CHINEDU INNOCENT NWOYE

Research Data Scientist | AI Researcher | Developer | Machine Learning Engineer | Academic

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RECENT PROJECTS

Surgical Tool Tracking for Context-Aware Intraoperative Assistance

- Led part of €1.2 million ANR DeepSurg project on developing OR control tower.
- Build large surgical dataset for endoscopic instrument tracking.
- Develop weakly supervised learning models cutting down ~73% annotation cost.
- Resultant app now integrated in the NVIDIA Holoscan SDK release.

Surgical Activity Modeling for Tool-Tissue Interaction Understanding

- Led part of €14 million CONDOR project on surgical workflow analysis.
- Build <instrument, verb, target> datasets (CholecT40, CholecT50, CholecT45).
- Develop attention-based models for fine-grained analysis of surgical activities.
- Collaborate with surgeons, engineers, industries, and research labs.
- Develop standard python library "ivtmetrics"- open source, pip & conda installer.
- Organize 2-stream international contests "CholecTriplet (2021, 2022)" on this.

Synthetic Surgical Data Generation from Text Prompts

- Own and pursue innovative CAMMA project generating hard-to-obtain medical data and solve data scarcity for AI development.
- Build deep learning methods to generate photo-realistic surgical images and videos from text prompts. Drive project from start to finish.
- Undergoing expert validation, completed 2 months before expected duration.

PROFESSIONAL EXPERIENCE

Senior Research Engineer
ICube Laboratory & IHU Strasbourg

Nov. 2021 – Date   Strasbourg, France

- Leading current project on operating room safety awareness, building simple and generalizable AI models for large scale data across multiple health centers.
- Collaborating with peers (surgeons and engineers) across labs and industries.
- 2 models integrated in clinical demo app, 1 model undergoing expert evaluation.
- Teaching, PhD supervision, conferences, and publications on research methods.

Doctoral Research Scientist
CAMMA, University of Strasbourg

Feb. 2018 – Nov. 2021   Strasbourg, France

- Developing new deep learning methodologies for AI in healthcare leading to doctoral thesis and publications.
- Own and pursue a long-running research project leading to innovation of a new research domain in Surgical AI and 14 publications (7 first authored).
- Attending conferences, workshops, seminars on research methods based on computer vision, medical image analysis, and machine learning.

Teaching Assistant
University of Strasbourg

Sep. 2018 – Nov. 2021   Strasbourg, France

- Lecture modules on Computer Vision, Deep Learning, OpenCV, C++. Practical.
- Prepare students for final examination, recorded 100% success.

EDUCATION

Ph.D. Image and Computer Vision
University of Strasbourg

Strasbourg, France   Sep. 2018 – Nov. 2021

- Specialization in Deep Learning, Surgical Data Science, Medical Image Analysis, and Computer Assisted Medical Intervention.

M.Sc. Artificial Intelligence (Distinction)
University of Southampton

Southampton, UK   Sep. 2016 – Sep. 2017

- Specialization in Machine Learning, Image Processing, and Computational Finance.

M.Sc. Computer Science (Distinction)
University of Nigeria, Nsukka (UNN)

Enugu, Nigeria   Sep. 2015 – Sep. 2016

- Specialization in Expert Systems & DBMS.

B.Sc. Computer Science (First Class Hons.)
University of Nigeria, Nsukka (UNN)

Enugu, Nigeria   Sep. 2008 – Sep. 2012

TECH STACKS

Python, Java, MATLAB, C++, Android

TensorFlow, PyTorch, Keras, OpenCV

JavaScript, SQL, PHP, HTML, AJAX, CSS

LaTeX, Docker

SKILLS

- Machine Learning/Deep Learning
- Data Analysis
- Research & Development
- Data Simulation & Visualization
- Website Design, Hosting & Management
- Financial Modeling
- Desktop & Mobile App Development
- Graphics Design
- Project Management

Assistant Lecturer
University of Nigeria, Nsukka (UNN)
📅 Mar. 2014 – Sep. 2018
📍 Enugu, Nigeria

- Lecture modules on Computer Programming in Java, C++, Database Design & Management Systems (DBMS), Introduction to Computer Science.
- Lecture approx. 300 students per session with 100% graduation goal met.
- Conduct practical, examination, and result processing.

