BIOGRAPHICAL SKETCH

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NAME: BANDOS, Andriy

eRA COMMONS USER NAME (credential, e.g., agency login): abandos

POSITION TITLE: Associate Professor, Department of Biostatistics, University of Pittsburgh

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine	MS(Specialist)	06/2000	Mathematics
University of Pittsburgh, Pittsburgh, USA	PhD	07/2005	Biostatistics

A. Personal Statement

Dr. Andriy Bandos is a biostatistician with long experience of applied and methodological work in statistical assessment of classification, prediction and detection performance, biomarker evaluation, and observer performance studies. He has been closely collaborating with the Department of Radiology, and a large part of his work focused on the design and analysis of screening and diagnostic studies in medical imaging. As a part of academic duties, Dr. Bandos has taught courses and advised graduate students at the Department of Biostatistics, served as an associate editor for Biometrical Journal and as a faculty on the annual Clinical Trials in Medical Imaging workshop (CTMW/RSNA) as well as reviewed and consulted for various scientific journals, Medical Research Council (UK), NIH study sections, and FDA Medical Devises Advisory Committee. His current research interests include statistical evaluation of classification and prognostic accuracy, biomarker assessment, analysis of observer-performance studies, free-response ROC (FROC) methodology, and nonparametric methods in statistics. Dr. Bandos's methodological work was supported by several methodological grants. He has also been involved as a co-investigator or co-PI in many large studies in radiology-related and other areas.

a. Pu J, Leader J, **Bandos** A, Shi J, Du P, Yu J, Yang B, Ke S, Guo Y, Field JB, Fuhrman C. Any unique image biomarkers associated with COVID-19? *European Radiology* 2020: 30(11): 6221-6227.

b. Skaane P, **Bandos AI**, Niklason LT, Sebuødegård S, Østerås BH, Gullien R, Gur D, Hofvind S. Digital Mammography versus Digital Mammography Plus Tomosynthesis in Breast Cancer Screening: the Olso Tomosynthesis Screening Trial. *Radiology 2019:* 291(1): 23-30.

c. Aggarwal R, **Bandos AI**, Reed AM, Ascherman DP, RIM Study Group, Oddis CV. Predictors of Clinical Improvement in Rituximab-Treated Refractory Adult and Juvenile Dermatomyositis and Adult Polymyositis. *Arthritis & Rheumatology 2014:* 66(3), 740-9.

d. Zou KH, Liu A, **Bandos** AI, Ohno-Machado L, Rockette H. (2011) *Statistical Evaluation of Diagnostic Performance: Topics in ROC Analysis*. 1st ed. CRC press, Taylor & Francis Group.

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2019 - present	Associate Professor (with tenure), Department of Biostatistics, University of Pittsburgh, Pittsburgh, PA
2019- present	Associate Editor, Biometrical Journal (Wiley-VCH; John Wiley & Sons)
2018 - present	Grant Reviewer, Medical Research Council, UK Research and Innovation, United Kingdom
2011 - present	Consultant, Medical Devices Advisory Committee, FDA
2020- present	Associate Professor, Department of Radiology, University of Pittsburgh
2013 - 2019	Assistant Professor, Department of Radiology, University of Pittsburgh

2013 - 2019	Assistant Professor (tenure track), Department of Biostatistics, University of Pittsburgh
2005 - 2012	Research Assistant Professor, Department of Biostatistics, University of Pittsburgh
2005 - 2012	Research Assistant Professor, Department of Radiology, University of Pittsburgh

Scientific Appointments and Honors

2015, 2017, 2020	Faculty member at the RSNA Clinical Trial Methodology Workshop
2018	Voting Member, Panel Meeting, Neurological Devices Panel, Medical Devices Advisory Committee, FDA
2017	SPIE Medical Imaging, Poster Award
2012, 2015	Voting Member, Panel Meeting, General and Plastic Surgery Devices Panel, Medical Devices Advisory Committee, FDA
2009, 2010	Voting Member NIH/NCI ICMIC Special Emphasis Panel
2006	Best Dissertation and Student of the Year, Department of Biostatistics, University of Pittsburgh, Delta Omega National Honor Society in Public Health
2000	Honors Diploma, VN Karazin Kharkiv National University, Ukraine

