Boubacar DIALLO Ph.D.

R&D Engineer in DATA - IA - VISION - ROBOTICS - LLM

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DATA ANALYSIS

- **Image processing** ★★★★★
- **Clustering - KMean** ★★★★★
- **Analysis Embeddings** ★★★★★
- **Explorat. Data Analysis** ★★★★★
- **Data Quality/Curation** ★★★★★
- **Data Distribution Shift** ★★★★★
- **Data Analysis Report** ★★★★★
- **Metadata Analysis** ★★★★★
- **Active learning** ★★★★★

IA - VISION - LLM

- **Deep Learning - LLM** ★★★★☆
- **Objects detect. - YOLO** ★★★★☆
- **Semantic Segmentation** ★★★★☆
- **Instance Segmentation** ★★★★☆
- **GAN - Auto-encoder** ★★★★☆
- **Conformal Prediction** ★★★★☆
- **Reinforcemt Learning** ★★★★☆
- **VLM - Transformers** ★★★★☆
- **AI models optimization** ★★★★☆
- **Deployment AI models** ★★★★☆
- **NVIDIA Jetson Hardw.** ★★★★☆
- **Google GCP / AWS** ★★★★☆

ROBOTICS TASKS

- **Autonomous driving** ★★★★☆
- **Robot Learning** ★★★☆☆
- **Policies / Sim2Real** ★★☆☆☆
- **Embodied AI / Agents** ★★★☆☆
- **Camera - Lidar - Radar** ★★★☆☆
- **GPS - IMU - UltraSonic** ★★★☆☆

SIMULATION TOOLS

- **Synthetic Data Generat.** ★★★☆☆
- **3D Models with Blender** ★★★☆☆
- **Nvidia ISAACLAB / SIM** ★★★★☆
- **ROS2 - RVIZ - Gazebo** ★★★☆☆
- **Virtual Reality & Aug.** ★★★☆☆

Programming Lang.

- **Python, Torch, C++/R** ★★★★☆
- **Jax, Docker, OpenCV** ★★★★☆

Langage

- **Français** ★★★★★
- **Anglais** ★★★★☆

Professional experiences

1/2021 - 2/2025 **Senior R&D Engineer in AI - VISION** — Exxact Robotics, Epernay, France

Senior AI Research and Development Engineer within the AI/Vision team, specializing in the development of innovative AI solutions for precision agriculture and robotics.

AI Projects for Precision Agriculture and Robotics

- Project 3S: Precise weed detection by AI/VISION
- Model optimization for real-time execution
- AI pipeline for cluster/stem detection in vines
- Production of AI models in embedded systems
- Sensor fusion (LiDAR, Radar, Camera) for autonomous driving
- Robot Learning tasks in precision agriculture (RL/LLM)

Scientific Publications and Collaborations

- Thesis supervision : *Contributions to conformal prediction for vision-based decision-making in agriculture.*
- List of scientific publications on *Google Scholar*
- Supervision of several internships and collaborations with laboratories such as *WUR labs, Netherlands* - *IMS Bordeaux*
- Experience in leading innovative technological projects
- Ability to present technical ideas to diverse audiences

Other topics and tools

- Languages and frameworks: Python, C++, Torch, JAX, TensorRT (NVIDIA)
- Infrastructures: Google Cloud Platform, AWS, NVIDIA GPU (Jetson)
- Advanced techniques: Knowledge distillation, pre-annotation algorithm
- Interactive tools: Image embedding analysis with FiftyOne Apps
- AI algorithms: Classification, semantic segmentation, object detection

Education - Formation

2017 - 2020 **PhD in Image Processing and Deep Learning** — Poitiers University - XLIM lab, France

Subject : Measuring Image Integrity: From Physical Models to Deep Learning Models.
- XLIM Research Institute

- In this thesis, we focus on several of these image forensic challenges including camera model identification and image tampering detection. After reviewing the state of the art in the field, we propose a first data-driven method for identifying camera models. Rapport de thèse : https://theses.fr/2020POIT2293

Work tools

- Deep Learning - CNN - Image forensic, JPEG Compression
- Camera models identification, Image tampering detection - Auto-Encoder
- Python - C++ - Pytorch - Tensorflow - OpenCV - GCP - AWS - Nvidia GPU

2015 - 2017 **Master in Telecom, Multimedia and Networks** — Poitiers University, France

Image Processing, Data Analysis, Machine Learning, Classification, Pattern and Face Recognition, Deep Learning, Watermark, Wireless Transmission, IoT (Lora, Sigfox, VANET), Langages (C/C++, Python, Matlab-Simulink, OpenCV), Gestion de projet.
*Top of the Master's class with Honors (**BIEN**) (GPA = 14.56)*

RELATIONAL

Rigor ★★★★★
Autonomy ★★★★★
Teamwork ★★★★★

LINKS

Github : Personal Page
Publications : Google Scholar
Robot Learning : Franka Arm

Scientific productions

- P. Melki, **B Diallo** et al., **Uncertainty Guarantees on Automated Precision Weeding using Conformal Prediction**, Journal on Agriculture, **2025**.

- P. Melki, **B Diallo** et al., **The penalized inverse probability measure for conformal classification**, Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, **2024**.

- PM. Blok, Bart M, **B Diallo** et al., **Active learning for efficient annotation in precision agriculture: a use-case on crop-weed semantic segmentation**, Submission to ICCV **2023**.

- P. Melki, **B Diallo** et al., **Group-Conditional Conformal Prediction via Quantile Regression Calibration for Crop and Weed Classification** Proceedings of the IEEE/CVF International Conference on Computer Vision ICCV - **2023**.

- P. Melki, L Bombrun, **B Diallo**, H El Chaoui El Ghor, J-P Da Costa, **A study of pixelwise segmentation metrics using clustering of variables and self-organizing maps**, Submission to International Horticultural Congress (IHC) **2022**.

- PM. Blok, **B Diallo.** et al., **Active learning with MaskAL reduces annotation effort for training Mask R-CNN on a broccoli dataset with visually similar classes.** Computers and Electronics in Agriculture 197 - **2022**.

- P. Melki, **B Diallo** et al., **Exploratory Analysis on Pixelwise Image Segmentation Metrics with an Application in Proximal Sensing.** Remote Sensing 14.4 - **2022**.

B. Diallo, Ph.D. report - **Mesure de l'intégrité d'une image: des modèles physiques aux modèles d'apprentissage profond**. (*Image Integrity Measuring: From Physical Models to Deep Learning Models*), **2020**.

- **B. Diallo**, T. Urruty, P. Bourdon, C. Fernandez-Maloigne, **Robust Forgery Detection for Compressed Images using CNN Supervision**, Submission to Forensic Science International: Reports, **2020**.

- **B. Diallo**, T. Urruty, P. Bourdon, C. Fernandez-Maloigne, **Improving robustness of image tampering detection for compression**, in: International Conference on Multimedia Modeling, Springer, **2019**.

- **B. Diallo**, **Amélioration de la robustesse de la détection d'images altérées pour la compression.** B Diallo, T Urruty, P Bourdon, C Fernandez-Maloigne - (COmpression et REprésentation des Signaux Audiovisuels) CORESA **2018**.

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