

JOÃO PEDRO VASCONCELOS TEIXEIRA

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Education

Federal University of Paraíba (UFPB)

June 2018 – October 2023

B.S. in Computer Engineering

João Pessoa, PB, Brazil

Thesis: Medical Image Synthesis using Latent Diffusion Models

Research Experience

Summer Geometry Initiative (SGI) @ MIT

Summer 2023

SGI Fellow

Remote

Summer program that introduces students to research in Geometry Processing through projects:

- **The (in)accurate Gradients of Neural Representations:** mentored by Peter Yichen Chen (MIT), explored different methods to smooth the noisy gradients of Implicit Neural Spatial Representations for Time-dependent PDEs.
- **Sampling Surfaces from Point Clouds:** mentored by Silvia Sellán (University of Toronto) and Ana Dodik (MIT), implemented Gaussian and Neural Processes to predict a distribution of possible surfaces of a given Point Cloud.
- **Exvivo surface mesh reconstruction from in-vivo FreeSurfer meshes:** mentored by Karthik Gopinath (Harvard Medical School/Massachusetts General Hospital), translated in-vivo MRI FreeSurfer meshes into ex-vivo meshes using a surface-based approach to close the deep sulci of the brain.

X-ray Physics Lab (XPL), UPenn and ARIA Lab, UFPB

June 2021 – October 2023

Undergraduate Research Assistant

Remote

- Contributed to the development of methods for generating realistic simulations (phantoms) of breast anatomy, enhancing the efficiency and realism of the simulations:
 - * Introduced a Perlin noise-based pipeline, reducing the average generation time of small/medium-sized phantoms from hours to minutes.
 - * Developed a Simplex noise-based pipeline, further improving generation time from minutes to seconds for smaller phantoms and from days to hours for large phantoms.
- These advancements aim to facilitate virtual clinical trials for evaluating digital breast tomosynthesis (DBT) systems.
- Engineered deep learning models for the segmentation of breast tissue and identification of suspicious findings, contributing to the advancement of diagnostic accuracy.
 - Currently developing diffusion models to generate phantoms, aiming to further enhance the realism and applicability of the simulations in clinical trials.

Publications

Multiclass Segmentation of Breast Tissue and Suspicious Findings: A Simulation-Based Study for the Development of Self-Steering Tomosynthesis

Bruno Barufaldi, Yann Nobrega, Giulia Carvalhal, **João P. V. Teixeira**, Thais G. do Rego, Yuri Malheiros, Telmo Filho, Raymond J. Acciavatti, Andrew D. A. Maidment

Tomography 9, no. 3: 1120-1132, 2023

Interactive breast lesion designer for virtual trials based on Perlin noise

Magnus Dustler, Hanna Tomic, Anna Bjerken, Anders Tingberg, Pontus Timberg, Sophia Zackrisson, Arthur Chaves Costa, **João P. V. Teixeira**, Bruno Barufaldi, Predrag R. Bakic

Live Demonstrations Workshop, SPIE Medical Imaging, 2023, San Diego, California, United States, 2023

Spatial dependency of lesion detectability in digital breast tomosynthesis

Chloe J. Choi, Bruno Barufaldi, **João P. V. Teixeira**, Raymond J. Acciavatti, Andrew D. A. Maidment

16th International Workshop on Breast Imaging (IWBI), 2022

Multiclass segmentation of suspicious findings in simulated breast tomosynthesis images using a U-Net

Yann Nobrega, Giulia Carvalhal, **João P. V. Teixeira**, Barbara Camargo, Thais G. do Rego, Yuri Malheiros, Telmo Filho, Trevor Vent, Raymond J. Acciavatti, Andrew D. A. Maidment, Bruno Barufaldi

16th International Workshop on Breast Imaging (IWBI), 2022

Novel Perlin-based phantoms using 3D models of compressed breast shapes and fractal noise

