

BehzadBozorgtabar

Research Scientist – Machine Learning & Medical Imaging & Computer Vision|Patents Expert



date

8th of September,
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personal details

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languages

English (Fluent)
Persian(Mothertongue)

marital status

Single (no children)

programming

Python
Java, C++
MATLAB
HTML5

homepage

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summary

I am a senior scientist at the Centre for Biomedical Imaging (CIBM), with the main affiliation with the Signal Processing Lab (LTS5) of the Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland. I am also affiliated with the Lausanne University Hospital (CHUV), Department of Radiology. I have been elected as a member of the European Lab for Learning & Intelligent Systems (ELLIS). At the CIBM and EPFL-LTS5, I am the machine learning leader for the imaging group at LTS5. I am in charge of coordinating the research in the lab, and supervising five Ph.D. students. I am also in charge of the EPFL CV reading group's weekly meetings, scheduling, and hosting guest speakers. I have been leading the EPFL team for the European Union's Horizon 2020 research and innovation program (ADAS&ME) for three years (2017-2020) in the field of Advanced Driver Assistance Services. At the time of writing, I have more than 2120 citations to my credit from researchers worldwide. My previous role as a postdoctoral Researcher at IBM has led to the development of novel deep learning-based medical image analysis methods leading to peer-reviewed scientific articles and patents. My contribution to detecting skin cancer is being used in production at IBM's Watson supercomputer, leading to early melanoma detection. I won the Research Division Image Award at IBM, Australia. In 2012, I won the Australian International Postgraduate Research Scholarship (IPRS) for my Ph.D. degree and reached the final level of the Australian Imagine Cup organized by Microsoft in 2014. I have taught a number of master's courses at EPFL. My articles have been published in highly reputed conferences (CVPR, ICCV, MICCAI, MIDL, etc.) and IEEE journals (T-MI, TCSVT, etc). I have also been a peer reviewer and program committee for several conferences, workshops, journals, and transactions published in IEEE and Elsevier.

expertise and area of interests

- **Medical Image Analysis** (interpretability of deep learning, anomaly detection, semantic segmentation, disease classification, domain generalization, survival analysis)
- **Computer Vision** (multi-target tracking, action recognition, style transfer, generative image synthesis, image super-resolution, 3D vision, depth and ego-motion estimation, facial expression recognition, GANs)
- **Machine Learning** (self-supervised learning, domain adaptation/generalization, generative adversarial networks, out-of-distribution (OoD) detection, meta-learning)

My research interests lie in the general area of medical image analysis, computer vision, and machine learning, particularly in deep representation learning, as well as their applications in **domain adaptation** and **self-supervised learning**, which I consider as major avenues for innovation and impact in visual computing. My research's ultimate goal is to develop robust deep image representations that capture and understand the world, as well as our human eye and mind, do. Those representations will form the basic building block of downstream vision-based tasks. Another crucial aspect of my research is to assess the performances of deep learning models on large-scale real-world datasets and improve their transparency in decision-making processes.

academic qualifications

since Jan 2019 **Senior Scientist** The Centre for Biomedical Imaging (CIBM), with main affiliations with the Signal Processing Lab (LTS5) of the École polytechnique fédérale de Lausanne (EPFL) and the Lausanne University Hospital (CHUV), Department of Radiology

since Oct 2017 **Scientist** EPFL, LTS5

Project Title: ADAS&ME

2012–2016 **Ph.D. in Information Science and Engineering** University of Canberra, Faculty of Education, Science, Technology & Mathematics (ESTeM)

Thesis Title: Vision-based Tracking for Sports Performance Analysis

2008–2011 **M.Sc. in Electrical Engineering-Electronics** Iran University of Science and Technology (IUST), Faculty of Electrical Engineering

Thesis Title: Improved PCA Feature Extraction for Face Recognition

2004–2008 **B.Sc. in Electrical Engineering-Electronics** University of Mazandaran

