Matteo Dunnhofer

Department of Mathematics, Computer Science, and Physics University of Udine Via delle Scienze 206, 33100 Udine, Italy

matteo.dunnhofer@uniud.it

matteo-dunnhofer.github.io

Education

- Visiting Researcher

- Visiting Student

University of Alcalá

 – PhD in Industrial and Information Engineering University of Udine Awarded "cum laude". Thesis title "Visual Object Tracking with Deep Learning". Advisor: Prof. Christian M 	2018 - 2022 Udine, Italy 1icheloni.
 – MSc in Computer Science University of Udine 	2018 - 2022 Udine, Italy
 BSc in Computer Science University of Udine 	2018 - 2022 Udine, Italy
Academic Positions	
 – Research Fellow (RTD-a) Department of Mathematics, Computer Science, and Physics, University of Udine Research activity on computer vision and deep learning. 	2023 - pres Udine, Italy
 – Postdoctoral Researcher Machine Learning and Perception Lab, University of Udine Research activity on computer vision methods for athlete performance analysis in winter sports. 	2022 - 2023 Udine, Italy
 – Postdoctoral Researcher Machine Learning and Perception Lab, University of Udine Research activity on weakly-supervised deep learning methods for visual object tracking. 	2021 - 2022 Udine, Italy
Visiting Positions	
– Visiting Researcher	2023
McGovern Institute for Brain Research Massachusetts Institute of Technology (MIT) Two weeks visiting period dedicated to preparing a MSCA Postdoctoral Fellowship proposal.	Cambridge, MA, USA
- Visiting Researcher	2023
Centre for Vision Research York University One week visiting period dedicated to preparing a MSCA Postdoctoral Fellowship proposal.	Toronto, ON, Canada
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Alcalá de Henares, Madrid, Spain Three weeks visiting period under the grant "Giner de los Rios" dedicated to host foreign scientists at the aforementioned institution.

2023

2018

Australian Centre for Robotic Vision Queensland University of Technology Brisbane, QLD, Australia One month visiting period for research on visual tracking of knee cartilages in ultrasound videos.

Industrial Experience

– Deep Learning Engineer

Medishare srl Gorizia. Italv Development and deployment of a breast density classifier for mammographies based on multi-view convolutional neural networks.

- Software Developer

Self-employed

Design and development of: an iOS and Android app; a webapp for the registration and payment to a local sport association; a distributed system to manage competition data in real-time during ski jumping competitions.

Publications

Journal Papers

- Dunnhofer, M., Furnari, A., Farinella, G. M. F., Micheloni, C. (2022). Visual Object Tracking in First Person Vision. International Journal of Computer Vision. IF: 19.5, Scimago Q1 (2022). https://doi.org/10.1007/s11263-022-01694-6
- **Dunnhofer, M.**, Martinel, N., Micheloni, C. (2022). Deep Convolutional Feature Details for Better Knee Disorder Diagnosis in Magnetic Resonance Images. Computerized Medical Imaging and Graphics. IF: 5.7, Scimago Q1 (2022). https://doi.org/10.1016/j.compmedimag.2022.102142
- Dunnhofer, M., Simonato, K., Micheloni, C. (2022). Combining Complementary Trackers for Enhanced Long-Term Visual Object Tracking. Image and Vision Computing. IF: 4.7, Scimago Q2 (2022). https://doi.org/10.1016/j.imavis.2022.104448
- Dunnhofer, M., Martinel, N., Micheloni, C. (2021). Weakly-Supervised Domain Adaptation of Deep Regression Trackers via Reinforced Knowledge Distillation. IEEE Robotics and Automation Letters. IF: 5.2, Scimago Q1 (2022). https://doi.org/10.1109/LRA.2021.3070816
- Martinel, N., Dunnhofer, M., Pucci, R., Foresti, G. L., Micheloni, C. (2021). Lord of the Rings: Hanoi Pooling and Self-Knowledge Distillation for Fast and Accurate Vehicle Re-Identification. IEEE Transactions on Industrial Informatics. IF: 12.3, Scimago Q1 (2022). https://doi.org/10.1109/TII.2021.3068927
- Miani, M., Dunnhofer, M., Micheloni, C., Marini, A., Baldo, N. (2021). Surrogate Safety Measures Prediction at Multiple Timescales in V2P Conflicts Based on Gated Recurrent Unit. Sustainability. IF: 3.9, Scimago Q1 (2022).

