Moussa Koulako Bala Doumbouya

Ph.D. Candidate, Computer Science, Stanford University

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mdoumbouya.github.io

Research Interests

Interpretable and Psychologically Plausible Deep Learning; AI Safety; Computational Pedagogy; Natural Language Processing.

Education

Stanford University, California 2021–2027
Ph.D. in Computer Science
Advisors: Christopher D. Manning, Dan Jurafsky.

Ecole Supérieure d'Ingénierie en Sciences Appliquées. Fez, Morocco 2008
Diplôme d'Ingénieur en Informatique (B.S. equivalent in Computer Science)

Manuscripts

1. **Doumbouya, M.K.B.**, et al. (2024). *NeuralPAC: Teaching with Analogies and Contrasts in Neural Feature Spaces.*

Publications

1. **Doumbouya, M.K.B.**, Jurafsky, D., Manning, C.D. (2025). *Tversky Neural Networks: Psychologically Plausible Deep Learning with Differentiable Tversky Similarity.* ***ICLR 2026***
2. Bartelds, M., Nandi, A., **Doumbouya, M.K.B.**, Jurafsky, D., Hashimoto, T., Livescu, K. (2025). *CTC-DRO: Robust Optimization for Reducing Language Disparities in Speech Recognition.* ***ICLR 2026***
3. **Doumbouya, M.K.B.**, Nandi, A., Poesia, G., Ghilardi, D., Goldie, A., Bianchi, F., Jurafsky, D., Manning, C.D. (2025). *h4rm3l: A Language for Composable Jailbreak Attack Synthesis.* ***ICLR 2025.***
4. Caswell, I., Nielsen, E., Luo, J., Cherry, C., Kovacs, G., Shemtov, H., Talukdar, P., Tewari, D., Diane, B.M., **Doumbouya, K.M.**, Diane, D., Cissé, S.F. (2025). *SMOL: Professionally Translated Parallel Data for 115 Under-Represented Languages.* ***WMT 2025.***
5. Islam, M.S., **Doumbouya, M.K.B.**, Manning, C.D., Piech, C. (2024). *Handwritten Code Recognition for Pen-and-Paper CS Education.* ***ACM Learning @ Scale 2024***
6. **Doumbouya, M.**, Diane, B.M., Cissé, S.F., Diane, D., Sow, A., Doumbouya, S.M., et al. (2023). *Machine Translation for N'ko: Tools, Corpora, and Baseline Results.* ***WMT 2023***
7. **Doumbouya, M.**, Einstein, L., Piech, C. (2021). *Using Radio Archives for Low-Resource Speech Recognition.* ***AAAI 2021***
8. Bommasani, R., Hudson, D.A., Adeli, E., ... **Doumbouya, M.**, ... et al. (2021). *On the Opportunities and Risks of Foundation Models.* ***arXiv:2108.07258.***

Patents

1. Doumbouya, M., et al. (2025). Systems and Methods for Set-Based Similarity Architectures. U.S. Provisional Patent.
2. Doumbouya, M., et al. (2023). Semantic Coherence Analysis of Deep Neural Networks. US Patent 11,816,565.
3. Doumbouya, M., et al. (2021). Alias Capture to Support Searching for an Object-of-Interest. US Patent 11,048,930.
4. Doumbouya, M., et al. (2021). Method and System for Facilitating Identification of an Object-of-Interest. US Patent 10,891,509.
5. Alcantara, T., Doumbouya, M., et al. (2020). Method and System for Interfacing with a User to Facilitate an Image Search. US Patent 10,810,255.
6. Doumbouya, M., et al. (2020). Sensor Fusion for Monitoring an Object-of-Interest in a Region. US Patent 10,776,672.
7. Butt, R., Chau, A., Doumbouya, M., et al. (2020). System and Method for Appearance Search. US Patent 10,726,312.
8. Doumbouya, M., He, L., Saptharishi, M. (2020). System and Method for CNN Layer Sharing. US Patent 10,628,683.
9. Doumbouya, M., et al. (2018). Method for Interactively Identifying Same Individuals in Video Recordings. US Patent 10,121,515.
10. Cecchini, A., Doumbouya, M. (2014). Systems and Methods for Finding Mobile Phone Users. US Patent App. 13/644,807.

Invited Talks

- *Tversky Neural Networks* NVIDIA Research, Oct 2025
- *Handwritten Code Recognition for Pen-and-Paper CS Education.* ACM Learning @ Scale, 2024
- *Why AI Needs to Understand All the World's Languages* Stanford OVAL Workshop, 2021
- *Semantic Coherence Analysis.* Apple Machine Learning Summit, 2018
- *New Video Search Capabilities for Public Safety.* NVIDIA GPU Technology Conference, 2017

Teaching Experience

Stanford University

- Teaching Assistant, *CS224N: Natural Language Processing with Deep Learning.* Spring 2024
- Teaching Assistant, *CS329H: Machine Learning for Human Preferences.* Fall 2024
- Section Leader, *Code in Place.* 2020–2021
- Core Organizing Team, *Code in Place* 2021
- Lead Instructor *GNCode.org High School Introduction to Computer Science* 2019-2021

Professional Experience

Apple Inc., CA 2018–2019

Machine Learning Research Engineer – Apple AI Research

Conducted research on explainable AI and failure analysis for autonomous navigation. Engineered systems for neural network introspection, compression, and efficient deployment.

Avigilon, MA 2016–2018

Engineering Manager – Applied Deep Learning
Led deep learning R&D for real-time video surveillance and Appearance Search technology.

Avigilon, MA 2015–2016
Senior Software Engineer – Advanced Technology Group
Developed forensic face analytics products and cloud-based data annotation infrastructure.

VideoIQ / Avigilon, MA 2013–2014
Senior Cloud Developer
Developed multi-tenant SaaS solutions on Windows Azure for video analytics.

EBSCO Publishing, MA 2012–2013
Software Engineer
Designed and deployed bibliographic database production and indexing systems.

Agero Inc., MA 2011–2012
Software Engineer
Developed call center and connected vehicle (telematics) systems.

Libera Inc., NY 2009–2011
Software Engineer
Built case management applications and maintained SaaS environments for government agencies offering social services.

Fellowships and Awards

- P. Michael Farmwald Stanford Graduate Fellowship (SGF) 2021–2025
- Stanford EDGE Fellowship 2021–2025
- Schmidt Futures International Strategy Forum Fellow 2024
- Stanford CSBridge Seed and Continuation Grants 2020

Service and Leadership

- Reviewer, ICLR 2026 2025
- Reviewer, NeurIPS 2025 2025
- Organizer, Nko Machine Translation Workgroup 2021-present
- Consultant, OECD Programme for International Student Assessment (PISA). 2020
- Co-founder, GNCode.org — STEM education. NLP for West African languages. 2019–Present
- Reviewer, Baylearn Symposium 2017 2017

Technical Skills

Software Engineering: Experienced in production-grade software engineering using Java, C++, C#, Python and JavaScript on operating systems including Microsoft Windows and Linux.
Machine Learning: Caffe, TensorFlow, Keras, Scikit-learn, Dlib, PyTorch
Data Visualization: Data Driven Documents (D3.js)
Cloud Platforms: Microsoft Azure, Amazon AWS, Google Cloud.

Languages

Maninkakan, Susu, French, English