Specialized Project: Licence Plate Recognition Using Feed-forward Neural Network

work experience & professional activities

April 2016– Oct 2017 **IBM Research - Australia, Melbourne** Postdoctoral Fellow

Skin cancer project

Schizophrenia project (face expression analysis)

Supervised PhD students

2012–2015 **University of Canberra, Faculty of ESTeM** Guest Lecturer

PhD research project and consulting projects

Guest lecturer in Computer Vision and Image Analysis

2014–2016 **University of Canberra, Faculty of ESTeM** Research Assistant

Terrain Park Project (Visual Tracking of Skiers)

skills

deep learning libraries:

- PyTorch
- Tensorflow
- Caffe
- Theano
- Keras

additional softwares:

- IBM CPLEX
- Eclipse
- SQL
- Latex
- Microsoft Office
- Adobe Photoshop

teaching experience

2019–present	EPFL École polytechnique fédérale de Lausanne <i>Image Analysis and Pattern Recognition</i> <i>Flipped teaching, teaching in large class (> 100 students)</i>	Lecturer
2019–present	EPFL École polytechnique fédérale de Lausanne <i>Lab in signal and image processing</i>	Lecturer
2018	EPFL École polytechnique fédérale de Lausanne <i>Lab in signal and image processing</i>	Head TA, lab coordinator
2013–2015	University of Canberra, Faculty of ESTeM Technology (IIT) <i>Shared responsibilities for exams/homework assignments and grades</i> <i>Lab demonstrator-preparation for tutorials and computer laboratory class</i>	TA - Introduction to Information

I have given lectures at EPFL, invited talks at multiple universities and summits, and mentored students ranging from undergraduates to PhDs. My teaching philosophy centers around the idea of engagement and simplicity. I experienced various pedagogical approaches, such as **blended learning**. I have given lectures as a lecturer at EPFL; I am teaching, together with Prof. Thiran, two courses at the master level:

Image analysis and pattern recognition (EE-451-4 ECTS- Bozorgtabar & Thiran):

This course explores the basic digital image analysis methods and pattern recognition: pre-processing, image segmentation, shape representation, and classification. These concepts are illustrated by applications in computer vision and medical image analysis.

Lab in signal and image processing (EE-490(f)-4 ECTS- Bozorgtabar & Thiran):

This course and lab sessions are designed as a practical companion to the course "Image Analysis and Pattern Recognition." The main objective is to learn how to use some critical image processing libraries, namely OpenCV, for performing image analysis tasks such as object detection and object tracking.

media coverage

1. ABC TV Catalyst Program research on developing a diagnostic aid for depression
2. IBM's Watson Supercomputer in Early Detection of Melanoma

projects

- since 2021 **Domain Generalization: Generalizing to Unseen Domains & Concepts** EPFL
This project aims to improve the generalization ability of deep learning models, as usually, training data cannot capture the infinite variability of the real world. While deep learning demonstrates its strong capability in an experimental environment to handle independent and identically distributed (i.i.d) data, it often suffers from out-of-distribution (OoD) generalization, where the test data come from unseen visual domains with different distributions, w.r.t. the training one. Thus, this project aims to design deep neural architectures and learn a model that can generalize to new unseen visual domains and recognize novel semantic concepts. The rationale behind the proposed methodology is learning domain-invariant representation for visual domains applicable to various computer vision tasks, including object recognition and semantic segmentation.
- since 2019 **Tissue Type Classification in Colorectal Cancer** EPFL, CIBM
The availability of labeled data conditions supervised learning for tissue classification. Using open-source data for pre-training or using domain adaptation can be a way to overcome this issue. However, pre-trained deep networks often fail to generalize to new test domains that are not distributed identically to the training data due to variations in tissue stainings, types, and textures. Additionally, current domain adaptation methods mainly rely on a fully-labeled source dataset. This project aims to develop a self-supervised learning-based methodology for domain adaptation to remove a fully-labeled source dataset burden.
- since 2019 **Anomaly Detection for X-Ray Images** EPFL, CIBM
Anomaly detection (AD) methods find extensive use in radiology related fields. The recent advances in deep learning have shaken up this area of research. However, the success of such supervised systems hinges on a large amount of annotations by radiologists, which is often prohibitively very time consuming and expensive to acquire. Moreover, these supervised systems are tailored to closed set scenarios, e.g., trained models suffer from overfitting to previously seen rare anomalies at training. A promising approach to AD relies on a fully unsupervised or self-supervised training scheme. This project aims to develop a computer-aided diagnosis (CAD) system that can automatically identify abnormal X-rays by learning only from normal ones during the training phase.
- 2019-2020 **Predicting Risk Stratification for Colorectal Cancer Patients** EPFL, CIBM
Computational pathology aims to diagnose cancer and distinguish tissue components (e.g., nuclei, tumour), which has seen great improvements in recent years due to the advancement of convolutional neural networks (CNN) based diagnosis systems. However, most of the tumor microenvironments used to describe patterns of aggressive tumor behavior are ignored. This project aims to develop a computer-aided diagnosis (CAD) system to identify histopathological patterns within cancerous tissue regions that can be used to improve prognostic stratification for colorectal cancer.