https://doi.org/10.3390/su13179681

– Miani, M., Dunnhofer, M., Rondinella, F., Manthos, E., Valentin, J., Micheloni, C., Baldo, N. (2021). Bituminous Mixtures Experimental Data Modeling Using a Hyperparameters-Optimized Machine Learning Approach. Applied Sciences. IF: 2.7, Scimago Q2 (2022).

https://doi.org/10.3390/app112411710

- Dunnhofer, M., Antico, M., Sasazawa, F., Takeda, Y., Camps, S., Martinel, N., Micheloni, C., Carneiro, G., Fontanarosa, D. (2020).

Siam-U-Net: encoder-decoder siamese network for knee cartilage tracking in ultrasound images.

2018

2015 - 2017

Medical Image Analysis. IF: 10.9, Scimago Q1 (2022). <u>https://doi.org/10.1016/j.media.2019.101631</u>

- Antico, M., Sasazawa, F., Dunnhofer, M., Camps, S., Jaiprakash, A., Pandey, A., Crawford, R., Carneiro, G., Fontanarosa, D. (2020).
 Deep learning-based femoral cartilage automatic segmentation in ultrasound imaging for guidance in robotic knee arthroscopy.
 Ultrasound in Medicine & Biology. IF: 2.9, Scimago Q1 (2022).
 https://doi.org/10.1016/j.ultrasmedbio.2019.10.015
- Camps, S., Houben, T., Carneiro, G., Edwards, C., Antico, M., Dunnhofer, M., Martens, E., Baeza, J., Vanneste, B., van Limbergen, E., de With, P., Verhaegen, F., Fontanarosa, D. (2020).
 Automatic quality assessment of transperineal ultrasound images of the male pelvic region.
 Ultrasound in Medicine & Biology. IF: 2.9, Scimago Q1 (2021).
 https://doi.org/10.1016/j.ultrasmedbio.2019.10.027

Conference Papers

- Dunnhofer, M., Sordi, L., Martinel, N., Micheloni, C. (2024).
 Tracking Skiers from the Top to the Bottom.
 IEEE/CVF Winter Conference on Applications of Computer Vision (WACV).
 Accepted for publication.
- Dunnhofer, M., Sordi, L., Micheloni, C. (2023).
 Visualizing Skiers' Trajectories in Monocular Videos.
 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops.
 https://doi.org/10.1109/CVPRW59228.2023.00547
- Dunnhofer, M., Micheloni, C. (2023).
 Automatic Video-Based Reconstruction of the Trajectories Performed by Skiers.
 9th International Congress on Science and Skiing (ICSS).
- Kristan, M., ..., Dunnhofer, M., (2023).
 The First Visual Object Tracking Segmentation VOTS2023 Challenge Results. IEEE/CVF International Conference on Computer Vision (ICCV) Workshops.
- Khan, A. H., Umer, R. M., Dunnhofer, M., Micheloni, C., Martinel, N (2023).
 Lightweight Blur Kernel Estimation Network for Blind Image Super-Resolution.
 International Conference on Image Analysis and Processing (ICIAP) 2023.
 https://doi.org/10.1007/978-3-031-43153-1_18
- Dunnhofer, M., Micheloni, C. (2022).
 CoCoLoT: Combining Complementary Trackers in Long-Term Visual Tracking. International Conference on Pattern Recognition (ICPR). <u>https://doi.org/10.1109/ICPR56361.2022.9956082</u>
- Kristan, M., ..., Dunnhofer, M., (2022).
 The Tenth Visual Object Tracking VOT2022 Challenge Results.
 European Conference on Computer Vision (ECCV) Workshops.
 https://doi.org/10.1007/978-3-031-25085-9 25
- Dunnhofer, M., Furnari, A., Farinella, G. M. F., Micheloni, C. (2021).
 Is First Person Vision Challenging for Object Tracking?.
 IEEE/CVF International Conference on Computer Vision (ICCV) Workshops. https://doi.org/10.1109/ICCVW54120.2021.00304
- Kristan, M., ..., Dunnhofer, M., (2021).
 The Ninth Visual Object Tracking VOT2021 Challenge Results.

