

# JOAO LUIS DA SILVA CARREIRA

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DeepMind

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## Experience

- **Google DeepMind**—London, UK  
*Senior Research Scientist, December 2015 – Present.*
  - Working on human action recognition and video understanding with Andrew Zisserman.
- **University of California at Berkeley**—Berkeley, USA  
*Post-Doctoral Scholar, January 2014 – July 2015.*
  - Worked on 3D reconstruction, unsupervised learning and human pose estimation in Jitendra Malik's group.
- **University of Coimbra**—Coimbra, Portugal  
*PostDoc, January 2012 – November 2015.*
  - Worked on FCT-funded project "DG2CVPR: Differential Geometry for Computer Vision and Pattern Recognition" - PTDC/EEA-CRO/122812/2010, in Jorge Batista's group.
- **University of Bonn**—Bonn, Germany  
*PhD student, January 2008 – December 2011.*
  - Worked on image segmentation and visual recognition in Cristian Sminchisescu's group, within project "HUMOREV: Human Modeling, Reconstruction and Recognition in Video", funded by Marie Curie Excellence Grant 25481.
- **University of Coimbra**—Coimbra, Portugal  
*Research assistant, January 2006 – December 2007.*
  - Developed a vision-based tabletop interface with Paulo Peixoto, for collaborative interaction scenarios, in the context of FCT-funded project "HCOGICOS: Human Computer Gesture Interfaces for Collaborative Scenarios" - POSC/EEA-SRI/61451/2004. See media coverage in:  
<http://hcogicos.isr.uc.pt/news.php>
- **Critical Software**—Coimbra, Portugal  
*Intern, October 2005 – January 2006*
  - Developed the prototype of a satellite's data handling system, a simulation of its hardware and the software for the ground command center, to be used in a joint case study with NASA.
- **University of Coimbra**—Coimbra, Portugal  
*Research assistant, September 2003 – March 2004.*
  - Integrated and implemented software for a surveillance application using active computer vision, in a partnership between the University of Coimbra (with Jorge Batista and Paulo Peixoto) and the spanish company Visual Tools. As a result of this project a prototype was presented at an international surveillance exhibition in Madrid.

## Academic Degrees

- **University of Bonn**—Bonn, Germany  
*PhD in Informatik*
  - Advisor: Cristian Sminchisescu
  - Thesis: *Bottom-up Object Segmentation for Visual Recognition*
  - Thesis Defense Date: 19-12-2012. Started in January 2008.
- **University of Coimbra**—Coimbra, Portugal  
*Licenciatura in Electrotechnical and Computer Engineering (equivalent to an integrated master's degree, after the Bologna Treaty).*
  - Thesis: *A Vision-Based Gestural Interface for Local Collaboration Environments*
  - Thesis Advisor: Paulo Peixoto
  - Period: from September 2000 to September 2005

## Journal Publications

- S. Tulsiani\*, A. Kar\*, J. Carreira and J. Malik. Learning Category-Specific Deformable 3D Models for Object Reconstruction. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) Special Issue CVPR 2015*. April, 2017. (\* first two authors contributed equally)
- J. Carreira\*, S. Vicente\*, L. Agapito and J. Batista. Lifting Object Detection Datasets into 3D. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) invited paper for special issue of CVPR 2014*. July, 2016. (\* first two authors contributed equally)
- J. Malik, P. Arbelaez, J. Carreira, K. Fragkiadaki, R. Girshick, G. Gkioxari, S. Gupta, B. Hariharan, A. Kar, S. Tulsiani. The Three R's of Computer Vision: Recognition, Reconstruction and Reorganization. *Pattern Recognition Letters*, February 2016.
- J. Carreira, R. Caseiro, J. Batista and C. Sminchisescu. Free-Form Region Description with Second-Order Pooling. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, July 2015.
- A. Ion, J. Carreira and C. Sminchisescu, Probabilistic Joint Image Segmentation and Labeling via Figure-Ground Composition. *International Journal of Computer Vision (IJCV)*, March 2014.
- J. Carreira and C. Sminchisescu. CPMC: Constrained Parametric Min-Cuts for Automatic Object Segmentation. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, July 2012.
- J. Carreira\*, F. Li\* and C. Sminchisescu, Object Recognition by Sequential Figure-Ground Ranking. *International Journal of Computer Vision (IJCV)*, July 2012. (\* first two authors contributed equally)