- 2017-2019 **ADAS&ME Project** EPFL
 Advanced Driver-Assistance Systems (ADAS) are one of the fastest-growing safety applications in the automotive industry. This project's objective was to incorporate driver state, situational context, and adaptive interaction to automatically transfer control between vehicle and driver and thus ensure safety and comfort in driving for all vehicle types. Among ADAS solutions, the most demanding examples are related to monitoring systems, where the driver-centric behavior and its related analysis such as automatic face and gesture analysis are the focus of interest. Here, the goal was to leverage and analyze facial data to better understand the car driver's user experience and avoid potentially unsafe maneuvers by alerting drivers. I have been actively involved in this Horizon 2020 project (ADAS&ME Project) and supervised the EPFL team for the ADAS&ME project.
- 2016-2017 **Skin Cancer Detection Project** IBM, Australia
 Melanoma is the most aggressive type of skin cancer, which causes a majority of skin cancer deaths. The aim of this project was to design a platform for automatic analysis of dermoscopic images, which can assist dermatologists in clinical decision making. To perform automatic analysis of dermoscopic images, segmentation of skin lesions from surrounding normal regions is usually the first step. I proposed several deep models for skin lesion segmentation, which achieved state-of-the-art results on many skin datasets.
- 2016-2017 **Retinal Image Analysis** IBM, Australia
 I have developed a novel image super-resolution, which can reconstruct detailed images from unbelievably small, blurry images to help an accurate localization of pathologies in retinal images and has impact in the commercial space.
- 2016 **Schizophrenia Project** IBM, Australia
 I was involved in the face analysis project and had the opportunity to mentor and advise a PhD student. This project was aimed to estimate the emotional state through analysis of facial expressions for the patients with schizophrenia.
- 2015 **Terrain Park Project:** University of Canberra, Australia
 I have developed an accurate visual tracking system for position tracking of skiers to estimate different jump patterns of the skiers.
- 2015 **SportCipher:** University of Canberra, Australia
 Developed in collaboration with coaches and sports performance analysts from a range of team sports such as soccer, rugby, hockey, a project in team sports performance analysis has been conducted to provide a scalable, affordable solution to assist coaches in close-to-real-time analysis of dynamic match situations, post-match analysis, and the prediction of injury likelihoods. The research outcome of this project led to successful application for research grant DTF.2.0 (Discovery Translation Fund 2.0).

organization of scientific meetings & PC membership

- 2021 PC Member ICCV 2021 Workshop on Computer Vision for Automated Medical Diagnosis (CVAMD), 2021
- 2020- Organizer of the Computer Vision Reading Group, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