IEEE/CVF International Conference on Computer Vision (ICCV) Workshops. https://doi.org/10.1109/ICCVW54120.2021.00305

- Dunnhofer, M., Martinel, N., Micheloni, C. (2021).
 Improving MRI-based Knee Disorder Diagnosis with Pyramidal Feature Details.
 International Conference on Medical Imaging with Deep Learning (MIDL).
 https://proceedings.mlr.press/v143/dunnhofer21a.html
- Miani, M., Dunnhofer, M., Micheloni, C., Marini, A., Baldo, N. (2021).
 Young drivers' pedestrian anti-collision braking operation data modelling for ADAS development.
 Living and Walking in Cities Conference (LWC).
 https://doi.org/10.1016/j.trpro.2021.12.056
- Dunnhofer, M., Martinel, N., Micheloni, C. (2020).
 Tracking-by-Trackers with a Distilled and Reinforced Model.
 Asian Conference on Computer Vision (ACCV).
 https://doi.org/10.1007/978-3-030-69532-3_38
- Dunnhofer, M., Martinel, N., Micheloni, C. (2020).
 An Exploration of Target-Conditioned Segmentation Methods for Visual Object Trackers.
 European Conference on Computer Vision (ECCV) Workshops.
 https://doi.org/10.1007/978-3-030-69532-3_38
- Kristan, M., ..., Dunnhofer, M., (2020).
 The Eight Visual Object Tracking VOT2020 Challenge Results.
 European Conference on Computer Vision (ECCV) Workshops.
 https://doi.org/10.1007/978-3-030-68238-5_39
- Dunnhofer, M., Martinel, N., Foresti, G. L., Micheloni, C. (2019).
 Visual Tracking by means of Deep Reinforcement Learning and an Expert Demonstrator.
 IEEE/CVF International Conference on Computer Vision (ICCV) Workshops. <u>https://doi.org/10.1109/ICCVW.2019.00282</u>
- Kristan, M., ..., Dunnhofer, M., (2019).
 The Seventh Visual Object Tracking VOT2019 Challenge Results.
 IEEE/CVF International Conference on Computer Vision (ICCV) Workshops. https://doi.org/10.1109/ICCVW.2019.00276
- Chini, M., Martinel, N., Dunnhofer, M., Ceschia, C., Micheloni, C. (2018). Unsupervised Smoke Detection in Normally Smoking Environments. International Conference on Distributed Smart Cameras (ICDSC). https://doi.org/10.1145/3243394.3243699
- Camps, S., Houben, T., Fontanarosa, D., Edwards, C., Antico, M., Dunnhofer, M., Martens, E., Baeza, J., Vanneste, B., van Limbergen, E., de With, P., Verhaegen, Carneiro, G., F. (2018).
 One-class Gaussian process regressor for quality assessment of transperineal ultrasound images. International Conference on Medical Imaging with Deep Learning (MIDL). https://openreview.net/pdf?id=r1s0gx3iG
- Camps, S., Houben, T., Edwards, C., Antico, M., Dunnhofer, M., Martens, E., Baeza, J., Vanneste, B., van Limbergen, E., de With, P., Verhaegen, Carneiro, G., F., Fontanarosa, D. (2018).
 Quality Assessment of Transperineal Ultrasound Images of the Male Pelvic Region Using Deep Learning. *IEEE International Ultrasonics Symposium (IUS)*. <u>https://doi.org/10.1109/ULTSYM.2018.8579839</u>

PhD Thesis

Dunnhofer, M. (2022). Visual Object Tracking with Deep Learning. University of Udine.

