

PROMOTION RECOMMENDATION
The University of Michigan
School of Nursing

Ivo D. Dinov, associate professor of nursing, with tenure, School of Nursing, and associate professor of computational medicine and bioinformatics, without tenure, Medical School, is recommended for promotion to professor of nursing, with tenure, School of Nursing, and professor of computational medicine and bioinformatics, without tenure, Medical School.

Academic Degrees:

PhD	1998	Florida State University, Mathematics, Tallahassee, FL
MS	1998	Florida State University, Statistics, Tallahassee, FL
MS	1993	Michigan Technological University, Mathematics, Houghton, MI
BSN	1991	University of Sofia, Mathematics and Computer Science, Sofia, Bulgaria

Professional Record:

2016 – Present	Associate Professor, Medical School, University of Michigan
2013 – Present	Associate Professor, School of Nursing, University of Michigan
2008 – 2013	Associate Professor, College of Arts & Sciences, University of California, Los Angeles
2001 – 2008	Assistant Professor, College of Arts & Sciences, University of California, Los Angeles
2000 – 2002	Visiting Assistant Professor, College of Arts & Sciences, University of California, Los Angeles

Summary of Evaluation:

Teaching: Professor Dinov has made important contributions to the teaching mission of the School of Nursing as a faculty member, and to the UM as the associate director of the Michigan Institute for Data Science (MIDAS) Education and Training. He also serves a role in leading the School of Nursing's team of Data Analytics Core faculty and designed, implemented and rolled out a four-course series on scientific methods for health science students. His dedication to education is further illustrated by his commitment to the development and maintenance of open access resources for statistical computing, for example his leadership of Statistics Online Computational Resource (SOCR) (<http://SOCR.umich.edu>). His contributions to the educational mission are not limited to traditional classroom teaching, but extend to the use of innovative strategies to expand access to bioinformatics and big data to schools across campus and outside of the UM.

Professor Dinov was a key contributor to the campus' Data Science Initiative (DSI) and MIDAS. He was involved in the writing of the UM Office of Research (UMOR) proposal that led to the creation of MIDAS, and subsequently spearheaded the creation of the Rackham Certificate in Data Science, a unique program accessible to graduate students' university-wide seeking exposure to this new and rapidly evolving scientific paradigm.

Professor Dinov led the development of the MIDAS Data Science Graduate Certificate Program. He conceived of the idea, planned and wrote-up the proposal, organized the faculty and marketed the program to Rackham Graduate School. Professor Dinov recently implemented the certificate program, starting with 15 graduate students from eight UM schools and colleges. This program trains skillful data scientists and builds substantial transdisciplinary knowledge, broad analytical skills, and agile technological abilities. The program emphasizes the practice of data science using modern technology to handle large, incongruent, and heterogeneous collections of data. The current certificate program is residential and requires Rackham Graduate School enrollment. Professor Dinov is now developing plans to offer this certificate program to non-U-M learners and is leading a group of faculty in the development of a Massive Open Online Course (MOOC) to meet the demand from non-UM learners. He plans to continue using “open-science” principles in the development of these courses and programs.

Professor Dinov’s commitment to open source materials is noteworthy. He is the creator and maintainer of the SOCR. It includes over 500 applets and it is widely used. He developed it. These activities greatly enhance the visibility of the UM in the area of big data. He is well known for having created several online computing and teaching platforms. Among them is the Laboratory of Neuro Imaging (LONI) Pipeline, which is one of the early workflow management systems for neuroimaging, genomics, and bioinformatics analysis as well as the already mentioned SOCR. At the school level, Professor Dinov led faculty efforts to design the analytics curriculum for School of Nursing master’s and doctoral students that resulted in a four course sequence: HS550, HS851, HS852 and HS853. Professor Dinov has led a group of four faculty who designed and implemented the program. Professor Dinov has earned higher marks for his teaching in MIDAS and the Undergraduate Research Opportunity Program (UROP) course for 30 undergraduate students (all scores of 4.5 to 5.0).

Professor Dinov has mentored four UROP students and two biostatistics graduate students on a predictive big data analytics project. Professor Dinov is co-mentoring one PhD student from biomedical data science; two visiting scholars; and two junior faculty - one in the School of Public Health and another in the Department of Radiology. Evidence suggests that Professor Dinov is making major contributions to the educational mission for the UM and School of Nursing. Professor Dinov has assumed leadership for education and training in data science at the campus level.