- 2019 FG 2019 Workshop Organizer on Face Analysis for Advanced Driver Assistance Systems (FA4ADAS)
- 2019 Associated editor of the Frontiers in Medicine, Switzerland
- 2018- Machine Learning Leader for Medical Imaging Group, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

honors, awards and leadership

- 2021 Elected as a member of the European Lab for Learning Intelligent Systems (ELLIS), EPFL, Switzerland
- 2017-2019 ADAS&ME Project Leadership (Horizon 2020), EPFL, Switzerland
- 2017 IBM Research Division Image Award, Australia
- 2017 IBM First Patent Award, Australia
- 2014 Imagine Cup, Australian Finals, Microsoft, Sydney, Australia
- 2012 International Postgraduate Research Scholarship (IPRS), Australia
- 2008 National Scholarship for Master's Degree, Iran
- 2002 Placed Third in Advanced Science Contest in Province, Placed First in the City, Iran.

invited speaker

- 2020 Invited Speaker: Huawei France Future Image Signal Processing Workshop, Nice, France
- 2016 Invited Speaker: The Emerging Sensing Technologies Summit 2016 (ESTS'16), Melbourne, Australia

grants

- 2018-present PHRT Grant (co-PI and main author)
- 2018-present Swiss Cancer Foundation Grant (co-PI and main author)
- 2015 Discovery Translation Fund (DTF 2.0) (co-PI and main author)

External funding is important to conduct research and support graduate students. During my career at EPFL, I have been actively involved in writing grants. I got major grants, including the PHRT grant (three years of Ph.D. support) and the Swiss Cancer Research funded. I was involved in writing application proposals and collaboration with the institute of pathology in Bern.

membership

ELLIS 2021-present
IEEE 2012-present

invited peer-reviews

I am a peer reviewer of:

- 2020-present International Conference on Computer Vision (ICCV)
- 2019-present IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- 2020-present IEEE Winter Conference on Applications of Computer Vision (WACV)
- 2019-present International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)
- 2019-present IEEE Transactions on Medical Imaging (T-MI)
- 2021-present Medical Image Analysis (MedIA)
- 2016-present IEEE Transactions on Image Processing (TIP)
- 2017-present Journal of Computer Vision and Image Understanding (Elsevier)
- 2016-present The Journal of the Pattern Recognition

publications

Conferences

- G. Jaume, P. Pati, **B. Bozorgtabar**, A. Foncubierta-Rodríguez, A. Anniciello, F. Ferrocce, T. Rau, J.-Ph. Thiran, M. Gabrani, O. Goksel. *Quantifying Explainers of Graph Neural Networks in Computational Pathology*. The Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
- Valentin Anklin, Pushpak Pati, Guillaume Jaume, **B. Bozorgtabar**, Antonio Foncubierta-Rodríguez, Jean-Philippe Thiran, Mathilde Sibony, Maria Gabrani, Orcun Goksel. *Learning Whole-Slide Segmentation from Inexact and Incomplete Labels using Tissue Graphs*. 24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2021.
- **B. Bozorgtabar**, G. Vray, D. Mahapatra, J.-Ph. Thiran. *SOoD: Self-Supervised Out-of-Distribution Detection Under Domain Shift*. IEEE/CVF International Conference on Computer Vision Workshop (ICCVW), 2021.
- D. Mahapatra, **B. Bozorgtabar**, Z. Ge. *Medical Image Classification Using Generalized Zero Shot Learning*. IEEE/CVF International Conference on Computer Vision Workshop (ICCVW), 2021.
- S. Rad, T. Yu, **B. Bozorgtabar** and J.-Ph. Thiran. *Test-Time Adaptation for Super-Resolution: You Only Need to Overfit on a Few More Images*. IEEE/CVF International Conference on Computer Vision Workshop (ICCVW), 2021.
- D. Tomar, **B. Bozorgtabar**, M.Lortkipanidze, G.Vray, S. Rad, J.-Ph. Thiran. *Self-Supervised Generative Style Transfer for One-Shot Medical Image Segmentation*. The IEEE Winter Conference on Applications of Computer Vision (WACV), 2022, under review.
- C. Abbet, L. Studer, A. Fischer, H. Dawson, I. Zlobec, **B. Bozorgtabar** and J.-Ph. Thiran. *Self-Rule to Adapt: Learning Generalized Features from Sparsely-Labeled Data Using Unsupervised Domain Adaptation for Colorectal Cancer Tissue Phenotyping*. The Medical Imaging with Deep Learning conference (MIDL), 2021.
- D. Mahapatra, **B. Bozorgtabar**, Sh. Kuanar, Z. Ge. *Self-Supervised Multimodal Generalized Zero Shot Learning For Gleason Grading*. Domain Adaptation and Representation Transfer (DART), 2021.
- D. Mahapatra, Sh. Kuanar, **B. Bozorgtabar**, Z. Ge. *Self-Supervised Learning of Inter-Label Geometric Relationships For Gleason Grade Segmentation*. Domain Adaptation and Representation Transfer (DART), 2021.