Bibliometrics

Last updated on 13-10-2023

Database	Citations	H-index	Publications	Avg Citations per Document
Google Scholar	1073	13	30	35,8
ResearchGate	1082	12	28	38,6
Scopus	629	10	25	25,2

Awards & Achievements

Awards

- Outstanding Reviewer Award recognized by the European Conference on Computer Vision (ECCV) 2022 Selected to be among the best 205 conference reviewers, out of 4719.
- Winning Tracker Award recognized by the VOT Challenge Committee
 Prize received for the development of the most accurate algorithm in the Visual Object Tracking VOT2021 Long-Term Challenge held at the International Conference on Computer Vision (ICCV) 2021.
- QUT Postgraduate Research Award (International) recognized by the Queensland University of Technology Living expenses fund for PhD students awarded by the Queensland University of Technology in 2018. I had to refuse the award after my admission in the PhD program at the University of Udine.

Achievements

- Doctoral Consortium Fellowship by the International Conference on Computer Vision (ICCV) 2021 Mentor: Dr. Joao Henriques, Visual Geometry Group, University of Oxford, United Kingdom.
- Top-10 Finish at the Visual Object Tracking VOT2020 Challenge Results achieved in both the Short-Term and Real-Time challenges held at the European Conference on Computer Vision (ECCV) 2020.
- Bronze Medal (Top 10%) in Kaggle's "Planet: Understanding the Amazon from Space" competition

Grants

- Giner de los Rios (~1700€) by the University of Alcalá (2022)
 Competitive expense-covering grant to spend a visiting period at the institution.
- Voucher for EU Horizon Europe Proposals (5000€) by the University of Udine (2022) Grant to cover the training expenses to prepare a proposal for the 2023 MSCA Postdoctoral Fellowship call.

Projects & Collaborations

Project Leading

 – PRINNEVOT: Towards Primate-like Artificial Neural Networks for Visual Object Tracking Funder: EU Horizon Europe MSCA Postdoctoral Fellowship (Global)

submitted

Project Participation

 TEAM: Tracking in Egovision for Applied Memory Funder: PRIN 2022 PNRR – Italian Ministry for University and Research 	2023 - 2025
 EXTRA-EYE: Egocentric and eXocenTRic views for An object-level human bEhavior analYsis ar undErstanding through tracking in complex spaces Funder: PRIN 2022 – Italian Ministry for University and Research 	nd 2023 - 2025
 Next Generation AI-driven Winter Sports Analytics Funder: Organizing Committee of the European Youth Olympic Festival (EYOF) 2023 	2021 - 2023
 Advanced Hardware/Software Components for Integrated/Embedded Vision Systems Funder: EU H2020 MSCA Innovative Training Network 	2018 - 2021
 Billet Ovality Prediction Funder: SMACT Centro di Competenza del Triveneto 	2021
 New class of intelligent robotic imaging system for keyhole surgeries Funder: Australia-India Strategic Research Fund 	2018 - 2019
Technology Transfer	
 "WE-SAFE: Proactive Risk Assessment" Funder: Call4Solutions Smart Road Anas, Foundation Open Factory, ELIS, Area Science Park, Anas 	2022
Collaborations	
 York University, Toronto, Ontario, Canada Collaboration with the group led by Prof. Kohitij Kar on research in computer vision and visual neuroscience. 	2022 - pres
 University of Alcalá, Alcalá de Henares, Madrid, Spain Collaboration with the group led by Prof. Alfredo Gardel on research in computer vision and machine learning. 	2022 - pres
 University of Trento, Trento, Italy Collaboration with the group led by Prof. Nicola Conci on the organization of a workshop about computer vision in v domains. 	2021 - 2023 winter sport
– University of Catania, Catania, Italy Collaboration with the group led by Prof. Giovanni Maria Farinella on visual object tracking research in first person	2019 - pres vision.
 University of Udine (DPIA), Udine, Italy Collaboration with the group led by Prof. Nicola Baldo on research in machine learning for prediction of the mechan asphalts and driving safety. 	2019 – 2022 nical behavior of
 Queensland University of Technology, Brisbane, Australia Collaboration with the group led by Prof. Davide Fontanarosa on research in medical image analysis. 	2018 - 2019
 The University of Adelaide, Adelaide, Australia Collaboration with the group led by Prof. Gustavo Carneiro on research in medical image analysis. 	2018 - 2019
Talks & Presentations	

