

## Ernest Mwebaze, Ph.D

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### CONTACT INFORMATION

Executive Director,  
Sunbird AI Uganda  
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### PROFESSIONAL EXPERIENCE

**Sunbird AI**, Uganda,

***Executive Director***

**2019 - Present**

I am a founding director and executive director at Sunbird AI Limited, a non-profit solely focused on tackling social challenges within the context of Africa.

**Google AI**, Ghana,

***Research Scientist***

**2018 - 2020**

I work as a research scientist in the Google AI research lab in Accra, Ghana, where I do basic and applied research in Artificial Intelligence with the view of impacting positively the societal challenges facing the world but specifically the African context.

**Artificial Intelligence & Data Science Research group**, Makerere University,

***Head/Tech lead***

**2015 - 2018**

***Researcher (Machine Learning & Image Processing)***

**2009 - 2018**

I was the head the Artificial Intelligence and Data Science research lab at Makerere University. It is a lab focused on tackling developing world problems using a *bag-of-tools* model; computational tools based on Artificial Intelligence and Data Science. The lab was run in a fairly loosely coupled manner so my *head* role is to facilitate the different projects running in the lab as well as provide general research and technical focus particularly for students.

**School of Computing, Makerere University**, Makerere University,

***Lecturer***

**2007 - 2018**

I worked as a lecturer for courses in Artificial Intelligence and Machine Learning at Makerere University and Uganda Technology and Management University. I also supervised masters and PhD students research in these areas.

**UN Pulse Lab Kampala**, Kampala,

***Consultant Data Scientist***

**2015 - 2018**

The Pulse Lab Kampala has a mandate to leverage big data analytics to solve prevailing national and international issues particularly focused on the Sustainable Development Goals (SDGs). My role was to work on specific project pipelines that required a deeper academic research oriented intervention. I worked on several projects in machine learning e.g. counting cars to determine daytime and nighttime population of Kampala, facebook data analysis, utility data analytics and call data record (CDR) analysis as some of the key projects. I was also involved in several other projects on visualization and data science.

**Other professional work**, Kampala,

***Work outside Academia***

**2005 - 2007**

Worked with local NGO - Uganda Chartered HealthNet as the Technical Manager implementing an innovative mobile technological solution for rural healthworkers. My role involved working with structured data from the Health Management Information System (HMIS) of the Ministry of Health in Uganda. Several consultancies in electronic data collection using PDAs, SmartPhones and netbooks in and around Africa.

## EDUCATION

**University of Groningen**, The Netherlands

- PhD in Computer Science (Machine Learning)

**Makerere University**, Kampala, Uganda

- MSc. Computer Science
- BSc. Electrical Engineering

## OTHER PROFESSIONAL EXPERIENCE

I have been part of several professional affiliations.

1. Member of organizing committee and reviewer of several academic conferences including ICLR, ICML, CVPR, ML4D, ACM-COMPASS, PloS
2. Session Co-chair, Low-cost technology in the field scientific track, 2017 Gates Grand Challenges
3. Steering committee (and founding) member for Africa Data Science workshop, 2015 - 2020
4. Chair, committee on program restructuring, School of Computing & IT, Makerere University, 2017.
5. Committee member, curriculum review for Department of Computer Science, Makerere University, 2016.
6. Head, Quality Assurance committee. International Conference on Technology and Management (ICTM-14), 2014.
7. Member, program committee organizing the International Conference on ICT and Development (ICTD 2010), London, 2010.

## HONORS AND AWARDS

### Honors

- Invited talks at several big conferences including ICML 2020, AAAI 2020, CVPR 2019
- Best poster award Gates Grand Challenges conference 2017
- MIT ETT Fellowship in 2015
- MIT MISTI collaboration grant award, 2016
- Award for best graduating engineering student, 2003.
- Short-term research scholar on epidemiological mathematical modeling of disease at University of California San Francisco. UCSF (San Francisco, CA) 2014
- Scholar/Tutorial Instructor, Clinic on Meaningful Modeling of Epidemiological Data (MMED), Cape Town. 2013/2014

### Awards

- 2019 - 2021 Grant: #2019-9752 Hewlett Foundation grant general support for Sunbird AI targeted at scaling up AI research focused on addressing locally contextualized social challenges to influence policy. (Co-PI)
- 2019 - 2021 INV-016492 Bill and Melinda Gates Foundation grant on Synthetic Agricultural Training Data for Satellite Observations. Goal is to build Generative Adversarial Networks to create synthetic agricultural satellite data for building robust models. (Co-PI)
- 2017 - 2020 FAIN: 1543958 Sub-award on NSF grant project BREAD PHENO: High-Throughput Phenotyping with smart phones. A project to build AI enabled smartphone applications to increase the throughput of Phenotyping of plants in the field. (PI)

