Balázs Harangi Ph.D.

Professional Experience

- 2021-2023: 2020-1.1.2-PIACI-KFI-2021-00223 – "Integrált, egységes egészségügyi adatbányászati platform létrehozása", (researcher-developer)
- 2020-2022: GINOP-2.3.4-15-2020-00008 – "Komplex Egészségipari Multidiszciplináris Kompetencia Központ kialakítása a Debreceni Egyetemen új innovatív termékek és technológiák fejlesztése érdekében", (resercg group leader and senior researcher)
- 2019-2022, ED_18-1-2019-0028 - „Járműipar - Autonóm járművek fejlesztése", (senior researcher)
- 2019-2022 GINOP-2.2.1-18-2018-00012 – "Rákos sejtek automatizált felismerése méhnyak citológiai kenetekben", (researcher-developer)
- 2018-2021: 20428-3/2018/FEKUTSTRAT - FELSŐOKTATÁSI INTÉZMÉNYI KIVÁLÓSÁGI PROGRAM – Big Data pillér Mesterséges Intelligencia Kutatócsoport pályázatában, (researcher-developer)
- 2017-2021: EFOP-3.6.2.-16-2017-00015 - „A HU-MATHS-IN – Magyar Ipari és Innovációs Matematikai Szolgáltatási Hálózat tevékenységének elmélyítése" (senior researcher).
- 2017-2021: GINOP-2.2.1-15-2017-00055 – „Implantátumok osteoszintézisének kutatása és trabekuláris szerkezetének kifejlesztése additive manufacturing alkalmazásával" (researcher-developer),
- 2015 – 2018: SCOPIA: Development of software supported clinical devices based on endoscope technology (researcher-developer),
- 2015 – 2017: Vizuális „tumormarkerek" digitális azonosítását és automatikus klasszifikációját végző rendszer kutatása és fejlesztése (researcher-developer),
- 2013 – 2015: „FIRST – Future Internet Research Services and Technology" (young researcher-developer),
- 2013: OTKA/NK101680 - Mathematical modeling of clinical observations for improved melanoma detection project (researcher-developer position),
- 2011 – 2013: University of Debrecen, NKTH-INNOCSEKK-7 „A belső szemizmok görcsös állapotát kimutató eszköz prototípusának kifejlesztése" project (researcher-developer position),
- 2009 – 2011: University of Debrecen, DRSCREEN - Developing a computer-based image processing system for diabetic retinopathy screening project (researcher-developer position),
- 2007: Horizont Informatikai Kft. (summer internship).

Professional Skills

- Programming ability in Python; Matlab; Java SE; C; VBA;
- PhotoShop
- Microsoft Office

Teaching

- Lectures and seminars on Introduction into artificial Intelligence
- Lectures and seminars on Foundation of Artificial Intelligence
- Lectures and seminars on Advanced Machine Learning

- Lectures and seminars on Machine Learning Basics
- Seminars on Programming.
- Lectures and seminars on Digital Image Processing.
- Lectures and seminars on Machine Learning.
- Lectures and seminars on Finite Element Modeling

Memberships
- 2010- IEEE member.
- 2010- IEEE Signal Processing Society member.
- 2010- IEEE EMBS member.
- 2008- Hungarian Association for Image Analysis and Pattern Recognition, member.
- 2008- John von Neumann Computer Society, member.

Lectures and conferences
- 2018: 40th International Engineering in Medicine and Biology conference, HI, Honolulu, USA.
- 2017: 10th International Symposium on Image and Signal Processing and Analysis conference, Ljubljana, Slovenia.
- 2017: 30th IEEE International Symposium on Computer-Based Medical System conference, Thessaloniki, Greece.
- 2014: 11th IEEE International Symposium on Biomedical Imaging conference, Beijing, China.
- 2013: 10th IEEE International Symposium on Biomedical Imaging conference, San Francisco, USA.
- 2013: 9th Hungarian Association for Image Processing and Pattern Recognition conferences, Bakonybél, Hungary.
- 2012: IEEE International Symposium on Computer-Based Medical System conference, Rome, Italy.
- 2012: 11th Quantitative InfraRed Thermography conference, Naples, Italy.
- 2012: 9th IEEE International Symposium on Biomedical Imaging conference, Barcelona, Spain.
- 2011: 7th International Symposium on Image and Signal Processing and Analysis conference, Dubrovnik, Croatia.
- 2011: 9th IEEE International Symposium on Applied Machine Intelligence and Informatics, Smolenice, Slovakia.
- 2011: 8th Hungarian Association for Image Processing and Pattern Recognition conferences, Szeged, Hungary.
- 2010: 7th IEEE International Symposium on Biomedical Imaging, Rotterdam, Netherland.
- 2010: 17th Summer School on Image Processing, Debrecen, Hungary.
- 2009: 7th Hungarian Association for Image Processing and Pattern Recognition conferences, Budapest, Hungary.