Research: Professor Dinov has established a productive program of research that focuses on the development, customization, improvement and validation of innovative analytical strategies for modeling, processing and visualization of big data. He is on the cutting edge of team science and collaborates with psychiatrists, computer scientists, neuroscientists, engineers, clinicians and health scientists. Professor Dinov brings together neuroimaging, genomics and clinical data. His work demonstrates the utility of big data machine learning approaches to predicting/forecasting patient diagnosis of Parkinson’s Disease.

Clinical researchers generate high volumes of complex and heterogeneous data that rapidly outpace available computational methods, so Professor Dinov’s work is critical for processing and visualizing the data. When applying for grant funding and/or publishing results his novel methods are frequently embedded in the larger project and the methods themselves are not

necessarily published separately. While Professor Dinov has a track record of first authored papers, it is important to recognize that some of his most creative work is buried in the methods sections of scientific papers that report clinical findings. He collaborates extensively with investigators in the field of neuroimaging and genetics with high throughput data. This speaks to the quality of his work and the significance of his contribution.

The quality of Professor Dinov's research is admirable as evidenced by his peer reviewed funding. He is a key investigator on five National Institutes of Health (NIH) grants. In addition, he has three applications under review. He has served as a co-investigator on multiple other sponsored projects. Professor Dinov regularly disseminates his research in peer-reviewed publications. He has published a total of 131 manuscripts, 26 as the first author. This includes 27 manuscripts published since 2013, seven as the first or senior author. Professor Dinov publishes his work in highly respected journals in the field including the *Frontiers in Neuroinformatics*, *Brain Imaging and Behavior*, *Plos One* and *BMC Informatics*.

Professor Dinov plans to continue to expand his collaborative research (computational neuroscience, predictive big data analytics, and transdisciplinary education) nationally through the Midwest Big Data Hub Initiative as well as develop the Compressive Big Data Analytics (CBDA) foundation leading to a canonical mathematical representation theory that enables effective computational modeling, statistical analysis, and scientific visualization of large and complex datasets. Professor Dinov was recently elected to the International Statistical Institute (ISI) a prestigious and longstanding organization.

Professor Dinov has served on national level review panels and this is evidence of a national reputation. He has served on multiple NIH review panels and on one National Science Foundation (NSF) panel. He is regularly invited to present at national venues, most recently at the Joint Statistics Meeting in Chicago, IL; Big Data Analytics Experience Conference; Tecnologico de Monterrey, Mexico and at the University of Southern California Pipeline Demo Day. In addition, Professor Dinov is an active and visible member of multiple statistics groups. He maintains high national visibility by organizing work groups at scientific meetings including: organized a workgroup on Scientific Tools and Workflows for Big Data Discovery Science in Palm Springs, CA; organized a special session on Big Data: Modeling, Tools, Analytics and Training at the 2015 Joint Statistical meeting in Seattle, WA; and presented SOCR Resources at the 43rd Annual Meeting of the Statistical Society of Canada.

Recent and Significant Publications:

Dinov, I., Heavner, B., Tang, M., Glusman, G., Chard, K., Darcy, M., Madduri, R., Pa, J., Spino, C., Kesselman, C., Foster, I., Deutsch, E., Price, N., Van Horn, J., Ames, J., Clark, K., Hood, L., Hampstead, B., Dauer, W., and Toga, A. (2016). Predictive Big Data Analytics: A Study of Parkinson's Disease using Large, Complex, Heterogeneous, Incongruent, Multi-source and Incomplete Observations. *PLoS ONE* 2016. doi: 10.1371/journal.pone.0157077.