- 2014 - 2018 OPP1112548 Bill and Melinda Gates grant for project PEARL 1: Automated survey technology and spatial modeling of viral crop disease in Uganda. Project focused on developing AI tools and methodologies for improving surveillance and prediction of disease in crop fields in Uganda. (PI)
- 2018 - 2022 Sub-award No. 84941-11036 from Cornell University for Bill and Melinda Gates grant Next Generation Cassava Breeding 2 - NextGEN-2. Role here was to build suitable AI powered smartphone tools for estimation of pest and disease symptoms in the field. (PI)
- 2017 Award AID-OAA-A-11-00012 from National Academy of Sciences (NAS) and USAID for a project Scaled deployment of smartphone agro-applications for field based diagnosis and real-time surveillance data collection. (PI)
- 2016 MIT MISTI Global seed Fund for work on Using mobile technology for viral crop disease identification and analysis in collaboration with the Decentralized Information Group (DIG) at MIT-CSAIL. (Co-PI)

## PUBLICATIONS

Select publications. A full list of publications is available at <https://scholar.google.com/citations?user=YWUV9zYAAAAJ&hl=en>

### **Refereed Conferences and Journal Papers on methodology/theory of AI**

1. Mwebaze, Ernest, Petra Schneider, F-M. Schleif, Jennifer R. Aduwo, John A. Quinn, Sven Haase, Thomas Villmann, and Michael Biehl. "Divergence-based classification in learning vector quantization." *Neurocomputing* 74, no. 9 (2011): 1429-1435.
2. Mwebaze, Ernest, Gjalt Bearda, Michael Biehl, and Dietlind Zhlke. "Combining dissimilarity measures for prototype-based classification." In *Proceedings of the European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN2015)*, pp. 31-36. 2015.
3. Mwebaze, Ernest, and John A. Quinn. "Fast committee-based structure learning." In *Causality: Objectives and Assessment*, pp. 203-214. 2010.
4. Mwebaze, Ernest. "Divergences for prototype-based classification and causal structure discovery: Theory and application to natural datasets." PhD diss., University of Groningen, 2014. Enanoria, Wayne TA, Lee Worden, Fengchen Liu, Daozhou Gao, Sarah Ackley, James Scott, Michael Deiner et al. "Evaluating subcriticality during the Ebola epidemic in West Africa." *PLoS One* 10, no. 10 (2015): e0140651.

### **Refereed Conferences and Journal Papers on application of computational methods to addressing developing world challenges.**

1. Quinn, John Alexander, Kevin Leyton-Brown, and Ernest Mwebaze. "Modeling and Monitoring Crop Disease in Developing Countries." In *AAAI*. 2011.
2. Aduwo, Jennifer R., Ernest Mwebaze, and John A. Quinn. "Automated Vision-Based Diagnosis of Cassava Mosaic Disease." In *Industrial Conference on Data Mining-Workshops*, pp. 114-122. 2010.
3. Nakasi, Rose, Ernest Mwebaze, Aminah Zawedde, Jeremy Tusubira, Benjamin Akera, and Gilbert Maiga. "A new approach for microscopic diagnosis of malaria parasites in thick blood smears using pre-trained deep learning models." *SN Applied Sciences* 2, no. 7 (2020): 1-7.
4. Owomugisha, Godliver, Friedrich Melchert, Ernest Mwebaze, John A. Quinn, and Michael Biehl. "Machine Learning for diagnosis of disease in plants using spectral data." In *Proceedings on the International Conference on Artificial Intelligence (ICAI)*, pp. 9-15. The Steering Committee of The World Congress in Computer Science, Computer Engineering and Applied Computing (WorldComp), 2018.

### **Refereed Conferences and Journal Papers on productization, tools and datasets.**

1. Nakatumba-Nabende, Joyce, Benjamin Akera, Jeremy Francis Tusubira, Solomon Nsumba, and Ernest Mwebaze. "A Dataset of Necrotized Cassava Root Cross-Section Images." *Data in Brief* (2020): 106170.
2. Mwebaze, Ernest, Timnit Gebru, Andrea Frome, Solomon Nsumba, and Jeremy Tusubira. "iCassava 2019 Fine-Grained Visual Categorization Challenge." *arXiv preprint arXiv:1908.02900* (2019).
3. Owomugisha, Godliver, Pius KB Mugagga, Friedrich Melchert, Ernest Mwebaze, John A. Quinn, and Michael Biehl. "A low-cost 3-D printed smartphone add-on spectrometer for diagnosis of crop diseases in field." In *Proceedings of the 3rd ACM SIGCAS Conference on Computing and Sustainable Societies*, pp. 331-332. 2020.
4. Nakasi, Rose, Jeremy Francis Tusubira, Aminah Zawedde, Ali Mansourian, and Ernest Mwebaze. "A Web-Based Intelligence Platform for Diagnosis of Malaria in Thick Blood Smear Images: A Case for a Developing Country." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops*, pp. 984-985. 2020.