C. Contributions to Science

1. Classification and prediction accuracy studies are integral parts of the development, optimization, and regulatory approval of diagnostic devices, practices, and markers in many fields. Contemporary decision tasks require new tools that address clinically relevant, rather than abstract, accuracy characteristics and a lot of work is being done to address this need. As a part of the analytical group at the Imaging Division of the Department of Radiology, I have worked on clinically relevant methods for analyzing diagnostic performance in imaging studies, which is relevant to many applications including regulatory approval of medical devices. This work was in part supported by the NIH grant our group received for developing clinically relevant approaches analysis of diagnostic accuracy, which was led by me during several years, and provided training and support for my Ph.D. students (underlined).
    a. Ma H, **Bandos AI**, Gur D. Informativeness of Diagnostic Marker Values and the Impact of Data Grouping. *Computational Statistics and Data Analysis*. 2018; 117:76-89. PMCID: PMC5584883
    b. **Bandos** AI, Guo B, Gur D. Jackknife variance of the partial area under the empirical receiver operating characteristic curve. *Statistical Methods in Medical Research*. 2017; 26(2):528-541 PMCID: PMC5133195.
    c. Ma H, **Bandos** AI, Rockette HE, Gur D. On use of partial area under the ROC curve for evaluation of diagnostic performance. *Statistics in Medicine*. 2013 Sep 10; 32 (20):3449-58. PMCID: PMC3744586
    d. **Bandos** AI, Rockette H, Gur D. Use of Likelihood Ratios for Comparison of Binary Diagnostic Tests: Underlying ROC Curves. *Medical Physics*. 2010 Nov; 37 (11):5821-5830.

    underlined first author indicates PhD or MS advisee in a publication that is a part of his/her dissertation

2. Receiver Operating Characteristics (ROC) analysis is the primary tool for analyzing classification and prediction accuracy in many applications. The quality of the ROC study design and methods determines the size, and thereby the cost, of accuracy studies. Although the field has been gradually evolving over several decades, statistical methods for ROC analysis are still being improved upon. Together with my collaborators, I developed several improved methods for the comparison of rating systems and binary classifiers in tasks that are frequently encountered during the evaluation of diagnostic systems and technologies in medicine.
    a. Ma H, **Bandos** AI, Gur D. On the use of partial area under the ROC curve for comparison of two diagnostic tests. *Biometrical Journal,* 2015: 57 (2), 304-20. doi: 10.1002/bimj.201400023
    b. **Bandos** AI, Rockette H, Gur D. Exact bootstrap variances of the area under the ROC curve. *Communications in Statistics - Theory & Methods*. 2007; 36 (13):2443 - 2461.
    c. Gur D, **Bandos** AI, Rockette HE. Comparing areas under receiver operating characteristic curves: potential impact of the "Last" experimentally measured operating point. *Radiology*. 2008 Apr; 247 (1):12-5. PMCID: PMC2637106.
    d. **Bandos** AI, Rockette HE, Gur D. A permutation test sensitive to differences in areas for comparing ROC curves from a paired design. *Statistics in medicine*, 2005: 24 (18), 2873-93.

    underlined first author indicates PhD or MS advisee in a publication that is a part of his/her dissertation

3. Efficient approaches for the study design and analysis of observer performance studies are critical for conducting affordable and conclusive studies. Several works that I led introduced more efficient approaches for statistical analysis of observer performance studies and enabled improved analysis of ongoing studies and some of the works in which I participated laid a solid foundation for continuing development in this area.
    a. Callahan MJ, Kleinman PL, Strauss KJ, **Bandos** A, Taylor GA, Tsai A, Kleinman PK. Pediatric CT dose reduction for suspected appendicitis: a practice quality improvement project using artificial Gaussian noise--part 1, computer simulations. *American Journal of Roentgenology*. 2015, 204 (1):W86-94.
    b. Gallas B, **Bandos** AI, Samuelson F, Wagner RA. A framework for random-effects ROC analysis: biases with the bootstrap and other variance estimators. *Communications in Statistics, Theory and Methods*. 2009; 38 (15):2586-2603.
    c. Gur D, **Bandos** AI, Cohen CS, Hakim CM, Hardesty et al. The "laboratory" effect: comparing radiologists' performance and variability during prospective clinical and laboratory mammography interpretations. *Radiology* 2008: 249 (1), 47-53. PMCID: PMC2607194
    d. **Bandos** AI, Rockette HE, Gur D. A permutation test for comparing ROC curves in multireader studies a multi-reader ROC, permutation test. *Academic radiology*. 2006 Apr; 13 (4):414-20.