Scholarships and prizes
- scholarship of Universitas Foundation (2018)
- NTP-NFTÖ-16 National Young Researcher Scholarship (2016)

- scholarship of Universitas Foundation (2016)
- Ph.D student scholarship of TÁMOP-4.2.2B-15/1/KONV-2015-0001 project (2015)
- TÁMOP 4.2.4. A/2-11-1-2012-0001 National Program of Excellence - New Central Europe Young Researcher Scholarship for Hungarian and international students and researchers in convergence regions (2014)
- Campus Hungary – Higher Education Staff Short Term Mobility (2013)
  award of excellent PhD student of Doctoral School of Informatics of the University (2013)
- scholarship of TÁMOP-4.2.4.A/ 2-11/1-2012-0001 „National Excellence Program" (2013)
- scholarship of Universitas Foundation (2013)
- scholarship of Hungarian Intellectual Property Office (2010. június)
- 3rd place at Scientific Students' Associations (November of 2008)
- summer scholarship (July of 2008, July of 2009)
- scholarship of the republic (term of 2008/09, term of 2009/10)
- professional scholarship (term of 2008/09, term of 2009/10)

Publications

1. B. Harangi, A. Baran, A. Hajdu and M. Beregi-Kovacs: Composing Diverse Ensembles of Convolutional Neural Networks by Penalization, Springer - Machine Learning (Q1), submitted.

2. D. Kupas, B. Harangi: Classification of Pap-smear cell images using deep convolutional neural network accelerated by hand-crafted features for cervical cancer screening, 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2022), pp. 1452-1455, 2022.

3. G. Bogacsovics, J. Toth, A. Hajdu, B. Harangi: Enhancing CNNs through the use of hand-crafted features in automated fundus image classification, Biomedical Signal Processing and Control (BSPC), vol. 76, 2022, IF. 3.88 (Q1)

4. Bogacsovics, G., Hajdu, A., Harangi, B., Lakatos, I., Lakatos, R., Szabó, M., Tiba, A., Tóth, J., Tarcsi, Á.: Adatelemzési folyamat és keretrendszer a közigazgatás számára. Közigazgatástudomány. vol. 1, no. 2, 146-158, 2021.

5. Bogacsovics, G., Hajdu, A., Harangi, B., Lakatos, I., Lakatos, R., Szabó, M., Tiba, A., Tóth, J.: Napelemfarmok Magyarország területén történő elhelyezését segítő döntéstámogató rendszer fejlesztése. Közigazgatástudomány. vol. 1, no. 2, 134-145, 2021.

6. G. Bogacsovics, A. Hajdu, B. Harangi: Cell Segmentation in Digitized Pap Smear Images Using an Ensemble of Fully Convolutional Networks, Conference of the IEEE Signal Processing in Medicine and Biology Symposium (SBMB 2021), pp. 1-6, 2021.

7. D. Kupas, B. Harangi: Solving the problem of imbalanced dataset with synthetic image generation for cell classification using deep learning, 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2021), pp. 2981-2984, 2021.

8. I. Lakatos, A. Hajdu, B. Harangi: Molecule Classification Using Visualization and Convolutional Neural Network, IEEE 18th International Symposium on Biomedical Imaging (ISBI 2021), pp. 1695-1698, 2021

9. A. Ahammed, B. Harangi, A. Hajdu: Hybrid AdaBoost and Naïve Bayes Classifier for Supervised Learning, Proceedings of the 1st Conference on Information Technology and Data Science (CITDS 2021), pp. 1-18, 2021

10. D. Kupas, B. Harangi: Deep learning-based cell classification in case of unbalanced dataset (abstract), 1st Conference on Information Technology and Data Science (CITDS 2020), pp. 44-45, 2020

11. Kovács K.S., Kovács A. R., Harangi B., Lampé R., Török P.: Standardized measurement in uterine ultrasonography, ORVOSI HETILAP, vol. 161, no. 48, pp. 2029-2036, 2020, IF. 0.54.

12. B. Harangi, A. Baran, A. Hajdu: Assisted Deep Learning Framework for Multi-class Skin Lesion Classification Considering a Binary Classification Support, Biomedical Signal Processing and Control, vol. 62, pp. 102041, 2020, IF. 3.137.

