Diego Rafael Lucio

Maringá - Paraná - Brazil

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PROFESSIONAL SUMMARY

Ph.D. in Computer Science from the Federal University of Paraná, with over 10 years of experience combining full-stack development and advanced research in Artificial Intelligence. Senior full-stack developer with solid experience in modern backend technologies (Python with Django/FastAPI and Java with Spring Boot) and frontend (React.js and Next.js). Expert in Machine Learning and Computer Vision, with a proven track record in developing innovative solutions in biometrics and facial recognition. I combine technical expertise in software development with deep knowledge of AI algorithms, enabling the creation of robust and scalable applications that integrate cutting-edge technologies in production environments.

Skills

- **Backend Development:**
    - **APIs e Microservices:** FastAPI, Django REST Framework, Spring Boot, Flask
    - **Databases:** MySQL, PostgreSQL, SQLServer, MongoDB, Redis, Neo4j
    - **Caching & Performance:** Redis (caching, session management, pub/sub), Memcached
    - **Graph Databases:** Neo4j (graph modeling, Cypher queries, relationship analysis)
    - **Message Queues:** Apache Kafka, RabbitMQ, Redis Streams
- **Python and Ecosystem:**
    - **Machine Learning:** PyTorch, TensorFlow, Scikit-learn, Keras, PyCaret
    - **APIs e Web:** FastAPI, Django, Sanic, Flask
    - **Data Analysis:** Pandas, NumPy, Matplotlib, Seaborn
    - **Image Processing:** OpenCV, PIL, scikit-image, imutils
- **Other Languages:** Java (Spring, JSF, Hibernate), JavaScript/TypeScript, PHP, MATLAB, C++, C
- **Web Development:** React, Angular, Spring Boot
- **DevOps:** Docker, Kubernetes, Jenkins, CI/CD, AWS, Linux
- **Methodologies:** Agile (Scrum, Kanban, TDD), DevOps, Continuous Integration
- **Other Tools:** Git, Jira, Confluence, Microsoft Azure

Professional Experience

Tokenology - Miami, USA

Senior Machine Learning Engineer / Back-End Developer *January 2024 – Present*
- Leading the development of advanced facial recognition and liveness detection systems using state-of-the-art architectures such as Vision Transformers and attention models.
- Implementing innovative fraud detection techniques in liveness detection, including deepfake detection and presentation attacks.
- Developing robust facial biometric verification pipelines with high accuracy and low latency using PyTorch and ONNX Runtime.
- Coordinating the integration of biometric systems with Spring Boot microservices, ensuring scalability and security.
- Deployed distributed caching and session management solutions, reducing API response times by 40% and improving system scalability for concurrent users.
- **Key technologies:** Python (PyTorch, ONNX, FastAPI), Java (Spring Boot), Docker, AWS, Redis

Machine Learning Consultant *January 2023 – December 2023*
- Developed facial recognition models using modern architectures like ArcFace and CosFace, achieving high accuracy in challenging scenarios.
- Implemented liveness detection system using advanced deep learning techniques for motion and facial expression detection.
- Created scalable FastAPI APIs for asynchronous biometric verification processing.
- Optimized models for real-time inference using ONNX Runtime and TensorRT.
- Implemented pub/sub messaging system for real-time notifications and caching layer for frequently accessed model predictions, improving system performance by 35%.
- **Key technologies:** Python (PyTorch, TensorRT, FastAPI), Java (Spring Boot), Docker, AWS

Ecotrace - Vinhedo, Brazil

Senior Artificial Intelligence Consultant *January 2024 – Present*
- Leading expansion and optimization projects of the computer vision system for new industrial units.
- Acting as technical mentor for the ML/CV team, sharing knowledge and best practices.
- Developing new features and optimizations for the carcass classification system.
- Designed graph database solutions to model complex relationships between product traceability data, enabling advanced analytics and improving supply chain transparency by tracking product lineage across multiple processing stages.
- **Key technologies:** Python (PyTorch, OpenCV, Django), Docker, Kubernetes, AWS, Neo4j

Senior Artificial Intelligence Engineer *November 2023 – December 2023*
- Led the expansion of the computer vision system to multiple industrial units.
- Implemented improvements in the inference pipeline, reducing processing time by 35%.
- Developed new modules for product quality analysis and traceability.
- Coordinated the ML/CV team, establishing development processes and methodologies.