## Conference Publications / Technical Reports

- J. Carreira and A. Zisserman. Quo Vadis, Action Recognition? A New Model and the Kinetics Dataset. CVPR 2017, to appear.
- W. Kay, J. Carreira, K. Simonyan, B. Zhang, C. Hillier, S. Vijayanarasimhan, F. Viola, T. Green, T. Back, P. Natsev, M. Suleyman and A. Zisserman. The Kinetics Human Action Video Dataset. arXiv, May 2017.
- J. Carreira, P. Agrawal, K. Fragkadiaki and J. Malik. Human Pose Estimation with Iterative Error Feedback. CVPR 2016. **Spotlight presentation, acceptance rate 9.7%**.
- P. Agrawal, J. Carreira and J. Malik. Learning to See by Moving. ICCV 2015.
- S. Tulsiani, J. Carreira and J. Malik. Pose Induction for Novel Object Categories. ICCV 2015.
- A. Kar, S. Tulsiani, J. Carreira and J. Malik. Amodal Completion and Size Constancy in Natural Scenes. ICCV 2015.
- J. Carreira, A. Kar, S. Tulsiani and J. Malik. Virtual View Networks for Object Reconstruction. CVPR 2015.
- A. Kar\*, S. Tulsiani\*, J. Carreira and J. Malik. Category-Specific Object Reconstruction from a Single Image. CVPR 2015. **Oral presentation, acceptance rate 3.3%. Best student paper award.** (first two authors contributed equally)
- C. Premebida, J. Carreira, J. Batista and U. Nunes. Pedestrian Detection Combining RGB and Dense Lidar Data. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2014.
- S. Vicente\*, J. Carreira\*, L. Agapito and J. Batista. Reconstructing PASCAL VOC. International Conference on Computer Vision and Pattern Recognition (CVPR) 2014. **Oral presentation, acceptance rate 5.75%** (\* first two authors contributed equally)
- C. Ionescu, J. Carreira and C. Sminchisescu. Iterated Second-Order Label Sensitive Pooling for 3D Human Pose Estimation. International Conference on Computer Vision and Pattern Recognition (CVPR) 2014. **Oral presentation, acceptance rate 5.75%**
- J. F. Henriques, J. Carreira, R. Caseiro and J. Batista. Beyond Hard Negative Mining: Efficient Detector Learning via Block-Circulant Decomposition. International Conference on Computer Vision (ICCV), December 2013. **Oral presentation, acceptance rate 2.5%**
- F. Li, J. Carreira, G. Lebanon and C. Sminchisescu. Composite Statistical Inference for Semantic Segmentation. In IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2013.
- J. Carreira, R. Caseiro, J. Batista and C. Sminchisescu. Semantic Segmentation with Second-Order Pooling. European Conference on Computer Vision (ECCV), October 2012. **Oral presentation, acceptance rate 2.8%**
- A. Ion, J. Carreira, and C. Sminchisescu. Probabilistic Image Segmentation and Labeling. In Advances in Neural Information Processing Systems (NIPS) 2011, December 2011. **Spotlight presentation, acceptance rate 4.7%**.
- A. Ion, J. Carreira, and C. Sminchisescu. Image Segmentation by Figure-Ground Composition into Maximal Cliques. In IEEE International Conference on Computer Vision (ICCV), November 2011.

- J. Carreira and C. Sminchisescu. Constrained Parametric Min-Cuts for Automatic Object Segmentation. In IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), June 2010.
- F. Li\*, J. Carreira\*, and C. Sminchisescu. Object Recognition as Ranking Holistic Figure-Ground Hypotheses. In IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), June 2010. (\* first two authors contributed equally)
- J. Carreira and P. Peixoto. Retrieving and Exploiting Hand's Orientation in Tabletop Interaction. IEEE International Conference on Multimedia & Expo, July 2007, Beijing, People's Republic of China.
- J. Carreira and P. Peixoto. A Vision Based Interface for Local Collaborative Music Synthesis. Proceedings of the IEEE Automatic Face and Gesture Recognition Conference, April 2006, Southampton, UK.