Google Student Ambassador (GSA)
Google
📅 Mar. 2014 – Aug. 2016
📍 Lagos, Nigeria

- Organizing Google app training, local language translation for Google translator, region mapping for Google map. Networking and presentation.
- Successfully executed Google Campus Academy 2011, Pidgin English translation

POSITIONS OF RESPONSIBILITY

Lead Organizer: CholecTriplet 2022 – A deep learning/endoscopic vision challenge on surgical action triplet detection. MICCAI 2022.
📍 Singapore

Lead Organizer: CholecTriplet 2021 – A deep learning/endoscopic vision challenge on surgical action triplet recognition. MICCAI 2021.
📍 France

Team Lead: CaDis 2020 – A deep learning challenge on semantic segmentation of cataract surgery. MICCAI 2020.
📍 Peru

Organizing Committee Member: EuCor Cross-border – Computer Science and Biomedical Engineering workshop across France & Switzerland. 2019.
📍 La Bresse

Co-founder & Project Coordinator: AODI: Africa of Our Dream Initiative.

Convener: Setup Mentoring Scheme for African Prospective Graduate Students.

SELECTED PUBLICATIONS

Nwoye, C.I., Yu, T, Sharma, S. [...] & Padoy, N. (2023). CholecTriplet2022: Show me a tool and tell me the triplet – an endoscopic vision challenge for surgical action triplet detection. Submitted to *Medical Image Analysis*. IF 13.828.

Nwoye, C.I., Alapatt, D., Yu, T., Vardazaryan, A., Xia, F., Zhaoc Z., Xiad T., Jiad F., [...] & Padoy, N. (2022). CholecTriplet2021: A benchmark challenge for surgical action triplet recognition. Elsevier journal of *Medical Image Analysis, 86, 102803*. IF 13.828.

Nwoye, C.I., Yu, T., Gonzalez, C., Seeliger, B., Mascagni, P., Mutter, D., Marescaux, J., Padoy, N. (2022). Rendezvous: Attention Mechanisms for the Recognition of Surgical Action Triplets in Endoscopic Videos. *Medical Image Analysis*, 78, 102433. IF 8.545.

Nwoye, C. I., Gonzalez, C., Yu, T., Mascagni, P., Mutter, D., Marescaux, J., & Padoy, N. (2020). Recognition of instrument-tissue interactions in endoscopic videos via action triplets. *MICCAI, LNCS*, 12263, 364-374.

Nwoye, C. I., Mutter, D., Marescaux, J., & Padoy, N. (2019). Weakly supervised convolutional LSTM approach for tool tracking in laparoscopic videos. *Int. J. CARS*, 14(6), 1059-1067. IF 3.421. Presented at *IPCAI* 2019.

🌐 https://scholar.google.com/citations?hl=en&user=9lKxBUoAAAAJ

REFEREES

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🏛 University of Southampton, UK

INTERESTS

HealthTech, AR/VR, FinTech, Robotics, 3D CV, Consultancy, Startup, Quantum Computing, Blockchain, R&D, Innovation & Automation.

PROFESSIONAL MEMBERSHIP

- MICCAI Society
- CVPR Society
- Blacks in AI
- AODI

AWARDS & GRANTS

- Prix de thése 2022, MSII école doctorale, Université dé Strasbourg
- IPCAI 2019 audience choice award on best paper presentation
- NITDEF postgraduate scholarship
- MTNF award of academic excellence
- ETISALAT merit academic scholarship
- Best Graduating Student, Computer Science UNN 2012

PARTICIPATION

- The Cornell, Maryland, Max Planck Pre-Doctoral Research School **2017**
- International Conference on Medical Image Computing and Computer Assisted Interventions, MICCAI **2020, 2021, 2022**
- The Conference on Computer Vision and Pattern Recognition, CVPR **2019, 2020, 2021**
- Information Processing in Computer-Assisted Interventions, IPCAI **2019, 2022**
- International Summer School on Deep Learning, DeepLearn **2019**
- Surgical Data Science Summer School, EDU4SDS **2022, 2023**

EXTRA-CURRICULAR ACTIVITIES

Chess, reading, debate, football, volleyball, badminton, tourism, squash, innovation, investment, stock market, tech challenge, leadership, national and international politics.

LANGUAGES

English, Igbo, French, . . .