- Architected hybrid data solutions using distributed caching for real-time classification results and graph databases for modeling complex product relationships and supply chain networks, resulting in 50% faster query responses for traceability reports.
- **Key technologies:** Python (PyTorch, OpenCV, Django), Docker, Kubernetes, AWS, CUDA, Neo4j

Computer Vision Consultant   *November 2022 – October 2023*

- Developed a computer vision system using PyTorch and OpenCV for automatic bovine carcass classification, increasing processing efficiency by 25%.
- Implemented advanced image processing techniques with scikit-image and PIL for segmentation and quality analysis.
- Developed a REST API with Django for integrating the computer vision system with the existing ERP system.
- Optimized the inference pipeline for real-time processing using CUDA and TensorRT.
- Deployed caching layer for frequently accessed classification models and results, reducing database load by 60% and improving API response times for real-time processing requirements.
- **Key technologies:** Python (PyTorch, OpenCV, Django, scikit-image, PIL), Docker, Kubernetes, AWS, CUDA, TensorRT, Redis, Neo4j

Hypeone - Curitiba, Brazil

Machine Learning Consultant   *January 2023 – October 2023*

- Acted as technical consultant for ML and development teams, providing mentorship in complex projects.
- Optimized microservices architecture with Spring Boot and Spring Cloud, improving system scalability.
- Implemented improvements in financial transaction processing services using Java and Spring Framework.
- Developed new features for the web system using Angular and TypeScript.
- Designed comprehensive backend solutions using high-performance caching for financial transactions and graph databases for modeling complex customer relationship networks and fraud detection patterns, resulting in 45% improvement in transaction processing speed.
- **Key technologies:** Java (Spring Boot, Spring Cloud), Python (scikit-learn, FastAPI), Angular, Kafka, AWS, Redis, Neo4j

Senior Software Engineer   *May 2021 – December 2022*

- Developed a complete financial system using Java with Spring Boot, including transaction processing and risk analysis modules.
- Implemented a scalable microservices architecture using Spring Cloud, Service Discovery and API Gateway.
- Created ML models using scikit-learn and PyCaret for financial process automation.
- Developed modern and responsive web interfaces using Angular and TypeScript.
- Integrated systems using Apache Kafka for asynchronous and real-time processing.
- Architected distributed caching and session management solutions, enabling horizontal scaling and reducing database queries by 70% during peak transaction periods.
- **Key technologies:** Java (Spring Boot, Spring Cloud), Python (scikit-learn, FastAPI), Angular,

Kafka, Docker, Redis, Neo4j

Federal University of Paraná (VRI) - Curitiba, Brazil

PhD Researcher   *October 2016 – May 2022*
- Developed deep learning models with PyTorch and TensorFlow for biometric recognition, focusing on periocular recognition.
- Implemented advanced image processing and computer vision techniques.
- Published articles in high-impact international journals and conferences.
- Collaborated on international biometric research projects.
- **Key technologies:** Python (PyTorch, TensorFlow, OpenCV), Docker, CUDA

Unicesumar - Maringá, Brazil

Senior Software Engineer   *October 2016 – December 2020*
- Developed a facial recognition system with PyTorch and OpenCV for online exam monitoring, significantly reducing academic fraud.
- Implemented predictive models using scikit-learn and Pandas to identify students at risk of dropping out, reducing rates by 87%.
- Created interactive dashboards with Plotly and Streamlit for academic metrics visualization.
- Developed a REST API with Django for integrating the facial recognition system with the LMS.
- Designed graph database solutions to model complex student behavioral patterns and academic relationships, enabling predictive analytics that improved early intervention strategies and contributed to the 87% dropout reduction.
- Deployed caching solutions for student session data, reducing database load and improving system responsiveness.
- **Key technologies:** Python (PyTorch, scikit-learn, Django, OpenCV, Pandas, Plotly, Streamlit), Docker, AWS, Redis, Neo4j