João P. V. Teixeira, Telmo Filho, Thais G. do Rego, Yuri Malheiros, Magnus Dustler, Predrag R. Bakic, Trevor Vent, Raymond J. Acciavatti, Srilalan Krishnamoorthy, Suleman Surti, Andrew D. A. Maidment, Bruno Barufaldi

SPIE Medical Imaging, 2022, San Diego, California, United States

Iris-CV: Classifying Iris Flowers Is Not as Easy as You Thought

Itamar Filho, **João P. V. Teixeira**, João W. L. Lins, Felipe Sousa, Ana Sousa, Manuel F. Junior, Thaís Ramos, Cecília Silva, Thaís G. do Rego, Yuri Malheiros, Telmo Filho

BRACIS, 2021

Industry Experience

Rei do Pitaco

May 2022 – November 2022

Software Engineering Intern

Remote

- Rei do Pitaco is the first trustworthy Brazilian Daily Fantasy Sports mobile app and recently raised Series A.
- Worked in the Data Platform team, building data extraction pipelines using Apache Airflow.

Amazon

October 2021 – May 2022

Software Development Engineer Intern

Remote

- Collaborated on the Fulfillment by Amazon Organization on a team focused on Tax Services.
- My internship involved creating dashboards to monitor the SLAs from the team's microservices.

Aplicativos de Bolso

March 2021 – September 2021

Data Science Intern

Remote

- Designed and implemented a new Deep Learning-based recommender system that assists Law Students in studying for the OAB Examination (Brazilian Bar Examination).
- The microservice, built using PyTorch, GRPC Python, and SQLModel, recommends questions to the users according to their performance on the application's simulations.

Atoptima and UFPB

November 2020 – April 2021

Combinatorial Optimization Developer

Remote

- Contributed to the development of Camina, an Open-source Vehicle Routing Problem Solver in Julia Language.
- I've developed heuristics and new features that improved Camina's time performance and reduced computational cost to be equivalent to C/C++ solvers, such as VRPSolver.

ARIA Lab - UFPB

April 2020 – September 2021

Data Engineering Intern

João Pessoa, PB, Brazil

- Upgraded the data infrastructure of the Department of Finance of the State of Paraíba and developed a tool that uses artificial intelligence to detect tax fraud.
- Maintained the data lake by building data loaders, new tables, users groups, setting permissions. Anonymized sensitive data with PostgreSQL Anonymizer.

LAVID - UFPB

September 2019 – December 2019

Software Engineering Intern

João Pessoa, PB, Brazil

- Collaborated on the development of a Distributed Collaborative Video Surveillance System for the Federal University of Paraíba.
- Built an Event-Driven Logging for the distributed system using Apache Kafka and explored methods to detect anomalous events in videos.

Leadership / Extracurricular

Technology and Artificial Intelligence League (TAIL)

August 2020 – Present

Co-Founder and Advisor

Federal University of Paraíba

- TAIL is a non-profit organization oriented by the ARIA LAB professors.
- The academic league aims to teach new students, produce content, contribute to AI and Data Analysis field and help the members achieve their goals (internships, graduation programs, full-time jobs).
- Since its creation, TAIL has had +500 applicants, +130 members, and +25 projects developed. It has already helped +50 students obtain internships and has +60 active members today.

Honors and Awards

Fundação Estudar's Tech Fellowship, 2022

This process selects students who will lead Brazil's technological revolutions. It is a merit-based scholarship for outstanding trajectory and academic potential. It includes a grant to pursue studies (~ \$10,000), mentorship, and career support. One of 0.6% approved over 4285 applications in 2022.

Skills

Languages: English (fluent), Portuguese (Native), Spanish (Basic)

Programming Languages: Python, C/C++, Julia, MATLAB, Java, JavaScript, SQL

Add-On: PyTorch, Tensorflow, Pandas, Numpy, Dask, gpytoolbox, gptoolbox, OpenCV, GRPC Python, SQLModel, FastAPI

Other: Linux, Git, Blender, Meshlab