Invited Talks

 "Visual Object Tracking in Machines and Brains" DiCarlo Lab, McGovern Institute for Brain Research, MIT 	2023
– "Visual Object Tracking in Machines and Brains" VITA Lab, York University	2023

 "Next-Generation AI-driven Winter Sports Analytics" Course on "Sistemi di gestione e analisi dei dati per l'allenamento", University of Udine 	2023
 "Fusing Complementary Trackers for Long-Term Visual Tracking" Visual Object Tracking VOT2021 Challenge workshop held at the International Conference on Computer Vision (ICCV) 20 	2021 021
 "Siam-U-Net: encoder-decoder siamese network for knee cartilage tracking in ultrasound images" AI4US workshop at the IEEE International Conference on Biomedical and Health Informatics (BHI) - International Conference Wearable and Implantable Body Sensor Networks (BSN) 	2021 ence on
– "Learning Visual Tracking from Teachers" VRAI Lab, Università Politecnica delle Marche	2020
Paper Presentations	
 "Visualizing Skiers' Trajectories in Monocular Videos" Spotlight and poster presentations at the CVsports workshop held at the IEEE/CVF Conference on Computer Vision and P Recognition (CVPR) 2023. 	2023 Pattern
 "Automatic Video-based Reconstruction of the Trajectories performed by Skiers" Oral presentation at the International Congress on Science and Skiing (ICSS) 2023. 	2023
 "CoCoLoT: Combining Complementary Trackers in Long-Term Visual Tracking Skiers" Oral presentation at the International Conference on Pattern Recognition (ICPR) 2022. 	2022
 – "Is First Person Vision Challenging for Object Tracking?" Oral presentation at the VOT2021 workshop held at the International Conference on Computer Vision (ICCV) 2021. 	2021
 "Improving MRI-based Knee Disorder Diagnosis with Pyramidal Feature Details" Poster presentation at the International Conference on Medical Imaging with Deep Learning (MIDL) 2021. 	2021
 "Tracking-by-Trackers with a Distilled and Reinforced Model" Poster presentation at the Asian Conference on Computer Vision (ACCV) 2020. 	2020
 "An Exploration of Target-Conditioned Segmentation Methods for Visual Object Trackers" Oral presentation at the VOT2020 workshop held at European Conference on Computer Vision (ECCV) 2020. 	2020
 "Visual Tracking by means of Deep Reinforcement Learning and an Expert Demonstrator" Spotlight and poster presentations at the VOT2019 workshop held at the International Conference on Computer Vision (I 2019. 	2019 CCV)

Service & Outreach Activity

Conferences

- International Conference on Computer Vision Theory and Applications (VISAPP) 2024 Area Chair
- International Conference on Image Analysis and Processing (ICIAP) 2023 Publicity and Social Media Chair

Workshops

 2nd Workshop on Computer Vision for Winter Sports at the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2023 *General Chair* – 1st Workshop on Computer Vision for Winter Sports at the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2022 General Chair

Tutorials

- "Video Object Tracking: a Deep Learning Perspective" at the International Conference on Intelligent Environments (IE) 2023 Leading Organizer
- "Deep Learning for Visual Object Tracking" at the International Conference on Image Analysis and Processing (ICIAP) 2022 Leading Organizer

Challenges

 - "EPIC-KITCHENS TREK-150 Object Tracking Challenge" at the EPIC workshop held at the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2023 Leading Organizer

Demos

 - "Ultrasound-Guided Autonomous Knee Arthroscopy" at the International Conference on Robotics and Automation (ICRA) 2018 Contributor

Editorial & Review Activity

Editorial Activity

– The Visual Computer (Springer) Associate Editor 2023 - pres

 Special issue on "Object Detection based on Vision Sensors and Neural Network" on Sensors (MDPI) 2023 Guest Editor