## Invited Talks

- Workshop on Frontiers of Video Technology, San Jose, 17th of June, 2017, "Kinetics and Video Understanding".
- Google, Zurich, 7th of July, 2017. "Kinetics and Video Understanding".
- Pre-doc Summer School on Learning System, ETH Zurich, 6th of July, 2017, "Learning video representation from YouTube".
- Pint of Science, London, 15th of May, 2017. "Teaching machines to recognize human actions by watching YouTube".
- Aston University, Birmingham, 28th of March, 2017. "Understanding people in videos".
- London, 10th of March, 2017, "Investigacao para la da academia", Portuguese Association of Researchers and Students in the United Kingdom (PARSUK).
- University of Coimbra, 4th of January, 2017, "DeepMind - Towards Artificial Intelligence", Workshop on Applied Machine Learning: Concepts and Case Studies.
- Oxford University, 22nd of February 2016. "Vision, Egomotion and Feedback".
- Facebook Artificial Intelligence Research, Paris, 15th of October 2015. "Vision, Egomotion and Feedback".
- ISR-Coimbra, 25th of September. "Vision, Egomotion and Feedback".
- Keynote Speaker at SIBGRAPI 2015, 29th of August, Salvador, Brazil. "3D Shape and Articulated Pose Recovery with Top-down Processing".
- CVPR, Columbus, 24th of June 2014. "Reconstructing PASCAL VOC".
- UC Berkeley, 12th of February 2014. "Semantic Segmentation with Second-Order Pooling".
- UC Berkeley, 31st of January 2014. "Reconstructing PASCAL VOC".
- Geometric Methods for Computer Vision and Control, Wuerzburg, 16th of November 2013. "Semantic Segmentation with Second-Order Pooling".

- European Conference on Computer Vision, Florence, 12th of October 2012. "Semantic Segmentation with Second-Order Pooling". Video online at [http://videlectures.net/eccv2012\\_carreira\\_semantic/](http://videlectures.net/eccv2012_carreira_semantic/)
- Pascal VOC Workshop, Barcelona, 7th of November 2011. "Object Recognition by Sequential CPMC Segment Ranking".
- ISR-Coimbra, 13th of April 2011, "Ranking Object Hypothesis for Recognition and Segmentation".
- Pascal VOC Workshop, Kyoto, 3rd of October 2009. "Ranking Figure-Ground Hypotheses for Object Segmentation".
- ISR-Coimbra, 16th of July 2008. "Graph-based Methods for Image Segmentation".
- HCSNet Workshop on the Use of Vision in Human-Computer Interaction, Canberra, 3rd of November 2006. "Nuisance Free Recognition of Hand Postures over a Tabletop Display".

## Teaching

- VISION Understanding and Machine intelligence Summer School, July 2014, Porto, Portugal. "Image Segmentation" tutorial, with Cristian Sminchisescu.

## Event Organization

- 10th International Workshop on Perceptual Organization in Computer Vision: The Role of Feedback in Recognition and Reorganization, at CVPR 2016. Organized with Katerina Fragkiadaki (Google) and Phillip Isola (UC Berkeley).
- First International Workshop on 3D from a Single Image, at CVPR 2015, organized with Sara Vicente (Anthropics Technology), Hao Su (Stanford) and Niloy Mitra (University College London).

## Patents

- Neural Network Systems for Processing Video Data. Filed in the USA on May 15, 2017 as application No. 62/506,507.

## Publicly Released Software

- IEF, release 1. Publicly available since August 2015.
- Carvi, release 1. Publicly available since March 2014.
- Semantic Segmentation with Second-Order Pooling, release 1. Publicly available since October 2012.
- Constrained Parametric Min-Cuts for Automatic Object Segmentation, release 1. Publicly available since October 2010.

