

Dr Relja Arandjelović

Др Реља Аранђеловић

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Work Experience

- Aug 2016 – present **Senior Research Scientist**, *DeepMind*.
- Oct 2014 – Jul 2016 **Postdoctoral Research Assistant**, *INRIA / École Normale Supérieure*.
Member of the WILLOW group
- Jan 2014 – Sep 2014 **Postdoctoral Research Assistant**, *University of Oxford*.
Member of the Visual Geometry Group, Department of Engineering Science
- Oct 2013 – Dec 2013 **Research Assistant**, *University of Oxford*.
Member of the Visual Geometry Group, Department of Engineering Science
- Feb 2013 – Apr 2013 **Software Engineering Intern**, *Google*, Los Angeles, USA.
Member of the Visual Search team
- Jun 2008 – Aug 2008 **Undergraduate Researcher**, *Computing Laboratory, University of Cambridge*.
Information Fusion for Sketch Recognition
- Jul 2007 – Aug 2007 **Software Engineering Intern**, *Symbian Ltd*, Milton, UK.
and
Member of the Security team developing the Symbian Operating System
- Jun 2006 – Aug 2006 for smart mobile phones

Education

- 2009 – 2013 **DPhil in Engineering Science**, *University of Oxford (College: Christ Church)*.
Visual Geometry Group, Department of Engineering Science
Supervised by Prof. Andrew Zisserman
- 2005 – 2009 **MEng and BA in Engineering**, *University of Cambridge (College: Trinity)*.
Information and Computer Engineering
4th year: Distinction (ranked 9th out of more than 200)
- 2001 – 2005 **High School of Mathematics**, Belgrade, Serbia.
Grade point average: 5.0 out of 5.0

Selected Publications

- 2018 “Neighbourhood Consensus Networks”,
Rocco, I. and Cimpoi, M. and Arandjelović, R. and Torii, A. and Pajdla, T. and
Sivic, J.
Neural Information Processing Systems
*** Spotlight presentation ***
- 2018 “Objects that Sound”,
Arandjelović, R. and Zisserman, A.
European Conference on Computer Vision

- 2018 "Convolutional neural network architecture for geometric matching",
Rocco, I. and Arandjelović, R. and Sivic, J.
IEEE Transactions on Pattern Analysis and Machine Intelligence
- 2018 "On the effectiveness of interval bound propagation for training verifiably robust models",
Gowal, S. and Dvijotham, K. and Stanforth, R. and Bunel, R. and Qin, C. and Uesato, J. and Arandjelović, R. and Mann, T. and Kohli, P.
NeurIPS workshop on Security in Machine Learning
*** Best paper award, Oral presentation ***
- 2018 "Training verified learners with learned verifiers",
Dvijotham, K. and Gowal, S. and Stanforth, R. and Arandjelović, R. and O'Donoghue, B. and Uesato, J. and Kohli, P.
CoRR, abs/1805.10265
- 2018 "End-to-end weakly-supervised semantic alignment",
Rocco, I. and Arandjelović, R. and Sivic, J.
IEEE Conference on Computer Vision and Pattern Recognition
- 2018 "GhostVLAD for set-based face recognition",
Zhong, Y. and Arandjelović, R. and Zisserman, A.
Asian Conference on Computer Vision
- 2018 "Compact Deep Aggregation for Set Retrieval",
Zhong, Y. and Arandjelović, R. and Zisserman, A.
ECCV workshop on Compact and Efficient Feature Representation and Learning in Computer Vision
*** Best paper award, Oral presentation ***
- 2017 "Look, Listen and Learn",
Arandjelović, R. and Zisserman, A.
IEEE International Conference on Computer Vision
- 2017 "NetVLAD: CNN architecture for weakly supervised place recognition",
Arandjelović, R. and Gronat, P. and Torii, A. and Pajdla, T. and Sivic, J.
IEEE Transactions on Pattern Analysis and Machine Intelligence
- 2017 "Convolutional neural network architecture for geometric matching",
Rocco, I. and Arandjelović, R. and Sivic, J.
IEEE Conference on Computer Vision and Pattern Recognition
*** Spotlight presentation ***
- 2017 "24/7 place recognition by view synthesis",
Torii, A. and Arandjelović, R. and Sivic, J. and Okutomi, M. and Pajdla, P.
IEEE Transactions on Pattern Analysis and Machine Intelligence
- 2016 "NetVLAD: CNN architecture for weakly supervised place recognition",
Arandjelović, R. and Gronat, P. and Torii, A. and Pajdla, T. and Sivic, J.
IEEE Conference on Computer Vision and Pattern Recognition
*** Oral presentation ***