- S. Rad, T. Yu, C. Musat, H. Kemal, **B. Bozorgtabar** and J.-Ph. Thiran. *Benefitting from Bicubically Down-Sampled Images for Learning Real-World Image Super-Resolution*. The Winter Conference on Applications of Computer Vision (WACV), 2021.
- A. Spahr, **B. Bozorgtabar** and J.-Ph. Thiran. *Self-Taught Semi-Supervised Anomaly Detection on Upper Limb X-rays*. The IEEE International Symposium on Biomedical Imaging (ISBI), 2021.
- **B. Bozorgtabar**, D. Mahapatra, G. Vray and J.-Ph. Thiran. *SALAD: Self-Supervised Aggregation Learning for Anomaly Detection on X-Rays*. 23th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2020.
- C. Abbet, I. Zlobec, **B. Bozorgtabar** and J.-Ph. Thiran. *Divide-and-Rule: Self-Supervised Learning for Survival Analysis in Colorectal Cancer*. 23th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2020.
- D. Mahapatra, **B. Bozorgtabar**, J.-Ph. Thiran and L. Shao. *Structure Preserving Stain Normalization of Histopathology Images Using Self Supervised Semantic Guidance*. 23th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2020.
- D. Mahapatra, **B. Bozorgtabar**, J.-Ph. Thiran and L. Shao. *Pathological Retinal Region Segmentation From OCT Images Using Geometric Relation Based Augmentation*. The Conference on Computer Vision and Pattern Recognition (CVPR), 2020.
- **B. Bozorgtabar**, S. Rad, D. Mahapatra and J.-Ph. Thiran. *SynDeMo: Synergistic Deep Feature Alignment for Joint Learning of Depth and Ego-Motion*. The International Conference on Computer Vision (ICCV), 2019.
- S. Rad, **B. Bozorgtabar**, H. Kemal and J.-Ph. Thiran. *SROBB: Targeted Perceptual Loss for Single Image Super Resolution*. The International Conference on Computer Vision (ICCV), 2019.
- A. Nicoleta Ciubotaru, A. Devos, **B. Bozorgtabar** and J.-Ph. Thiran. *Revisiting Few-Shot Learning for Facial Expression Recognition*. arXiv preprint arXiv:1912.02751, 2019.
- **B. Bozorgtabar**, S. Rad, H. Kemal and J.-Ph. Thiran. *Using Photorealistic Face Synthesis as Domain Adaptation to Improve Facial Expression Analysis*. The 14th IEEE International Conference on Automatic Face and Gesture Recognition (FG), 2019.
- O. Abdollahi Aghdam, **B. Bozorgtabar**, H. Kemal and J.-Ph. Thiran. *Exploring Factors for Improving Low Resolution Face Recognition*. The 2019 Computer Vision and Pattern Recognition Workshop on Biometrics (CVPRW), 2019.
- T. Albrici, **B. Bozorgtabar**, M. Fasounaki, S. Bagher Salimi, G. Vray, H. Kemal and J.-Ph. Thiran. *G2-VER: Geometry Guided Model Ensemble for Video-based Facial Expression Recognition*. The FG 2019 Workshop on Face Analysis for Advanced Driver Assistance Systems (FA4ADAS), 2019.
- Guillaume Jaume, **B. Bozorgtabar**, J.-Ph. Thiran and Maria Gabrani. *Image Level Attentional Context Modeling Using Nested Graph Neural Network*. Relational Representation Learning, NeurIPS, 2018.
- D. Mahapatra, **B. Bozorgtabar**, J.-Ph. Thiran and M. Reyes. *Efficient Active Deep Learning with Informative and Conditional Generative Sample Selection*. 21th International Conference on Medical Image Computing and Computer Assisted Intervention 2018 (MICCAI), 2018.