- Dinov, I., Siegrist, K., Pearl, D., Kalinin, A., Christou, N. (2015). Probability Distributome: a web computational infrastructure for exploring the properties, interrelations, and applications of probability distributions. *Computational Statistics* 2015. doi: 10.1007/s00180-015-0594-6.
- Husain, S., Kalinin, A., Truong, A., Dinov, I. (2015). SOCR Data Dashboard: An Integrated Big Data Archive Mashing Medicare, Labor, Census and Econometric Information. *Journal of Big Data* 2015. doi: 10.1186/s40537-015-0018-z.
- Dinov, I., Petrosyan, P., Liu, Z., Eggert, P., Hobel, S., Vespa, P., Woo, Moon S., Van Horn, J., Franco, J., and Toga, A. (2014). High-throughput neuroimaging- genetics computational infrastructure. *Frontiers of Neuro-informatics 2014*. doi: 10.3389/fninf.2014.00041.
- Dinov, I., Petrosyan, P., Liu, Z., Eggert, P., Zamanyan, A., Torri, F., Macchiardi, F., Hobel, S., Moon, S., Sung, Y., Jiang, Z., Labus, J., Kurth, F., Ashe-McNalley, C., Mayer, E., Vespa, P., Van Horn, J., Toga, A. (2014). The Perfect Neuroimaging-Genetics-Computation Storm: Collision of Petabytes of Data, Millions of Hardware Devices and Thousands of Software Tools. *Brain Imaging and Behavior* 2014. doi: 10.1007/s11682-013-9248-x.

Service: Professor Dinov is a solid citizen and contributes substantial service to the university and to the school. His service at the university level included serving on the Executive Committee of the Michigan Institute for Data Science (MIDAS), the Senate Assembly Development Advisory Committee and the University Senate Assembly IT Committee. Professor Dinov's contribution to MIDAS is noteworthy. He is active in organizing and often leading several related initiatives as a MIDAS core faculty member, beyond his role as the associate director for education and training.

Since 2013, Professor Dinov served on multiple committees at the School level. He led the committee that developed the core analytics courses for the School of Nursing, was a member of the PhD Admissions and Advisory Committee and was a member of the School of Nursing Promotion and Tenure Process Review ad-hoc Committee. He has served on multiple other committees at both the university and school levels.

External Reviewers:

Reviewer A: "Based on his extensive expertise and knowledge of mathematics, computer science and industrial engineering, [Professor] Dinov has advanced computationally-intense data science, a challenging area of methodological research crucial to advancing nursing and health services research. [Professor] Dinov's work is outstanding in its level of rigor, complexity and volume."

Reviewer B: "One of [Professor] Dinov's strengths seems to be his outstanding ability to leverage information communication technologies in his research and education. His work with the Statistics Online Computational Resource (SOCR) and MIDAS are exemplary. The SCORE team has made many valuable resources in the areas research and statistics available to academic communities through this website."

Reviewer C: "[Professor] Dinov's career track record and trajectory, leadership, and scholarly activities epitomize the highly desirable and simultaneously extremely challenging combination

of basic and applied science, spanning multiple problem domains and settings, that serve to define the most successful innovators and leaders in the contemporary academic environment.”

Reviewer D: “[Professor] Dinov is an accomplished researcher in the domain of neuroinformatics, and has made a number of important contributions to the field. He is probably best known for his work on the LONI Pipeline, which is one of the best established workflow and provenance management systems for neuroimaging analysis. It was also the first such system to be established in a production environment, and thus has served as a touchstone for newer projects that have extended the ideas coming from the LONI Pipeline.”

Reviewer E: “I am impressed by [Professor] Dinov’s scientific program, contributions to his field of study, and academic productivity.”

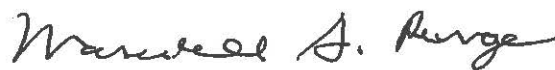
Reviewer F: “[Professor] Dinov has been very active in data driven research in a wide variety of biomedical and health areas, with more than 130 publications. The integration of data science and nursing research is rapidly growing area that has huge potentials in addressing many of the healthcare challenges that we are facing today, largely due to the recent availability of big health data. This is a key area for growth for any nursing program.”

Summary of Recommendation:

Professor Dinov presents evidence of a consistent and continuing record of scholarship, teaching and service. He has established himself as a recognized researcher at the regional and national levels, and is establishing himself internationally. He is successful as an interdisciplinary researcher and as a collaborator. Professor Dinov has a solid record of academic, professional and community service. He is an admirable teacher and mentor. It is with the support of the respective Executive Committees that we recommend Ivo D. Dinov for promotion to professor of nursing, with tenure, School of Nursing, and professor of computational medicine and bioinformatics, without tenure, Medical School.



Patricia D. Hurn
Dean, School of Nursing



Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School

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