4. Many contemporary tasks are focused on the detection and localization of multiple targets within a subject (e.g., multiple cancer lesions). Similar to the regular diagnostic systems, successful development and utilization of detection and localization systems rely on analysis of their accuracy. However, accuracy assessment of detection-localization systems requires a different, and more complicated, methodology. My work in this field led to the development of a fundamental approach for free-response ROC (FROC) analysis and laid a solid foundation for continuing the improvement of this important area.
    a. **Bandos AI**, Obuchowski NA. (2018). Evaluation of Diagnostic Accuracy in Free-Response Detection-Localization Tasks Using ROC tools. *Statistical Methods in Medical Research 2019;28(6):1808-25*.
    b. **Bandos** AI, Rockette HE, Gur D. Subject-centered free-response ROC (FROC) analysis. *Medical physics*. 2013 May; 40 (5):051706. PMCID: PMC3644034
    c. Gur D, **Bandos** AI, Rockette HE, Zuley ML, Sumkin JH, Chough DM, Hakim CM. Localized detection and classification of abnormalities on FFDM and tomosynthesis examinations rated under an FROC paradigm. *American Journal of Roentgenology,* 2011; 196 (3):737-41.
    d. **Bandos** AI, Rockette HE, Song T, Gur D. Area under the free-response ROC curve (FROC) and a related summary index. *Biometrics* 2009; 65 (1):247-56. PMCID: PMC2776072

5. Management of diseases and other conditions in contemporary medicine as well as in other fields heavily depends on imaging. Radiology is a rapidly developing field where new technologies are introduced almost every year. I have worked on multiple studies that evaluated existing and new technologies and practices. Some of these studies were groundbreaking and served as an integral part of regulatory approvals of technologies that are currently used in clinical practice.
    a. Zuley ML, **Bandos AI**, Abrams GS, Ganott MA, Gizienski TA, Hakim CM Kelly AR, Nair BE, Sumkin JH, Waheed U, Gur D. Contrast Enhanced Digital Mamography (CEDM) Helps to Safely Reduce Benign Breast Biopsies for Low to Moderately Suspicious Soft Tissue Lesions. *Academic Radiology* 2020. 27(7):969-76.
    b. Chough D, Berg, WA, **Bandos** AI, Rathfon G, Hakim C, et al.. A prospective study of Automated Breast Ultrasound (ABUS) screening of women with dense breasts in a Digital Breast Tomosynthesis (DBT) based practice. *Journal of Breast Imaging 2020. 2(2):125-33*.
    c. Skaane P, **Bandos AI**, Niklason LT, Sebuødegård S, Østerås BH, Gullien R, Gur D, Hofvind S. Digital Mammography versus Digital Mammography Plus Tomosynthesis in Breast Cancer Screening: the Olso Tomosynthesis Screening Trial. *Radiology 2019*. 291(1): 23-30.
    d. Berg WA, Gur D, **Bandos** AI, Nair B, Gizienski TA, Tyma CS, Abrams G, Davis KM, Mehta AS, Rathfon G, Waheed UX. Impact of Original and Artificially Improved Artificial Intelligence–based Computer-aided Diagnosis on Breast US Interpretation. *Journal of Breast Imaging. 2021. (3):301-11.*

Complete List of Published Work in MyBibliography:

http://www.ncbi.nlm.nih.gov/sites/myncbi/andriy.bandos.1/bibliography/45435753/public/?sort=date&direction=descending