- D.Mahapatra, **B. Bozorgtabar** and R. Garnavi. *Image Super Resolution Using Generative Adversarial Networks and Local Saliency Maps for Retinal Image Analysis*. 20th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2017.
- **B. Bozorgtabar**, Z. Ge, R. Chakravorty, M.Abedini, S.Demyanov and R. Garnav. *Investigating Deep Side Layers For Skin Lesion Segmentation*. IEEE International Symposium on Biomedical Imaging (ISBI), 2017.
- S.Demyanov, R. Chakravorty, Z. Ge, **B. Bozorgtabar**, A. Bowling and R. Garnav. *Tree-Loss Function for Training Neural Networks on Weakly-Labeled Datasets*. IEEE International Symposium on Biomedical Imaging (ISBI), 2017.
- Z. Ge, **B. Bozorgtabar**, M.Abedini, S.Demyanov, R. Chakravorty, A. Bowling and R. Garnavi. *Exploiting Local and Generic Features for Skin Lesions Classification*. IEEE International Symposium on Biomedical Imaging (ISBI), 2017.
- **B. Bozorgtabar**, M.Abedini and R. Garnavi. *Sparse Coding Based Skin Lesion Segmentation Using Dynamic Rule-Based Refinement*. In International Workshop on Machine Learning in Medical Imaging (MLMI), 2016.
- **B. Bozorgtabar** and R. Goecke. *Multi-level Action Detection via Learning Latent Structure*. Proceedings of the International Conference on Image Processing (ICIP), 2015.
- **B. Bozorgtabar** and R. Goecke. *Dominant Interaction Group Detection in Team Sports*. KDD Workshop on Large-Scale Sports Analytics, 2015.
- **B. Bozorgtabar** and R. Goecke. *Enhanced Laplacian Group Sparse Learning with Lifespan Outlier Rejection for Visual Tracking*. Proceedings of the Asian Conference on Computer Vision (ACCV), Singapore, 2014.
- **B. Bozorgtabar** and R. Goecke. *Joint Sparsity-Based Robust Visual Tracking*. Proceedings of the International Conference on Image Processing (ICIP), 2014.
- **B. Bozorgtabar** and R. Goecke. *Robust Visual Tracking via Rank-Constrained Sparse Learning*. Proceedings of the International Conference on Digital Image Computing: Techniques and Applications (DICTA), 2014.
- **B. Bozorgtabar** and R. Goecke. *Discriminative Multi-Task Sparse Learning for Robust Visual Tracking Using Conditional Random Field*. Proceedings of the International Conference on Digital Image Computing: Techniques and Applications (DICTA), 2014.
- **B. Bozorgtabar** and R. Goecke. *Robust Visual Vocabulary Tracking Using Hierarchical Model Fusion*. Proceedings of International Conference on Digital Computing, Techniques and Applications (DICTA), 2013.
- Co-Author in. *The Visual Object Tracking VOT2013 Challenge Results*. 2013 IEEE International Conference on Computer Vision Workshops (ICCVW), 2013.
- **B. Bozorgtabar** and R. Goecke. *Adaptive Multiple Component Metric Learning for Robust Visual Tracking*. Proceedings of International Conference on Neural Information Processing (ICONIP), 2013.
- **B. Bozorgtabar** and R. Goecke. *An Improved Neural Network Training Scheme Using a Two Stage LDA Features for Face Recognition*. Proceedings of the 19th International Conference on Neural Information Processing (ICONIP), 2012.
- **B. Bozorgtabar**, F. Noorian and G. Rezai Rad. *A Genetic Programming approach to face recognition*. IEEE GCC Conference and Exhibition, 2011.

