PAULO BRUNO SERAFIM

Deep Reinforcement Learning Researcher | Software Developer

I like to find creative solutions for challenging problems, to work on novel solutions to relevant and nontrivial matters. Through my experience on varied projects, I have learned not only to love problem-solving but also to share discoveries through writing.

SKILLS

C/C++ — 9 years
Data-Oriented and Object-Oriented C/C++

Reinforcement Learning — 6 years
Deep Q-Networks and Policy Gradients

Computer Graphics — 6 years
CG, 3D Printing, Computational Geometry, and Geometric Modelling in OpenGL and Qt

Python — 5 years
ML projects with Numpy, Scikit and Matplotlib

Deep Learning — 5 years
TensorFlow and Keras in Python

Image Processing and Computer Vision — 3 years
OpenCV, Image Segmentation, and OCR

Assembly — 1 year
Z80 processor (GBASM)

LANGUAGES

PT — Native Speaker
EN — Full Professional Proficiency
FR — Limited Professional Proficiency

SOCIAL

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CONTACT

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PROFESSIONAL EXPERIENCE

Deep RL Researcher — **Apr. 2018 - Present**
CRAb - Computer Graphics, Virtual Reality and Animation

Deep Reinforcement Learning (DRL) researcher, working with autonomous game agents using TensorFlow and the environments ViZDoom, OpenAI Gym, and Unity ML-Agents. Co-advisor of one BSc, two MSc, and one PhD candidate students. Currently working on analysis of agent's performance under different views of the same scenario by using model interpretability methods.

Senior Data Scientist — **May 2021 – Mar. 2022**
Instituto Atlântico

Tech Lead of the Data Science branch of an R&D project for Dell EMC. Working with anomaly detection using unsupervised learning methods, classification using supervised learning methods, and development of Business Intelligence dashboards to assist tactical and operational decision making.

Computer Vision Engineer — **Sept. 2020 – Apr. 2021**
Instituto Atlântico

Worked on an R&D Computer Vision project for HP Inc. applying Deep Learning to the problems of human segmentation and image matting using TensorFlow. Worked on OCR methods applied to printed text documents. Developed a synthetic document generator using OpenCV. Co-leader of the Cognitive Computing study group, focused on CV, Image Processing, and Reinforcement Learning.

Computer Graphics Engineer — **Feb. 2019 – Aug. 2020**
Instituto Atlântico

Worked on R&D projects for HP Labs on 3D printing, applying computer graphics methods using only C/C++ standard libraries. Developed a new way to build voxelized support structures, which generated a patent application (2019). Worked on improvements of Genetic Algorithm heuristics applied to a Bin Packing Problem (2020).

Software Developer — **May 2018 – Feb. 2019**
GREat - ASTEF

Developed solutions for fingerprint minutiae extraction and matching focused on high-performance, using OpenCV in C++. Implemented a data-oriented C++ version of SourceAFIS, reducing runtime in about 90%. Created a side project using Convolutional Neural Networks for fingerprint ROI segmentation. Worked on a Transfer Learning solution to enhance fingerprint images. Helped the team with singular point detection using YOLOv4.

EDUCATION

MSc – Computer Science   Mar. 2016 – Apr. 2018
Federal University of Ceará (UFC)

Advisor: Dr. Joaquim Bento Cavalcante Neto

Co-Advisors: Dr. Creto Augusto Vidal and Dr. Yuri Lenon Nogueira

Thesis: *Evaluating competition in training of Deep Reinforcement Learning agents in First-Person Shooter games (in Portuguese)*

Research on multi-agent competitive applications of Deep Q-Networks using the environment ViZDoom and TensorFlow.

BSc – Computer Science   Jan. 2013 – Dec. 2015
Federal University of Ceará (UFC) – Magna Cum Laude degree

Worked on hair animation projects using mass-spring systems and OpenGL (2013). Developed research on Neuroevolution for autonomous game agents (2014-2015).

STUDENTS (CO-ADVISOR)

Halisson Rodrigo	*PhD*	2020 – Present
Alexandre Magno	*BSc/MSc*	2019 – Present
Rômulo Férrer Filho	*BSc/MSc*	2019 – Present
Hyuan Farrapo	*BSc*	2020 – 2022
Anderson Oliveira	*BSc/MSc*	2017 – 2020
Matheus Cordeiro	*BSc*	2017 – 2019
Eduardo Melo	*BSc*	2015 – 2017
Gabriel Costa	*BSc*	2015 – 2017

PUBLICATIONS

Assessing the Robustness of Deep Q-Network Agents to Changes on Game Object Textures — Oct. 2021
XX Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

Gym Hero: A Research Environment for Reinforcement Learning Agents in Rhythm Games — Oct. 2021
XX Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

Robust Fingerprint Singular Point Detection using a Single-Stage CNN for Object Detection — June 2021
28th International Conference on Systems, Signals, and Image Processing (IWSSIP)

Investigating Deep Q-Network Agent Sensibility to Texture Changes on FPS Games — Nov. 2020
XIX Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

Deep Reinforcement Learning em Ambientes Virtuais (in Portuguese) — Nov. 2020
XXII Symposium on Virtual and Augmented Reality (SVR) - Pre-Symposium Book

Autonomous Foraging with SARSA-based Deep Reinforcement Learning — Nov. 2020
XXII Symposium on Virtual and Augmented Reality (SVR)

Simplificando o Balanceamento de Atributos em RPGs Eletrônicos (in Portuguese) — Nov. 2020
XIX Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

A Novel Approach for Automatic Enhancement of Fingerprint Images via Deep Transfer Learning — July 2020
2020 International Joint Conference on Neural Networks (IJCNN)

A Minimal Training Strategy to Play Flappy Bird Indefinitely with NEAT — Oct. 2019
18th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

A Method based on Convolutional Neural Networks for Fingerprint Segmentation — July 2019
2019 International Joint Conference on Neural Networks (IJCNN)

Evaluating Competition in Training of Deep Reinforcement Learning Agents in First-Person Shooter Games — Oct. 2018
17th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

On the Development of an Autonomous Agent for a 3D First-Person Shooter Game Using Deep Reinforcement Learning — Nov. 2017
16th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames)

Towards Playing a 3D First-Person Shooter Game Using a Classification Deep Neural Network Architecture — Nov. 2017
19th Symposium on Virtual and Augmented Reality (SVR 2017)

REFERENCES

Dr. Joaquim Cavalcante Neto
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