13. P. Porwal, S. Pachade, M. Kokare, G. Deshmukh, J. Son, W. Bae, L. Liu, J. Wang, X. Liu, L. Gao et al.: IDRiD: Diabetic Retinopathy – Segmentation and Grading Challenges, Medical Image Analysis, vol. 54, pp. 168-178, 2020, IF. 11.148.

14. L. Hajdu, B. Harangi, A. Tiba, A. Hajdu: Detecting Periodicity in Digital Images by the LLL Algorithm, Progress in Industrial Mathematics at ECMI 2018. Mathematics in Industry (Springer), vol. 30., pp. 613-619, 2019.

15. Lőrincz J.; Harangi B.; Lampé R.; Török P., Az endoszkópia jövője, a jövő endoszkópiája, Magyar Nőorvosok Lapja vol. 82., no. 3., pp. 10-12., 2019

16. B. Harangi, J. Toth, G. Bogacsovics, D. Kupas, L. Kovacs, A. Hajdu: Cell detection on digitized Pap smear images using ensemble of conventional image processing and deep learning techniques, 11th International Symposium on Image and Signal Processing and Analysis (ISPA 2019), Dubrovnik, Croatia, pp. 38-42, 2019.

17. J. Tóth, T. P. Kapusi, B. Harangi, H. Tomán, A. Hajdu: Accelerating the Optimization of a Segmentation Ensemble using Image Pyramids, 11th International Symposium on Image and Signal Processing and Analysis (ISPA 2019), Dubrovnik, Croatia, pp. 43-48, 2019.

18. D. Kupas, P. Torok, A. Hajdu, B. Harangi: Visualization of Fibroid in Laparoscopy Videos using Ultrasound Image Segmentation and Augmented Reality, 11th International Symposium on Image and Signal Processing and Analysis (ISPA 2019), Dubrovnik, Croatia, pp. 60-63, 2019.

19. B. Harangi, J. Toth, A. Baran, A. Hajdu: Automatic screening of fundus images using a combination of convolutional neural networks and hand-crafted features, 41th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, pp. 2699-2702., 2019.

20. B. Harangi: Skin Lesion Classification with Ensembles of Deep Convolutional Neural Networks, Journal of Biomedical Informatics (Q1), vol. 86., no. 10., pp. 25-32., 2018, IF. 2.882.

21. P. Török, B. Harangi: Digital Image Analysis with Fully Connected Convolutional Neural Network to Facilitate Hysteroscopic Fibroid Resection, Gynecologic and Obstetric Investigation (Q2), pp. 1-5, 2018, IF. 1.183.

22. B. Antal, M. K. G. S. Tavares, L. Kovács, B. Harangi, I. Lázár, B. Nagy, Gy. Kovács, J. Szakács, J. Tóth, T. Pető et al., Data analysis applied to diabetic retinopathy screening: performance evaluation, ANNALES MATHEMATICAE ET INFORMATICAE, vol. 49 pp. 3-9., 2018.

23. A. Hajdu, B. Harangi, J. Toth, M. Pap, A. Baran: Combining convolutional neural networks and hand-crafted features in medical image classification tasks, 20th European Conference on Mathematics for Industry (ECMI), Budapest, Hungary, p. 299., 2018.

24. A. Hajdu, L. Hajdu, B. Harangi, A. Tiba: Detecting periodicity in digital images by the LLL algorithm, 20th European Conference on Mathematics for Industry (ECMI), Budapest, Hungary, p. 279., 2018.

25. B. Harangi, A. Baran, A. Hajdu: Classification of Skin Lesions Using an Ensemble of Deep Neural Networks, 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Hawaii, USA, pp. 2575-2578., 2018.

26. B. Harangi, J. Toth, A. Hajdu: Fusion of Deep Convolutional Neural Networks for Microaneurysm Detection in Color Fundus Images, 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Hawaii, USA, pp. 3705-3708., 2018.

27. P. Burai, A. Hajdu, Felipe-Riverón E. M., B. Harangi, Segmentation of the uterine wall by an ensemble of fully convolutional neural networks 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Hawaii, USA, pp. 49-52., 2018.

28. B. Harangi: Skin Lesion Classification with Ensembles of Deep Convolutional Neural Networks, Journal of Biomedical Informatics, submitted.

29. P. Török, B. Harangi: Digital Image Analysis with Full Connected Convolutional Neural Network to Facilitate Complete Fibroid Resection, Journal of Minimally Invasive Gynecology, vol. 24., no. 7., pp. 161-162., 2017, IF. 3.061.