- **B. Bozorgtabar**, F. Noorian and G. Rezai Rad. *Comparison of different PCA based Face Recognition algorithms using Genetic Programming*. IEEE Telecommunications (IST), 2010.

Journals

- C. Abbet, L. Studer, A. Fischer, H. Dawson, I. Zlobec, **B. Bozorgtabar** and J.-Ph. Thiran. *Self-Rule to Adapt: Generalized Multi-source Feature Learning Using Unsupervised Domain Adaptation for Colorectal Cancer Tissue Detection*. Medical Image Analysis (MedIA), 2021, under review.
- D. Tomar, M. Lortkipanidze, G. Vray, **B. Bozorgtabar** and J.-Ph. Thiran. *Self-Attentive Spatial Adaptive Normalization for Cross-Modality Domain Adaptation*. IEEE Transactions on Medical Imaging (T-MI), 2020.
- **B. Bozorgtabar**, D.Mahapatra and J.-Ph. Thiran. *ExprADA: Adversarial Domain Adaptation for Facial Expression Analysis*. Pattern Recognition (PR). Special Issue on Domain Adaptation for Visual Understanding, 2020.
- **B. Bozorgtabar**, D.Mahapatra, I. Zlobec, T. Rau and J.-Ph. Thiran. *Computational Pathology*. Frontiers in Medicine, 2020.
- **B. Bozorgtabar**, D.Mahapatra, J.-Ph. Thiran and M. Reyes. *Informative sample generation using class aware generative adversarial networks for classification of chest Xrays*. Journal of Computer Vision and Image Understanding (CVIU). Special Issue on Adversarial Learning in Computer Vision, 2019.
- D. Mahapatra, **B. Bozorgtabar**, S. Hewavitharanage and R. Garnavi. *Image Super Resolution Using Progressive Generative Adversarial Networks for Medical Image Analysis*. The Elsevier Journal on Computerized Medical Imaging and Graphics, 2019.
- **B. Bozorgtabar**, S. Rad, H. Kemal, and J.-Ph. Thiran. *Learn to Synthesize and Synthesize to Learn*. Journal of Computer Vision and Image Understanding (CVIU). Special Issue on Adversarial Learning in Computer Vision, 2019.
- S. Bagher Salimi, **B. Bozorgtabar**, P. Schmid-Saugeon, H. Kemal, and J.-Ph. Thiran. *DermoNet: Densely Linked Convolutional Neural Network for Efficient Skin Lesion Segmentation*. EURASIP Journal on Image and Video Processing, 2019.
- S. Rad, **B. Bozorgtabar**, H. Kemal, and J.-Ph. Thiran. *Segment and Super Resolve: Benefiting from Multitask Learning to Improve Single Image Super-Resolution*. Journal of Neurocomputing. Special Issue on Deep Learning for Image Super-Resolution, 2018.
- **B. Bozorgtabar** and R. Goecke. *MSMCT: Multi-State Multi-Camera Tracker*. IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), 28, no. 12, 3361-3376. 2017.
- **B. Bozorgtabar**, S. Sedai, P.Roy and R.Garnavi. *Skin Lesion Segmentation Using Deep Convolution Networks Guided by Local Unsupervised Learning*. IBM Journal of Research and Development, 2017.
- **B. Bozorgtabar** and R. Goecke. *Efficient Multi-Target Tracking via Discovering Dense Subgraphs*. Journal of Computer Vision and Image Understanding (CVIU). Special Issue on Individual and Group Activities in Video Event Analysis, 2016.
- H. Azami, K. Mohammadi and **B. Bozorgtabar**. *An Improved Signal Segmentation Using Moving Average and Savitzky-Golay Filter*. Journal of Signal and Information Processing, 2012.