- 2016 "Pairwise Quantization",
Babenko, A. and Arandjelović, R. and Lempitsky, V.
CoRR, abs/1606.01550
- 2016 "Faces in Places: Compound query retrieval",
Zhong, Y. and Arandjelović, R. and Zisserman, A.
British Machine Vision Conference
- 2015 "24/7 place recognition by view synthesis",
Torii, A. and Arandjelović, R. and Sivic, J. and Okutomi, M. and Pajdla, P.
IEEE Conference on Computer Vision and Pattern Recognition
- 2015 "On-the-fly Learning for Visual Search of Large-scale Image and Video Datasets",
Chatfield, K. and Arandjelović, R. and Parkhi, O. and Zisserman, A.
International Journal of Multimedia Information Retrieval
- 2014 "Extremely low bit-rate nearest neighbor search using a Set Compression Tree",
Arandjelović, R. and Zisserman, A.
IEEE Transactions on Pattern Analysis and Machine Intelligence
- 2014 "Visual vocabulary with a semantic twist",
Arandjelović, R. and Zisserman, A.
Asian Conference on Computer Vision
- 2014 "DisLocation: Scalable descriptor distinctiveness for location recognition",
Arandjelović, R. and Zisserman, A.
Asian Conference on Computer Vision
- 2014 "Re-presentations of Art Collections",
Chung, J. S., Arandjelović, R., Bergel G., Franklin, A. and Zisserman, A.
ECCV workshop on Computer Vision for ART Analysis (VISART)
- 2013 "Advancing Large Scale Object Retrieval",
Arandjelović, R.
PhD thesis from University of Oxford
- 2013 "All about VLAD",
Arandjelović, R. and Zisserman, A.
IEEE Conference on Computer Vision and Pattern Recognition
- 2013 "Content-Based Image-Recognition on Printed Broadside Ballads: The Bodleian Libraries' ImageMatch Tool",
Bergel, G. and Franklin, A. and Heaney, M. and Arandjelović, R. and Zisserman, A. and Funke, D.
IFLA World Library and Information Congress
- 2012 "Three things everyone should know to improve object retrieval",
Arandjelović, R. and Zisserman, A.
IEEE Conference on Computer Vision and Pattern Recognition
- 2012 "Multiple queries for large scale specific object retrieval",
Arandjelović, R. and Zisserman, A.
British Machine Vision Conference

- 2012 "Name that Sculpture",
 Arandjelović, R. and Zisserman, A.
ACM International Conference on Multimedia Retrieval
 * **Best paper candidate, Oral presentation** *
- 2011 "Smooth Object Retrieval using a Bag of Boundaries",
 Arandjelović, R. and Zisserman, A.
IEEE International Conference on Computer Vision
 * **Most remembered poster, Spotlight presentation** *
- 2011 "Sketch recognition by fusion of temporal and image-based features",
 Arandjelović, R. and Sezgin, T. M.
Pattern Recognition
- 2010 "Efficient Image Retrieval for 3D Structures",
 Arandjelović, R. and Zisserman, A.
British Machine Vision Conference

Professional Activities

Deployed systems and demos

- Jul 2017 Released the VGG Image Search Engine (VISE).
- May 2014 Released a public demo, together with O. M. Parkhi, K. Chatfield and A. Zisserman, in collaboration with BBC R&D, used for visually searching five years of BBC News and Factual footage.
- Dec 2012 Deployed an image search system to Oxford University's Bodleian library, used for visually searching illustrations of early printed ballad sheets.
- Nov 2011 Released a public demo for visual search of smooth sculptures, in connection with my ICCV 2011 paper "Smooth Object Retrieval using a Bag of Boundaries".
- Nov 2011 Deployed an image search system to CLAROS (CLassical Art Research Online Research Services), used for visually searching antique vases and sculptures

