CHINEDU INNOCENT NWOYE

Data Analyst & Scientist | AI Researcher | Developer | Machine Learning Engineer | Academic

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RECENT PROJECTS

Surgical Tool Tracking for Context-Aware Intraoperative Assistance

- Building deep learning models for surgical instrument tracking in endoscopic videos, achieved by modeling spatial localization and temporal consistency in moving images in a video using weak supervision.
- Resultant app now integrated in the NVIDIA Holoscan SDK demo for release.

Activity Recognition for Tool-Tissue Interaction Understanding

- Collate and create datasets of surgical videos labeled as triplets <*instrument, verb, target*> for detailed and fine-grained modeling of surgical activities.
- Develop deep learning models based on multi-task learning, weak supervision, and attention/transformer for surgical action triplet detection.
- Develop standard python library "ivtmetrics"- open source, now available as pip & conda python package installers for public use.

PROFESSIONAL EXPERIENCE

Post-Doctoral Research Fellow

Nov. 2021 – Date

ICube Laboratory & IHU Strasbourg — Strasbourg, France

- Developing research methods and tools to perceive and model clinicians and clinical activities in the operating room using digital data acquired from endoscopic cameras.
- Teaching, workshops, conferences, and publications on research methods based on computer vision, medical image analysis, and machine learning.

Research Scientist

Feb. 2018 – Nov. 2021

CAMMA, ICube, University of Strasbourg — Strasbourg, France

- Developing new deep learning methodologies for AI in healthcare delivery leading to doctoral thesis and publications.
- Conferences, workshops, seminars, and publications on research methods based on computer vision, medical image analysis, and machine learning.

Teaching Assistant

Sep. 2018 – Nov. 2021

University of Strasbourg — Strasbourg, France

- Lecture modules: Computer Vision, Deep Learning, OpenCV, Project in C++. Practical, examination, and result processing.

Assistant Lecturer

Aug. 2016 – Sep. 2018

University of Nigeria, Nsukka (UNN) — Enugu, Nigeria

Lecture modules: Computer Programming in Java, C++, Database Design & Management Systems (DBMS), Introduction to Computer Science. Approx. 300 students per session. Practical, examination, and result processing.

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

Graduate Teaching Assistant
Mar. 2014 – Aug. 2016

University of Nigeria, Nsukka (UNN) — Enugu, Nigeria

- Lecture tutorials on Basics of Computer Science. Academic meeting reporting, lab demonstration, examination, and result processing.

Google Student Ambassador
Mar. 2014 – Aug. 2016

Google — Lagos, Nigeria

- Organizing Google app training, local language translation for Google translator, region mapping for Google map. Networking and presentation.

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., 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 2.473. Presented at *IPCAI* 2019.

Nwoye, C.I., Alapatt, D., Yu, T., Vardazaryan, A., Xia, F., ... , Padoy, N. (2022). CholecTriplet2021: A benchmark challenge for surgical action triplet recognition. Submitted to *Medical Image Analysis*.

Wagner, M., Müller-Stich, B. P., ..., Nwoye, C.I., ... & Bodenstedt, S. (2021). Comparative validation of machine learning algorithms for surgical workflow and skill analysis with the HeiChole benchmark. Submitted to *Surgical Endoscopy*.

Luengo, I., Grammatikopoulou, M., Mohammadi, R., Walsh, C., Nwoye, C. I., Alapatt, D., ... & Stoyanov, D. (2021). 2020 CATARACTS Semantic Segmentation Challenge. *arXiv preprint* arXiv:2110.10965.

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

REFEREES

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INTERESTS

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

PROFESSIONAL MEMBERSHIP

MICCAI Society
CVPR Society
Blacks in AI
AODI

AWARDS & GRANTS

- 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

- International Conference on Medical Image Computing and Computer Assisted Interventions, MICCAI 2021
- The Conference on Computer Vision and Pattern Recognition, CVPR 2020
- International Conference on Medical Image Computing and Computer Assisted Interventions, MICCAI 2020
- Information Processing in Computer-Assisted Interventions, IPCAI 2019
- The Conference on Computer Vision and Pattern Recognition, CVPR 2019
- 3rd International Summer School on Deep Learning, DeepLearn 2019
- The Cornell, Maryland, Max Planck Pre-Doctoral Research School 2017

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, . . .