



ERCIM "ALAIN BENSOUSSAN"
FELLOWSHIP PROGRAMME



Scientific Report

First name / Family name

Mahdi Amani

Nationality

Iranian

Name of the *Host Organisation*

NTNU

First Name / family name
of the *Scientific Coordinator*

Prof. Frank Lindseth

Period of the fellowship

01/12/2017 to 30/11/2019

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

My research activities were organized in COMP group of IDI department at Norwegian University of Science and Technology (NTNU) under the supervision of Prof. Frank Lindseth. During my fellowship I had the opportunity to gain teaching experience on deep learning course, to assist my coordinator on supervision of master student thesis, as co-supervisor, and to perform research on several interesting topics, namely, Algorithmic and Deep Learning Solutions, Medical Imaging, and Bioimaging Solutions. To be more specific, we worked on challenging topics such as Color Calibration focused on Human Skin Images along with Jaundice Disease Detection, Volumetric Segmentation and Abnormality Detection, Algorithmic Solutions for Mathematical Objects, and Improvements on Deep Learning Approaches.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

- Accepted: M. Amani, H. Falk, O. D. Jensen, G. Vartdal, A. Aune, F. Lindseth, Color Calibration on Human Skin Images, accepted and to appear in Proc. of 12th

International Conference on Computer Vision Systems (ICVS), 23-25 Sept 2019, Thessaloniki, Greece.

- Abstract Published: M. Amani, Isomorphism and Automorphism Reducibility in Groups/Graphs, Young Researchers Algebra Conference 2019, September 16-18, 2019, Napoli, Italy.
- Published: M. Amani, A. Nowzari-Dalini Efficient Generation, Ranking, and Unranking of (k,m) -Ary Trees in B-Order, Bulletin of the Iranian Mathematical Society, 45 (4), 2019, 1145-1158. doi:10.1007/s41980-018-0190-y.
- Abstract Published: M. Amani, F. Lindseth, A General Genetic Convolutional Neural Network, Palermo Workshop on Algorithm, July 19-20, 2018, Palermo, Italy.
- Published: M. Amani, Gap terminology and related combinatorial properties for AVL trees and Fibonacci-isomorphic trees, AKCE International Journal of Graphs and Combinatorics, 15 (1), 2018, 14-21. doi:10.1016/j.akcej.2018.01.019.
- Abstract Published: M. Amani, Random Generation and related Algorithms for Semi-Fibonacci trees, The 6th Gdansk Workshop on Graph Theory, July 1-4, 2018, Gdansk, Poland.
- Abstract Published: M. Amani, Do We Need a New Algorithm Complexity Theory for Convolutional Neural Networks?, Combinatorics 2018, June 3-9, 2018, Arco-Trento, Italy.
- Under preparation: M. Amani, H. Falk, O. D. Jensen, G. Vartdal, A. Aune, F. Lindseth, Jaundice Disease Detection on Neonatal Skin Images, to be submitted.
- Under preparation: S. Survarachakan, J. S. Johansen, M.s A. Pedersen, M. Amani, and F. Lindseth, Medical Image Segmentation: A General U-NetArchitecture and Novel Capsule NetworkApproaches, to be submitted.
- Under preparation: M. Amani, F. Lindseth, A Novel Solution for Efficient Graph Isomorphism, to be submitted.

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

- Bioinformatiha 8 (Ottava Edizione della Giornata Toscana di Bioinformatica e Systems Biology), October 4th, 2019, Dipartimento di Biologia dell'Università di Firenze, Florence, Italy.

- ICT in Smart City Day, October 30th, 2019, NTNU - IDI, Trondheim, Norway.
- Algebraic Combinatorics in Genova, September 11-13, 2019, University of Genova, Italy.
- RUHR University Summer School - Perspectives in Linear Algebraic Groups, August 19-23, 2019, Bochum, Germany.
- International Summer School on Deep Learning, July 23-27, 2018, Genoa, Italy.
- 3rd Workshop on Geometry and Machine Learning, Computational Geometry Week (CG Week 2018), June 11, 2018, Budapest, Hungary.

IV – RESEARCH EXCHANGE PROGRAMME (REP)

I did a 12 days research visit (REP) in October 2019 (from 3rd till 14th) at CNR institute in Italy. I visited Marco Pellegrini and his Computational Mathematic department and the Signals and Images Lab. We worked on several computational applications of BioImaging and further collaboration. I also had the opportunity to attend a related conference called Bioinformatiha 8 (Ottava Edizione della Giornata Toscana di Bioinformatica e Systems Biology) during the visit.