Media Appearances

- Aug 2018 DeepMind blog:
<https://deepmind.com/blog/objects-that-sound/>
- Jan 2018 Two minute papers:
<https://www.youtube.com/watch?v=FMEk8cHF-0A>
- Aug 2017 Two minute papers:
<https://www.youtube.com/watch?v=mL3CzZcBJZU>
- Aug 2017 Article in the New Scientist:
<https://www.newscientist.com/article/2143498-deepmind-ai-teaches-itself-about-the-world-by-watching-videos>
- May 2014 Blog post by the BBC Archive:
<http://www.bbc.co.uk/informationandarchives/archivenews/2014/face-recognition-and-new-ways-to-search-for-archive.html>
- 2012 Blog posts by Oxford University's Bodleian library:
<http://balladsblog.bodleian.ox.ac.uk/blog/570>
<http://balladsblog.bodleian.ox.ac.uk/blog/174>

Miscellaneous

- Jun 2018 **Talk at “Sight and Sound” CVPR 2018 Workshop, “Look, Listen and Learn”.**
- Apr 2018 **Talk at University of Bristol, “Look, Listen and Learn”.**
- Dec 2017 **Talk at UCL and Gatsby, “Look, Listen and Learn”.**
- Nov 2017 **Lecture at the “Learning from Big Data” Centre for Doctoral Training, University of Oxford, “Approximate Nearest Neighbours”.**
- Mar 2017 **Talk at St Andrews university, “NetVLAD: CNN architecture for weakly supervised place recognition”.**
- Apr 2013 **Google Tech Talk, “Extremely low bit-rate nearest neighbor search using a Set Compression Tree”.**
- Dec 2012 **Talk at Oxford University’s Bodleian library, “Image Matching on Printed Images in Bodleian Collections”.**
- 2009-2014 **Adminstrated three servers and various virtual machines used for hosting public demos for the Visual Geometry Group, University of Oxford.**
- Reviewing **Reviewer for various conferences including CVPR, ICCV, ECCV, ICLR, ACMMM, AAAI, ACCV and BMVC, and journals such as TPAMI, IJCV, Pattern Recognition, Transactions on Image Processing, and Signal Processing Letters. Received the Best Reviewer / Outstanding Reviewer awards at CVPR 2016, ICCV 2015, ECCV 2014 and ICCV 2013.**

Teaching and Supervision

- Apr 2016 – present **Co-supervising Ignacio Rocco Spremolla for MSc and PhD with Josef Sivic, INRIA / École Normale Supérieure.**
- Oct 2014 – Nov 2018 **Co-supervised Yujie Zhong for DPhil with Andrew Zisserman, Department of Engineering Science, University of Oxford.**
- Oct 2013 – May 2014 **Co-supervised Joon Son Chung for MEng with Andrew Zisserman, Department of Engineering Science, University of Oxford.**
The project was awarded the *GSK Excellence in Communication of Engineering Innovation Award*
- Mar 2011 – Mar 2014 **Demonstrator of the Information Engineering laboratory, Department of Engineering Science, University of Oxford.**
- Mar 2014 – Mar 2014 **Demonstrator of the Software Engineering laboratory, Department of Engineering Science, University of Oxford.**

Selected Awards

- 2016 IEEE Conference on Computer Vision and Pattern Recognition *Outstanding Reviewer award*
- 2015, 2013 IEEE International Conference on Computer Vision awarded the *Best Reviewer award*
- 2014 European Conference on Computer Vision awarded the *Outstanding Reviewer award*
- 2008, 2009 Trinity College, Cambridge awarded the *Tripos* prize and the status of a *Senior Scholar* in recognition of the 3rd and 4th year examination performance

- 2007 Cambridge University Engineering Department awarded the *1st prize for the Integrated Design Project (IDP)*.
Leader of the software subteam in the project which involved teams of 6 students building an Autonomous Guided Vehicle and competing against each other
- 2005 Society of Mathematicians of Yugoslavia awarded the *2nd prize at the Federal competition of young programmers*
- 2003 Society of Mathematicians of Yugoslavia awarded the *2nd prize at the Federal competition of young mathematicians*

Skills

Computer skills C & C++, Python, TensorFlow, Matlab, Parallel computing (MapReduce, MPI, etc), Java, etc.

Languages Serbian (native), English (fluent), Italian (beginner), French (beginner)