



# Ricardo Cruz, PhD

- Machine learning specialist
- Computer vision specialist
- Programmer

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🏠 <http://rpmcruz.github.io>

I am a post-doc at the THEIA project – a partnership between the University of Porto and Bosch Portugal in order to advance autonomous driving. My expertise is mainly on artificial intelligence and computer vision, working on TensorFlow, PyTorch, OpenCV, and a wide variety of other frameworks and languages. I have completed my Ph.D. in Computer Science in mid-2021. For the last four years, I have also been teaching Python and C++ at the University of Porto, where I was awarded the 2021 Pedagogy Award based on student feedback.

SKILLS: Python · C · C++ · Java · R · MATLAB · TensorFlow · PyTorch · OpenCV · SQL · Git

## CAREER

- Oct. 2021–currently | **Post-Doc Deep Learning Specialist**  
Faculty of Engineering, University of Porto  
Object detection, point-cloud LiDAR parsing
- Sept. 2015–Jul. 2021 | **INESC TEC (Porto)**  
Machine Learning and Computer Vision Researcher  
INESC TEC is an R&D institute
- Mar.–Jul. 2015 | **Flykt Startup**  
I was involved in a non-successful startup whose goal was to search for travel destinations. I was involved in the NLP part.
- Sept. 2014–Feb. 2015 | **Research Grant**  
Mathematics Center of the University of Porto  
Research on epidemiological models: from differential equations to stochastic simulations and cellular automata.

## TEACHING

- Sept. 2021–Aug. 2022 | **Faculty of Engineering, University of Porto**  
Invited Auxiliary Professor (~3h/week)  
Practical tutorials on Python, C++ and data structures to first-year students.
- Sept. 2018–Aug. 2020 | **Faculty of Engineering, University of Porto**  
Invited Teacher Assistant (~3h/week)  
Practical tutorials on Python and C++ to first-year students.

## EDUCATION

- 2016–2021 | **Ph.D. in Computer Science**  
University of Porto, Minho and Aveiro (joint degree)  
Thesis: Re-thinking a Deep Learning Pipeline for Images
- 2013–2015 | **MSc in Mathematical Engineering**  
Faculty of Sciences, University of Porto  
18 out of 20 points
- 2009–2012 | **BSc in Computer Science**  
Faculty of Sciences, University of Porto  
16 out of 20 points

## SELECTED OPEN-SOURCE PORTFOLIO

- **objdetect package**

Light-weight and versatile one-stage object detection framework

I developed this one-stage object detection framework because existing frameworks, such as detectron2, are either for two-stage models or are not versatile and simple enough to adapt for new models. At the very least, I hope this package is educational for someone learning object detection.

- **Apoo (virtual machine) GTK+ interface**



I helped with the development of the GTK+ interface for Apoo (together with Profs Rogério Reis and Nelma Moreira), a virtual machine that is currently being used to teach Assembly. Apoo is written in Python and GTK+.

- **EatFeed**



RSS/Atom reader written in C++ and GTK+

- **Google Summer of Code**

I was awarded twice a Google grant to work on open-source projects. LibreOffice dynamic layouts (2007) and YaST port from GTK+ to Qt (2006).

- **J2ME and Android games**

Games written in Java Mobile Edition; more recently, I ported a couple of them to Android.

- **SuperTux, co-author**



While in high-school, I was part of the initial team developing this game. It is written in C++, SDL, and OpenGL.

► Find more of my open-source code at <https://github.com/rpmcruz>.

## PUBLICATIONS

These are my indexed publications with some publications in **highlight** for emphasis. You may find the papers in my Google Scholar: [https://scholar.google.pt/citations?user=pSFY\\_gQAAAAJ](https://scholar.google.pt/citations?user=pSFY_gQAAAAJ)

- 2022 | **Quasi-Unimodal Distributions for Ordinal Classification.** T. Albuquerque, R. Cruz, J. Cardoso. MDPI Mathematics.
- 2021 | **Ordinal Losses for Classification of Cervical Cancer Risk.** T. Albuquerque, R. Cruz, J. Cardoso. PeerJ Computer Science.
- 2021 | **Background Invariance by Adversarial Learning.** R. Cruz, R. Prates, E. Filho, J. Costa, J. Cardoso. 25th International Conference on Pattern Recognition (ICPR), IEEE.
- 2019 | **Automatic Augmentation by Hill Climbing.** R. Cruz, J. Costa, J. Cardoso. 28th International Conference on Artificial Neural Networks (ICANN), Springer.
- 2019 | **Averse Deep Semantic Segmentation.** R. Cruz, J. Costa, J. Cardoso. 41st Engineering in Medicine and Biology Conference (EMBC), IEEE.
- 2019 | **Insulator visual non-conformity detection in overhead power distribution lines using deep learning.** R. Prates, R. Cruz, A. Marotta, R. Ramos, E. Filho, J. Cardoso. Journal Computers & Electrical Engineering, Springer.
- 2018 | **A Class Imbalance Ordinal Method for Alzheimer's Disease Classification.** R. Cruz, M. Silveira, J. Cardoso. 2018 International Workshop on Pattern Recognition in Neuroimaging (PRNI), IEEE.
- 2018 | **Binary ranking for ordinal class imbalance.** R. Cruz, K. Fernandes, J. Costa, M. Pérez Ortiz, J. Cardoso. Journal Pattern Analysis and Applications, Springer.
- 2018 | **Deep image segmentation by quality inference.** K. Fernandes, R. Cruz, J. Cardoso. International Joint Conference on Neural Networks (IJCNN), IEEE.

- 2017 | **Constraining type II error: building intentionally biased classifiers.** R. Cruz, K. Fernandes, J. Costa, J. Cardoso. International Work-conference on Artificial Neural Networks (IWANN), Springer.
- 2017 | **Fine-to-coarse ranking in ordinal and imbalanced domains: an application to liver transplantation.** M. Pérez-Ortiz, K. Fernandes, R. Cruz, J. Cardoso. International Work-conference on Artificial Neural Networks (IWANN), Springer.
- 2017 | **Combining ranking with traditional methods for ordinal class imbalance.** R. Cruz, K. Fernandes, J. Costa, M. Pérez-Ortiz, J. Cardoso. International Work-conference on Artificial Neural Networks (IWANN), Springer.
- 2017 | **Ordinal class imbalance with ranking.** R. Cruz, K. Fernandes, J. Costa, M. Pérez-Ortiz, J. Cardoso. Iberian conference on pattern recognition and image analysis (Ibipria), Springer.
- 2016 | **Tackling class imbalance with ranking.** R. Cruz, K. Fernandes, J. Costa, J. Cardoso. International Joint Conference on Neural Networks (IJCNN), IEEE.

## AWARDS

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| <ul style="list-style-type: none"> <li>• 2022   <b>Bosch for Mobility</b><br/>My students won Best New Participating Team on an autonomous driving competition</li> <li>• 2021   <b>INESC TEC</b><br/>Outstanding recognition award</li> <li>• 2021   <b>FEUP</b><br/>Pedagogic award, voted by students</li> </ul> | <ul style="list-style-type: none"> <li>• 2018   <b>INESC TEC</b><br/>Outstanding recognition award</li> <li>• 2017   <b>Kaggle</b><br/>Bronze medal for NLP competition and silver for engagement</li> </ul> |
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