30. B. Harangi, A. Hajdu, P. Torok, R. Lampe: Differentiating ureter and arteries in the pelvic area via endoscope camera using deep neural network, 10th International Symposium on Image and Signal Processing and Analysis (ISPA 2017), Ljubljana, Slovenia, pp. 86-89, 2017.

31. P. Burai, B. Harangi: Pixelwise segmentation of uterine wall in endoscopic video frame using convolutional neural networks, 10th International Symposium on Image and Signal Processing and Analysis (ISPA 2017), Ljubljana, Slovenia, pp. 95-98., 2017.

32. A. Tiba, B. Harangi, A. Hajdu: Efficient Texture Regularity Estimation for Second Order Statistical Descriptors, 10th International Symposium on Image and Signal Processing and Analysis (ISPA 2017), Ljubljana, Slovenia, pp. 90-94, 2017.

33. D. Kupás, Gy. Czifra, G. Andrassy, B. Harangi: Decision support system for the diagnosis of neurological disorders based on gaze tracking, 10th International Symposium on Image and Signal Processing and Analysis (ISPA 2017), Ljubljana, Slovenia, pp. 37-40, 2017.

34. P. Török, J. Lőrincz, B. Harangi: Differentiating tissues and organs in endoscopic images using a convolutional neural network, The 33rd Annual Meeting of ESHRE, Geneva, Switzerland, 2017.

35. M. Pap, B. Harangi, A. Hajdu: Automatic Pigment Network Classification Using a Combination of Classical Texture Descriptors and CNN Features, 30th IEEE International Symposium on Computer-Based Medical Systems (CBMS 2017), Thessaloniki, Greece, 2017, pp. 343-748.

36. B. Harangi, A. Hajdu, R. Lampe, P. Torok: Recognizing ureter and uterine artery in endoscopic images using a convolutional neural network, 30th IEEE International Symposium on Computer-Based Medical Systems (CBMS 2017), Thessaloniki, Greece, 2017, pp. 726-727.

37. B. Harangi: Skin lesion detection based on an ensemble of deep convolutional neural network, arXiv preprint arXiv:1705.03360, 2017.

38. A. Hajdu, B. Harangi, R. Besenczi, I. Lázár, G. Emri, L. Hajdu, R. Tijdeman: Measuring Regularity of Network Patterns by Grid Approximations using the LLL Algorithm, 23rd International Conference on Pattern Recognition (ICPR 2016), Cancún, Mexico, pp. 1524-1529.

39. B. Harangi, A. Hajdu: Exudate Detection in Fundus Images Using Active Contour Methods and Regionwise Classification, Biomedical Image Segmentation: Advances and Trends (CRC Press), pp. 157-184, 2016.

40. B. Harangi, A. Hajdu: Detection of the Optic Disc in Fundus Images by Combining Probability Models, Computers in Biology and Medicine, vol. 65, pp. 10-24, 2015, IF. 1.459.

41. J. Tóth, L. Bartha, T. Szabó, I. Lázár, B. Harangi, A. Hajdu: An Online Application for Storing, Analyzing, and Sharing Dermatological Data, 6th IEEE International Conference on Cognitive Infocommunications, (CogInfoCom 2015), Győr, Hungary, 2015, pp. 339-342.

42. K. Szitha, R. Besenczi, B Harangi, A. Csutak, A. Hajdu: Automatic Optic Disc and Optic Cup Detection in Retinal Images Acquired by Mobile Phone, Conference of the International Symposium on Image and Signal Processing and Analysis, 9th International Symposium on Image and Signal Processing and Analysis (ISPA 2015), Zagreb, Croatia, 2015, pp. 195-200.

43. J. Toth, L. Kovacs, B. Harangi, Cs. Kiss, A. Mohacsi, Z. Orosz, A. Hajdu: An Online Benchmark System for Image Processing Algorithms, 5th IEEE International Conference on Cognitive Infocommunications (CogInfoCom 2014), Vietri sul Mare, Italy, 2014, pp. 377-382.

44. J. Toth, L. Kovacs, B. Harangi, Cs. Kiss, A. Mohacsi, Z. Orosz, A. Hajdu: An Online System for Algorithm Benchmarking, 5th IEEE International Conference on Cognitive Infocommunications (CogInfoCom 2014), Vietri sul Mare, Italy, 2014, pp. 383.