Reviewer for Journals

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2021 2022
- International Journal of Computer Vision (IJCV), 2022 2023
- IEEE Transactions on Cybernetics (TCyb), 2022
- IEEE Robotics and Automation Letters (RA-L), 2020, 2023
- Robotics and Autonomous Systems, 2023
- Medical Image Analysis (MedIA), 2021, 2023
- IEEE Transactions on Medical Imaging (TMI), 2022
- Pattern Recognition (PR), 2021, 2023
- IEEE Transactions on Multimedia (TMM), 2022
- Machine Vision and Applications (MVA), 2023
- Journal of Visual Communication and Image Representation (JVCI), 2019 2020
- Knowledge-Based Systems (KNOSYS), 2020, 2022 2023

- IET Computer Vision, 2022
- IET Image Processing, 2021
- Journal of Science and Medicine in Sport Plus, 2023

Reviewer for Conferences

- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022 2023
- IEEE/CVF International Conference on Computer Vision (ICCV), 2023
- European Conference on Computer Vision (ECCV), 2022
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2021, 2022, 2024
- British Machine Vision Conference (BMVC), 2023
- International Conference on Pattern Recognition (ICPR), 2020, 2022
- IEEE International Conference on Robotics and Automation (ICRA), 2021, 2023
- Medical Imaging with Deep Learning Conference (MIDL), 2021, 2022

Technical Program Committee Membership

- International Workshop on Distributed Smart Cameras at ECCV 2022 and ICCV 2021
- AI City Challenge workshop at CVPR 2021

Teaching

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UNIUD

Guest Lectures

– "How to use Deep Neural Networks for Visual Tracking" MSc Course on "Deep Learning", UNICT	2022
– "Deep Reinforcement Learning for Robot Control" International Summer School on Artificial Intelligence AI-DLDA, Udine, Italy	2022, 2023
– "Deep Learning for Visual Object Tracking" International Summer School on Artificial Intelligence AI-DLDA, Udine, Italy	2022
– "Deep Reinforcement Learning for Control" International Summer School on Artificial Intelligence AI-DLDA, Udine, Italy	2020, 2021
 "Deep Learning for Visual Object Tracking" Master in Intelligence and ICT, UNIUD 	2021
– "The MNIST Digit Recognition Challenge" Piano Lauree Scientifiche, ISIS A. Malignani, Udine, Italy	2019

Student Co-supervision

- "SeismoIOT: Un prototipo IoT per il monitoraggio dei siti di stoccaggio di gas naturale" Paolo Bernardi, UNIUD, BSc Thesis, A.Y. 2022/2023
- "Stima della posa 3D per lo sci alpino con tecniche di computer vision" Andrea Marcon, UNIUD, BSc Thesis, A.Y. 2022/2023
- "Sistema di virtualizzazione su piattaforma embedded per l'esecuzione di algoritmi di intelligenza artificiale" Ethan Carena, UNIUD, BSc Thesis, A.Y. 2021/2022
- "Algoritmi di Deep Learning per il Long-Term Tracking"
 Kristian Simonato, UNIUD, MSc Thesis, A.Y. 2019/2020
- "Split-and-Merge Tracking: un nuovo problema di tracciamento" Mattia Di Giusto, UNIUD, MSc Thesis, A.Y. 2019/2020

Skills

Soft Skills

- Critical Thinking, Self-Confidence, Autonomy, Flexibility, Team Working

Languages

- Italian (mother tongue), English (C1, IELTS certificate), German (B1, Goethe certificate)

Programming

- Python, MATLAB, C, C++, Java, Swift, Haskell, Prolog, PHP, HTML, JavaScript

Frameworks

- PyTorch, TensorFlow, Keras, OpenCV, Kornia, Scikit

Il sottoscritto Matteo Dunnhofer, consapevole che le dichiarazioni false comportano l'applicazione delle sanzioni penali previste dall'art. 76 del D.P.R. 445/2000, dichiara che le informazioni riportate in questo curriculum vitae corrispondono a verità.

DM All