MOUSSA DOUMBOUYA

Computer Science Ph.D. Student

doumbouya.moussa@gmail.com
mdoumbouya.github.io

Research Interests

Computational Education; Cognitive Sciences; Natural Language Processing for West African Languages; STEM Education in West Africa

Education

Stanford University | Palo Alto, CA, USA
Ph.D. In Computer Science
P. Michael Farmwald Stanford Graduate (SGF) Fellow
Enhancing Diversity in Graduate Education Doctoral (EDGE) Fellow
06/2021 - Present

Ecole Supérieure d'Ingénierie en Sciences Appliquées | Fez, Morocco
Diplome d'Ingénieur en Informatique (Equiv. B.S. in Computer Science)
07/2008

Professional Experience

GNCode.org | Fria, Guinée
Co-founder
08/2019-present

Founded GNCode.org to transform Guinea into a nation that participates in the digital revolution in ways that are productive, responsible and beneficial for human, social and economic development.

Research:

• ***Virtual Assistant for Illiterate Speakers of Low-Resource Languages:*** Created the first ever speech recognition models for Maninka, Pular and Susu languages leveraging speech representations learned from radio broadcasting archives. [Paper] [Code]
• ***AI for Native Language Education and Universal Literacy:*** Collaborating with Stanford's HAI research group on a category induction framework that leverages pedagogical structures in deep neural network feature space. Applications include tools enabling rapid and efficient native language alphabetization for illiterate adults.
• ***CS Education in Developing Countries:*** Experimenting with computer programming teaching methodologies for low-resource environments.
• ***Consultancy with OECD / Chris Piech:*** Evaluated an early prototype of the computational thinking section of a future version of OECD's Programme for International Student Assessment (PISA) on 5 Guinean students.

Teaching:

• Organized coding camps and taught the Stanford CSBridge curriculum to Guinean high schoolers.
• Served as a section leader in Stanford Code In Place 2020.
• Served on the core organization team of Code In Place 20201.

Awards:

Received Stanford CSBridge's first seed and continuation grants.

Apple, Inc. | Santa Clara Valley, CA, USA
Machine Learning Engineer - AI Research
05/2018-08/2019

Carried out research projects on explainable AI, deep neural network introspection, and failure analysis in the context of autonomous systems. Designed software libraries that eased the integration and deployment of new AI algorithms.

Avigilon | Somerville, MA, USA
Engineering Manager - Applied Deep Learning
07/2016-05/2018

Managed deep learning research and development efforts for video surveillance applications with an emphasis on neural network based solutions that need to operate in real-time in high availability and throughput environments. Lead the team responsible for the algorithms and core software libraries that power Avigilon's Appearance Search technology. As a hands-on manager, actively participated in lab setups, data collection and curation, algorithm research, deep learning experiments, software engineering, user-interface prototyping, and system integration, benchmarking, and quality assurance.

Avigilon | Billerica, MA, USA
Senior Software Engineer - Advanced Technology Group
01/2015-06/2016

Rapidly prototyped video surveillance and business intelligence products based on face analytics (detection, tracking, alignment, recognition, and attribute classification). Evaluated the readiness of various face recognition algorithms, and third-party solutions. Developed novel user interfaces and data visualizations. Developed a cloud-based data annotation and curation infrastructure.

VideoIQ / Avigilon | Billerica, MA, USA
Senior Cloud Developer
12/2013-12/2014

Developed multi-tenant SaaS solutions based on Windows Azure cloud platform for video-analytics-enabled device connectivity, event data storage, event alerting and mobile application relay.

EBSCO Publishing | Ipswich, MA, USA
Software Engineer
08/2012-12/2013

Collaborated with bibliographic designers, production operators, QA engineers, project and product managers in an agile environment to design, implement, and deploy custom bibliographic databases.

Agero, Inc | Medford, MA, USA
Software Engineer
06/2011-08/2012

Developed and maintained call center and connected vehicles (telematics) systems based on Microsoft .Net 4.0; Windows Forms; ASMX Web Services; WCF; ADO.NET; Linq to XML; ASP.Net MVC3; Enterprise Library 5.0; Coded UI; Microsoft Team Foundation Server (TFS) and Visual Studio 2010.