45. B. Harangi, A. Hajdu: Automatic Exudate Detection by Fusing Multiple Active Contours and Regionwise Classification, Computers in Biology and Medicine, vol. 54, pp. 156-171, 2014, IF. 1.475

46. B. Harangi, A. Hajdu: Detection of Exudates in Fundus Images Using a Markovian Segmentation Model, 36th Annual International Conference of the Engineering in Medicine and Biology Society (EMBC 2014), Chicago, IL, USA, 2014, pp. 130-133.

47. B. Harangi, A. Hajdu: Improving automatic exudate detection based on the fusion of the results of multiple active contours, 10th IEEE International Symposium on Biomedical Imaging (ISBI 2013), San Francisco, CA, USA, 2013, pp. 45-48.

48. B. Harangi, A. Hajdu: Aktív kontúr használatával és régió alapú osztályozással pontosított exudátum detektáló algoritmus, Képfeldolgozók es Alakfelismerők Országos Konferenciája (KEPAF 2013), Bakonybél, Hungary, 2013, pp. 379-392.

49. B. Harangi, I. Lazar, A. Hajdu: Automatic Exudate Detection Using Active Contour Model and Regionwise Classification, 34th Annual International Conference of the Engineering in Medicine and Biology Society (EMBC 2012), San-Diego, CA, USA, 2012, pp. 5951-5954.

50. B. Harangi, B. Antal, A. Hajdu: Automatic Exudate Detection with Improved Naïve-Bayes Classifier, 25th IEEE International Symposium on Computer-Based Medical System (CBMS 2012), Rome, Italy, 2012, pp. 1-4.

51. B. Harangi, B. Nagy, A. Hajdu: Improving the detection of excessive activation of ciliaris muscle by clustering thermal images, 11th Quantitative InfraRed Thermography (QIRT 2012), Naples, Italy, 2012, pp. 1-6.

52. B. Harangi, A. Hajdu: Improving the accuracy of optic disc detection by finding maximal weighted clique of multiple candidates of individual detectors, 9th IEEE International Symposium on Biomedical Imaging (ISBI 2012), Barcelona, Spain, 2012, pp. 602-605.

53. R. J. Qureshi, L. Kovacs, B. Harangi, B. Nagy, T. Peto, A. Hajdu: Combining algorithms for automatic detection of optic disc and macula in fundus images, ELSEVIER Computer Vision and Image Understanding, vol. 116, no. 1, pp 138-145, 2012, IF. 1.232.

54. B. Nagy, B. Harangi, B. Antal, A. Hajdu: Ensemble-based exudate detection in color fundus images, 7th International Symposium on Image and Signal Processing and Analysis (ISPA 2011), Dubrovnik, Croatia, 2011, pp. 700-703.

55. L. Kovacs, B. Harangi, B. Nagy, A. Hajdu, R. J. Qureshi: Gráf alapú vakfolt és sárgafolt detektálás retina felvételeken, Alakfelismerők Társaságának 8. konferenciája (KÉPAF 2011), Szeged, Magyarország, 2011, pp. 329-341.

56. B. Harangi, T. Csordás, A. Hajdu: Detecting the excessive activation of the ciliaris muscle on thermal images, IEEE 9th International Symposium on Applied Machine Intelligence and Informatics (SAMI 2011), Slovakia, 2011, pp. 329-331.

57. L. Kovacs, R. J. Qureshi , B. Nagy, B. Harangi, A. Hajdu: Graph Based Detection of optic disc and fovea in retinal images, 4th International Workshop on Soft Computing Applications (SOFA 2010), Arad, 15-17 July, 2010, pp. 143-148.

58. B. Harangi, T. Csordás, A. Hajdu: Detecting the excessive activation of the ciliaris muscle on thermal images, 8th International Conference on Applied Informatics (ICAI 2010), Eger, 2010, pp. 449-450 (abstract).

59. R. J. Qureshi, L. Kovacs, B. Nagy, B. Harangi, A. Hajdu: Automatic detection of the fovea and optic disk in digital retinal images by combining algorithms, 8th International Conference on Applied Informatics (ICAI 2010), Eger, pp. 175-184.

60. B. Harangi, R. J. Qureshi, A. Csutak, T. Peto, A. Hajdu: Automatic Detection Of The Optic Disc Using Majority Voting In A Collection Of Optic Disc Detectors, 7th IEEE International Symposium on Biomedical Imaging (ISBI 2010), Rotterdam, The Netherlands, 2010, pp. 1329-1332.

61. Harangi B., Csordás T., Hajdu A.: A ciliaris izom túlzott működésének vizsgálata szomatoinfrával készített képeken, Magyar Képfeldolgozók és Alakfelismerők Társaságának 7. konferenciája (KÉPAF 2009), Budapest, Magyarország, 2009, pp. 1-6.