Wasys - Curitiba, Brazil

Senior Data Scientist   *October 2018 – May 2021*
- Developed complete ERP system modules using Java with JSF and Spring Boot, including financial management and inventory control.
- Implemented microservices architecture with Spring Boot, ensuring scalability and efficient maintenance.
- Developed an OCR system using TensorFlow and OpenCV for automatic extraction of data from financial documents, improving accuracy by 18%.
- Created responsive and intuitive web interfaces using JSF, PrimeFaces and Bootstrap.
- Implemented integrations with external systems using REST APIs and messaging with Apache Kafka.
- Designed graph database solutions to model complex business relationships in ERP system, enabling advanced analytics on customer-supplier networks and inventory dependencies, improving decision-making processes by 30%.
- Deployed distributed caching solutions for frequently accessed ERP data and session management, reducing database load and improving system responsiveness for concurrent users by 55%.

- **Key technologies:** Java (Spring Boot, JSF, Hibernate), Python (TensorFlow, OpenCV), Docker, Kubernetes, Apache Kafka, Neo4j, Redis

State University of Maringá - Maringá, Brazil

Master's Researcher *February 2014 – August 2016*
- Developed a computer vision application for automatic bird species classification based on their vocalizations.
- Implemented signal processing techniques for converting audio to spectrograms using specialized libraries.
- Applied advanced texture descriptors for feature extraction from spectrograms.
- Developed and optimized classification models using SVM (Support Vector Machines).
- **Key technologies:** Python, MATLAB, OpenCV, scikit-learn, librosa

Seebot - Maringá, Paraná, Brazil

Senior Biometrics Researcher/Full Stack Developer *January 2014 – December 2016*
- Developed computer vision algorithms with Python and OpenCV for biometric systems.
- Implemented embedded systems using Python on Raspberry Pi for real-time image capture and processing.
- Created web interfaces with PHP and Java for biometric data visualization and management.
- Integrated hardware systems (Arduino) with software for biometric capture automation.
- **Key technologies:** Python (OpenCV, scikit-learn), Java, PHP, Arduino, Raspberry Pi

Elotech Informática e Sistemas Ltda - Maringá, Paraná, Brazil

Junior Developer *August 2013 – February 2014*
- Developed solutions in Adobe Flex and Java for the transparency portal.
- Collaborated with team members to ensure seamless integration of new features and functionalities.
- Implemented efficient coding practices to optimize performance and user experience.
- **Key technologies:** Adobe Flex, Java, JSP, JSF, JSTL, MySQL

Visãonet Telecom - Goioerê, Paraná, Brazil

Junior Developer *March 2012 – December 2013*
- Developed new functionalities for internal web systems in JAVA and PHP.
- Maintained e-commerce sites on the MAGENTO framework.
- Collaborated with team to ensure smooth operations and updates.
- Contributed to the overall success of web development projects.
- **Key technologies:** Java, PHP, MAGENTO, MySQL

Systems Support Analyst *April 2011 – March 2012*
- Spearheaded the implementation of commercial automation systems, streamlining operations and enhancing productivity.
- Developed new software features in response to client requests.
- Collaborated with teams to ensure seamless integration of new features.

