.
    - Familiarity with **Jenkins** for implementing robust and automated **CI/CD** pipelines.
    - Experienced and excellent understanding of **Django** for web application development.
    - Developed backend services using **Flask**, harnessing simplicity and flexibility for robust applications.
    - Utilized **FastAPI** to create high-performance APIs, leveraging modern Python features for seamless integration.

Projects

- **Artificial Intelligence-Enabled Digital Pathology Platform** *2024 - ONGOING*

  Technologies: Python, TensorFlow, Python-Flask, OpenCV, Redis, Celery

  Contribution: Developed deep learning models for the platform. Designed and implemented the digital pathology architecture. Integrated the solution with the existing hospital information system at Changhua Christian Hospital.

  Outcome: The digital pathology platform has saved the hospital millions of NTD, which would otherwise be spent on similar commercial platforms.

- **Automatic Segmentation of Membranous Glottal Gap Area with U-Net-based Architecture** *2022 - ONGOING*

  Technologies: Python, TensorFlow, Python-Flask, OpenCV, FastAPI

  Contribution: Developed a user-friendly interface for medical AI applications. Performed the ETL for the project. Trained all deep learning models for the project. Implemented FastAPI for integration into the hospital's health information system. Drafted and wrote over 50% of the research manuscript.

  Outcome: The best model's I0U score is 0.8503. We integrated the model into the hospital to improve patient care. Our manuscript was accepted for publication.

- **Funduscopic Image Analysis** *2023 - ONGOING*

  Technologies: Python, TensorFlow, Python-Flask

  Contribution: Developed a user-friendly interface for medical AI applications. Designed the strategy for model training. Implemented deep learning methods for funduscopic image analysis. Drafted and wrote over 70% of the research manuscript.

  Outcome: Currently, we have achieved a model accuracy of 91%, and our manuscript is nearing completion for submission.

- **Medical Report Generation** *2023 - ONGOING*

  Technologies: Python, Llama-2, Python-Flask, FastAPI, PostgreSQL

  Contribution: Data cleaning and preprocessing. Developed strategies for notes summarization Responsible for the development of the report generation system.

  Outcome: AI Powered editor for medical notes writing and summarization.

- **Large Language Model for ICD Coding** *2023 - ONGOING*

  Technologies: Python, Llama-2, Falcon, Python-Flask, FastAPI, PostgreSQL

  Contribution: Data cleaning and preprocessing. Developed strategies for fine-tuning the models. User interface development for ICD coding. Drafted and wrote over 98% of the research manuscript.

  Outcome: The project has produced an open-source ICD coder, poised to significantly reduce coding time, with my ongoing commitment to optimize its use.

- **Skin Lesion Detection and Classification** *2023 - ONGOING*

Technologies: Python, TensorFlow, Python-Flask, OpenCV

Contribution: Prepared the dataset for training. Conducted model training for classification. Developed the user interface for the model.

Outcome: Our initial accuracy on the binary classification task reached 92%, and we are actively working on enhancing the model's performance while expanding the number of classes.

- **Detection of LVI from WSI using Deep Learning Methods** *2023 - ONGOING*

  Technologies: Python, TensorFlow, Python-Flask, OpenCV, FastAPI

  Contribution: Data cleaning and preprocessing. Model building and training. User interface development for LVI detection.

  Outcome: Our developed platform can identify the presence of LVI in WSI images with 95% accuracy. Currently, we are integrating the model inference into a report generation framework.

- **No-Code Low-Code AutoML Platform for Medical AI Applications** *2023 - ONGOING*

  Technologies: Python, TensorFlow, Django, FastAPI, Docker container, Celery, Redis, PostgreSQL

  Contribution: Designed the project architecture. Developed the user management module. Built the MVP of the Low-code Module. Implemented the CSV data import module. Implemented the CSV data cleaning module.

  Outcome: The current outcomes include the CSV data cleaning module, and the low-code module is currently under development.

- **Denial of Service Attack Detection** *2020 - 2021*

  Technologies: Python, PyTorch, Java

  Contribution: Designed and built a simulator for the project. Performed ETL for parameter selection.

  Outcome: Provided a parameter list for more efficient model development, achieving an accuracy of over 90% in the initial phase.

- **Diagnoses of Multiple Sclerosis Using Deep Learning Methods** *2021 - 2022*

  Technologies: Python, PyTorch, Java, Flask

  Contribution: Performed the ETL for the project. Built different models for comparison.

  Outcome: Developed five models for comparison, with our best model achieving over 82% accuracy.

- **Survey of Continual Learning Frameworks** *2021 - 2022*

  Technologies:

  Contribution: Surveyed numerous papers on continual learning. Tabulated and documented the surveyed materials.

  Outcome: Although the collaborative project did not materialize, the extensive survey provided invaluable insights into the diverse landscape of continual learning frameworks and their potential applications across various disciplines. This experience enhanced my knowledge and understanding of the evolving field.

- **Trend Analysis in Utility Pattern Mining** *2018 - 2021*

  Technologies: Python, Java, SQL

  Contribution: Surveyed and tabulated many utility pattern mining publications proposed and designed mining algorithms. Implemented mining algorithm in both java and python programming languages. Drafted and published academic papers in international conferences.

  Outcome: We proposed applications of utility pattern mining by introducing the following itemsets; Trending High Utility Itemsets. Emerging High Utility Itemsets. Stable High Utility Itemsets. We published three academic papers in international conferences.

Publications

- 帆薇徐, 英志 林, **克曼哈**, 天雄 古 and 佩云 王 基於機器學習方法預測醫院之出院量 Conference The 41st Symposium on Combinatorial Mathematics and Computational Theory (CMCT 2024) (2024)

- **Acquah Hackman**, Chih-Hua Chen, Andy Wei-Ge Chen, Mu-Kuan Chen Automatic Segmentation of

Membranous Glottal Gap Area with U-Net-based Architecture Journal The Laryngoscope (2023)

- **Acquah Hackman**, Yu Huang, Philippe Fournier-Viger, Vincent Tseng Stable High Utility Itemset Mining Conference iiWAS 2021 (2021)

- **Acquah Hackman**, Yu Huang, Philip S Yu, Vincent S Tseng Mining emerging high utility itemsets over streaming database Conference ADMA 2019 (2019)

- Rei-Jo Yamashita, Hsiu-Hsen Yao, Shih-Wei Hung, **Acquah Hackman** Accessing and constructing driving data to develop fuel consumption forecast model Conference IOP Conference Series: Earth and Environmental Science (2018)

- **Acquah Hackman**, Yu Huang, Vincent S Tseng Mining trending high utility itemsets from temporal transaction databases Conference DEXA 2018 (2018)

- Cheng-Da Huang, **Acquah Hackman**, Hsiu-Hsen Yao, Syuan-Yi Chen Generating a road situation data warehouse using detectives car approach Conference ICITCS 2013 (2013)