- **B. Bozorgtabar**, H. Azami, and F. Noorian. *Illumination Invariant Face Recognition Using Fuzzy LDA and FFNN*. Journal of Signal and Information Processing, 2012.
- **B. Bozorgtabar** and G. Rezai Rad. *A Genetic Programming-PCA Hybrid Face Recognition Algorithm*. Journal of Signal and Information Processing, 2011.
- H. Azami, **B. Bozorgtabar**, and M. Shiroie. *Automatic Signal Segmentation Using the Fractal Dimension and Weighted Moving Average Filter*. Journal of Electrical and Computer science, 2011.
- **B. Bozorgtabar** and G. Rezai Rad. *An Efficient Illumination Normalization Method with Fuzzy LDA Feature Extractor for Face Recognition*. International Journal of Modern Engineering Research (IJMER), 2011.

patents

Published

- **US10373312B2**, [Automated Skin Lesion Segmentation Using Deep Side Layers], Published with United States Patent and Trademark office as patent number US10373312B2, lead inventor: **B.Bozorgtabar**.
- **US10223788B2**, [Skin Lesion Segmentation Using Deep Convolution Networks Guided By Local Unsupervised Learning], Published with United States Patent and Trademark office as patent number US10223788B2, lead inventor: **B.Bozorgtabar**.
- **US10176574B2**, [Structure-Preserving Composite Model for Skin Lesion Segmentation], Published with United States Patent and Trademark office as patent number US10176574B2.
- **US10283221B2**, [Risk Assessment Based on Patient Similarity Determined Using Image Analysis], Published with United States Patent and Trademark office as patent number US10283221B2.
- **US10510150B2**, [Searching Trees: A New System for Live Time-lapse Cell Tracking and Cell Progression], Published with United States Patent and Trademark office as patent number US10510150B2, lead inventor: **B. Bozorgtabar**.
- **US20190328300A1**, [Real-Time Annotation of Symptoms in Telemedicine], Published with United States Patent and Trademark office as patent number US20190328300A1, lead inventor: **B. Bozorgtabar**.

Filed

- **PCT-IB2021-050753**, [Annotation-Efficient Image Anomaly Detection], Filed with International Bureau of WIPO as a PCT patent application with Application No. PCT-IB2021-050753, lead inventor: **B. Bozorgtabar**.
- **PCT-IB2021-051376**, [System And Method For Image Modality Conversion and Domain Adaptation], Filed with International Bureau of WIPO as a PCT patent application with Application No. PCT-IB2021-051376.
- **YOR8-2016-1660**, [Superpixel Flow: Label Propagation System Helps Deep Learning for Accurate Segmentation], Filed with United States Patent and Trademark office as docket YOR8-2016-1660, lead inventor: **B. Bozorgtabar**.
- **YOR8-2016-2258**, [Automatic Pattern Discovery for Skin Disease Classification], Filed with United States Patent and Trademark office as docket YOR8-2016-2258.
- **YOR8-2016-2652**, [Second Face: Combating Depression through Virtual Reality], Filed with United States Patent and Trademark office as docket YOR8-2016-2652, lead inventor: **B. Bozorgtabar**.

- **YOR820162998CN01**, [Quantifying the Symptoms of Brain Disorders Via Facial, Body Posture and Language Analytics], Filed in China (CNIPA) as docket YOR820162998CN01, lead inventor: **B. Bozorgtabar**.

personal pages

- Personal Homepage
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networks

- Massachusetts Institute of Technology (MIT), U.S.
- IBM Research Zurich, Switzerland
- University of Bern, Switzerland
- Inception Institute of Artificial Intelligence, UAE