## Professional Activities

- Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), International Journal of Computer Vision (IJCV), IEEE Transactions on Image Processing (TIP), Computer Vision and Image Understanding (CVIU), Pattern Recognition (PR), Pattern Recognition Letters (PRL), International Journal of Computer Mathematics (IJCM), IEEE Journal of Biomedical and Health Informatics (JBHI), IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), IET Computer Vision, Journal of Electronic Imaging (JEI).

## Program Committee

- International Conference on Computer Vision and Pattern Recognition (CVPR) 2013-present
- International Conference on Computer Vision (ICCV) 2013-present.
- European Conference on Computer Vision (ECCV) 2012-present.
- Asian Conference on Computer Vision (ACCV) 2012-present.
- International Conference on Machine Learning (ICML) 2015-present.
- Neural Information Processing Systems (NIPS) 2015-present.
- International Conference on Learning Representations (ICLR) 2016-present.
- SIGGRAPH 2015.
- British Machine Vision Conference 2015-present.
- International Conference on Robotics and Automation (ICRA) 2015.
- Portuguese Conference on Artificial Intelligence (EPIA) 2013.

## Chair

- Semantic Segmentation Oral Session - CVPR 2016

## Achievements

- Awarded a 150k grant from the Portuguese Science Foundation for a project about unsupervised learning of visual representations, 2015.
- Best student paper award, CVPR 2015.
- Selection for the CVPR 2013 Doctoral Consortium and travel award. Mentor: Pedro Felzenszwalb, Associate Professor at Brown University.
- Postdoctoral grant from the Portuguese Science Foundation, ref. SFRH/BPD/84194/2012 supporting research to be performed in Jitendra Malik's group at the University of California, Berkeley, and in Jorge Batista's group at the Institute of Systems and Robotics, Coimbra. December 2013 - December 2016
- Pascal VOC 2012 Segmentation Challenge winning entry. See <http://pascallin.ecs.soton.ac.uk/challenges/VOC/voc2012/workshop/index.html>
- Pascal VOC 2011 Segmentation Challenge winning entry. See <http://pascallin.ecs.soton.ac.uk/challenges/VOC/voc2011/workshop/index.html>

- Pascal VOC 2010 Segmentation Challenge co-winning entry. See <http://pascallin.ecs.soton.ac.uk/challenges/VOC/voc2010/workshop/index.html>
- Pascal VOC 2009 Segmentation Challenge winning entry. See <http://pascallin.ecs.soton.ac.uk/challenges/VOC/voc2009/workshop/index.html>
- Student Travel Award - VisHCI 2006, Canberra.
- Doctoral grant from the Portuguese Science Foundation, ref. SFRH/ BD/ 24295/ 2005. January 2006 - December 2008.
- Initiation to Research grant supported by Visual Tools. September 2003 - March 2004

## Extracurricular Courses

- **Seminar**—Cologne, Germany  
*Scientific Writing*  
– Period: May 9-10, 2011
- **Ph.D. School**—Copenhagen, Denmark  
*Optimization in Computer Vision*  
– Period: May 19-23, 2008
- **International Computer Vision Summer School 2007**—Sicily, Italy  
*Detection, Recognition and Segmentation in Context*  
– Period: July 9-14, 2007
- **Second Visiontrain thematic school**—Les Houches, France  
*Neurophysiological and computational models of visual perception*  
– Period: March 25-30, 2007
- **AERFAI Summer School**—Granada, Spain  
*Action and Object Classification Techniques in Digital Images*  
– Period: June 12-17, 2006
- **Computational Methods for Estimation, Detection and Identification**—Coimbra, Portugal  
*Taught by Joao P. Barreto*  
– Period: November 2005, March 2006
- **COTEC Entrepreneurship Course**—Coimbra, Portugal  
*Entrepreneurship of Technological Base*  
– Period: from November 2004 to May 2005.
- **Physics Talks**—Coimbra, Portugal  
*Topics in Astrophysics*  
– Period: from November 2002 to February 2003.