- Contributed to the overall efficiency and functionality of the software.
- **Key technologies:** Delphi, Firebird, Java, PHP, MySQL

Call Center Operator   *July 2008 – April 2010*
- Provided customer support via telephone to resolve internet access issues.
- Developed new technologies and fixed bugs in company products to enhance customer experience.
- Collaborated with team members to improve customer service processes and efficiency.
- Implemented innovative solutions to streamline customer support operations.
- **Key technologies:** PHP, MySQL, Elastix

Papelaria Famsit - Goioerê, Paraná, Brazil

General Assistant   *January 2006 – June 2008*
- Managed cleaning tasks, photocopying, and customer service.
- Ensured a clean and organized workspace and provided efficient services.
- Implemented new protocols to improve efficiency and customer satisfaction.
- Developed strong multitasking and customer service skills in a fast-paced environment.

Education

Ph.D. in Computer Science
Federal University of Paraná, Curitiba, Paraná, Brazil
2016–2022

Master's in Computer Science
State University of Maringá, Maringá, Paraná, Brazil
2014–2016

Bachelor's in Internet Systems Technology
Federal University of Technology - Paraná, Campo Mourão, Paraná, Brazil
2008–2011

Awards and Recognition

- **First place in the Biometrics Competition (Periocular Region)**
  IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE, Glasgow, Reino Unido, 2020

- **Second place in the Sclera Segmentation Competition**
  IEEE INTERNATIONAL JOINT CONFERENCE ON BIOMETRICS, Houston, EUA, 2020

Selected Publications

- Pati, S.; Baid, U.; Edwards, B. et al.(2022). Federated learning enables big data for rare cancer boundary detection. Nature communications, 13(1), 7346. **[305 citations]**
- LUCIO, D. R. et al. (2020). COVID-19 detection in CT images with deep learning: A voting-based scheme and cross-datasets analysis. Informatics in Medicine Unlocked, 20, 100427. **[260 citations]**
- LUCIO, D. R.; COSTA, Y. M. G. (2016). Combining visual and acoustic features for audio classification tasks. Pattern Recognition Letters, 88, 49-56. **[99 citations]**
- ZANLORENSI, L. A.; LAROCA, R.; LUCIO, D. R.; SANTOS, L. R., BRITTO JR; A. S.; MENOTTI, D. (2022). A new periocular dataset collected by mobile devices in unconstrained scenarios. Scientific Reports, 12(1), 17989. **[26 citations]**
- VITEK, MATEJ; DAS, ABHIJIT; LUCIO, DIEGO RAFAEL et al. (2022). Exploring Bias in Sclera Segmentation Models: A Group Evaluation Approach. IEEE Transactions on Information Forensics and Security, 18, 190-205. **[19 citations]**
- LUCIO, D. R.; LAROCA, R.; SEVERO, E.; BRITTO JR., A. S.; MENOTTI, D. (2018). Fully Convolutional Networks and Generative Adversarial Networks Applied to Sclera Segmentation. In Proceedings of the International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications. **[50 citations]**
- LUCIO, D. R. et al. (2020). SSBC 2020: Sclera Segmentation Benchmarking Competition in the Mobile Environment. In 2020 IEEE International Joint Conference on Biometrics (IJCB). **[43 citations]**
- LUCIO, D. R.; COSTA, Y. M. G. (2016). Combining visual and acoustic features for bird species classification. In Proceedings of the 25th Conference on Graphics, Patterns and Images. **[37 citations]**

Full list available on Google Scholar .

Work Presentations

1. LUCIO D. R. ; ZANLORENSI L.; BESSON V., COSTA Y. M. G., MENOTTI D. . Pupil Constrictions and Dilations Effects as Data Augmentation on an Iris Recognition CNN Approach. In: 23rd International Conference on Artificial Intelligence and Soft Computing, 2024.
2. KIMURA G.Y. ; LUCIO D. R. ; BRITO A. S. ; MENOTTI D. . Simultaneous Iris and Periocular Region Detection Using Coarse Annotations. In: International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications, 2020.
3. LUCIO, D. R. ; LAROCA, R. ; SEVERO, E. ; BRITTO JR., A. S. ; MENOTTI, D. . Fully Convolutional Networks and Generative Adversarial Networks Applied to Sclera Segmentation. 2018.