Libera, inc. | Jamestown, NY, USA
Software Engineer
10/2009-05/2011

Developed various highly accessible case management applications and tools to accelerate, simplify, and ensure quality in software development and deployment processes. Built applications on top of the System 7 Framework (a Libera proprietary framework) and Microsoft .Net framework. Lead software packaging and release efforts. Maintained production environments for SaaS clients. Implemented software components that ensured interoperability between the System 7 framework and other legacy systems used by Libera's clients.

Ankenweb | Columbus, OH, USA
Software Engineer, Intern
01/2009-05/2009

Used PHP, XML and MySQL to create a web application that manages online petitions. Created a lightweight PHP framework supporting the MVC Design Pattern, Globalization and Authentication

---

Faculté de Médecine et de Pharmacie de Fès | Fez, Morocco
Software Engineer, Intern
04/2008-07/2008

Developed a web-based academic publication management software that orchestrated the workflows between various actors. Employed technologies including XML, XSL, Java Servlet and Hibernate.

CAFODEC | Conakry, Guinea
Software Engineer, Intern
06/2007-08/2007

Created a micro-finance community bank management software using Java Swing, JDBC and MySQL.

Patents

Doumbouya, M., Hu, Y., Piette, K., Russo, P., Venetianer, P., & Yu, B.. (2018). Alias capture to support searching for an object-of-interest. US Patent App. 16/593,789.

Doumbouya, M., He, L., & Saptharishi, M.. (2017). System and method for CNN layer sharing. US Patent 10,628,683.

Doumbouya, M., Hu, Y., Piette, K., Russo, P., Saptharishi, M., & Yu, B.. (2020). Sensor fusion for monitoring an object-of-interest in a region. US Patent 10,776,672.

Butt, R., Chau, A., Doumbouya, M., Glozman, L., He, L., Lipchin, A., Marlatt, S., Sadanand, S., Saha, M., Saptharishi, M., & others. (2020). System and method for appearance search. US Patent 10,726,312.

Alcantara, T., Doumbouya, M., Sjue, E., Valbonesi, H., & Weston, W.. (2020). Method and system for interfacing with a user to facilitate an image search for a person-of-interest. US Patent 10,810,255.

Doumbouya, M., He, L., Hu, Y., Saptharishi, M., Zhang, H., Alcock, N., Donaldson, R., Azizabadifarahani, S., & Jessen, K.. (2019). Method and system for facilitating identification of an object-of-interest. US Patent App. 16/172,557.

Doumbouya, M., Saptharishi, M., Sjue, E., & Valbonesi, H.. (2018). Method, system and computer program product for interactively identifying same individuals or objects present in video recordings. US Patent 10,121,515.

Cecchini, A., & Doumbouya, M.. (2014). Systems and methods for finding mobile phone users. US Patent App. 13/644,807.

Academic Publications

Doumbouya, M., Einstein, L., & Piech, C. (2021, April). Using Radio Archives for Low-Resource Speech Recognition: Towards an Intelligent Virtual Assistant for Illiterate Users. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 35, No. 17, pp. 14757-14765).

Bommasani, R., Hudson, D. A., Adeli, E., Altman, R., Arora, S., von Arx, S., ... & Liang, P. (2021). On the opportunities and risks of foundation models. arXiv preprint arXiv:2108.07258.

Industry Conferences

Sapharishi, M., & Doumbouya, M. (2017). New Video Search Capabilities for Public Safety Through Intelligent Video Analytics and Deep Learning. In Nvidia GPU Technology Conference. [Oral Presentation]

Doumbouya, M., Seto, S., Horel, E., Zappella, L., Suau, X., & Apostoloff, N. (2019). Semantic Coherence Analysis. In The BayLearn Symposium. [Poster]

Skills, tools and languages

Software Engineering
Service Oriented Architectures; Databases; Image & Video Processing; Web & Desktop Applications; Data Visualization; Internet of things; .NET Framework; Java SE/EE; Python.

Machine Learning/Computer Vision
Object Tracking and Re-identification; Face Recognition; Speech Recognition; CNNs; Sequence Models; Explainable AI; Caffe; numpy; scikit-learn; Tensorflow; Keras; Pytorch

Cloud Computing (IaaS, PaaS)
Azure, AWS, Google Gloud
Operating Systems
Windows, Linux, macOS
Programming Languages
Python; C++; JavaScript; C#, Java, etc.
Human Languages
English, French, Maninka, Susu