

BIOGRAPHICAL SKETCH

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NAME: Cao, Aize

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

POSITION TITLE: Associate Professor of Biomedical Data Science

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
Beijing Institute of Technology	B.S	07/1993	Optical Engineering
Middle Tennessee State University	M.S	05/2013	Biostatistics
Nanyang Technological University, Singapore	Ph.D.	12/2005	EEE
Vanderbilt University	Postdoctoral	12/2007	Biomedical Engineering

A. Personal Statement

I joined the faculty at Meharry in January 2021. I am a biomedical informatician and data scientist with extensive experience in large-scale electronic health records (EHR). My research focuses on patient health outcome prediction and health disparity study, by leveraging the applications of descriptive statistics, predictive analysis, and machine learning techniques on EHR.

Upon finishing my PhD studies in medical image processing and pattern recognition using machine learning algorithms, I came to Vanderbilt University for my postdoc training in the Department of Biomedical Engineering. The focus of my research there was to evaluate brain surface deformation during neurosurgery through image-guided system. Between 2008 to 2012, I worked at Vanderbilt University Institute of Imaging Science (VUIIS) supporting mental disease studies of neuroimaging program in a non-academic position due to family obligation. From 2013 after my training in biostatistics, I returned to academic research in healthcare in the Department of Biomedical Informatics at Vanderbilt. My research focuses are healthcare informatics, common data models, and clinical outcome predictions. I cooperated with experts from a variety of background and published more than 20 peer reviewed journal papers.

My academic experience is unique in that I have worked in depth with local electronic healthcare records (EHR), large scale nationwide Veterans Affairs EHR and Medicare/Medicaid claims data, from data management to predictive modeling and decision making. I collaborated with other researchers on studies of chronic disease inpatient discharge and outpatient medical home, cirrhosis inpatient readmission and mortality, OMOP common data model extraction, transformation and loading (ETL), data quality assurance, and mental diseases. As a result of these previous experiences, I am aware of the importance of communication among team members and of constructing a realistic research plan, timeline, and budget.

B. Positions and HonorsPositions and Employment

2001-2004 Research Assistant, Nanyang Technological University, Singapore
 2005-2007 Research Associate, Department of Biomedical Engineering, Vanderbilt University
 2008-2012 Neuro-Imaging Analyst, Vanderbilt University Institute of Imaging Science, Vanderbilt

2013 Intern, Division of Policy, Planning and Assessment, Tennessee Department of Health
 2013-2016 Computer System Analyst II, the Institute for Medicine and Public Health, Vanderbilt
 2016-2020 Research Assistant Professor, Department of Biomedical Informatics, Vanderbilt
 2019-2020 Adjunct Faculty in Data Science, College of Computing Technology, Lipscomb University
 2021- Associate Professor of Biomedical Data Science, Meharry Medical College

Other Experience and Professional Memberships

2005-2006 Reviewer for IEEE Transaction on Biomedical Engineering
 2007-2008 Reviewer for IEEE Transaction on Medical Imaging
 2016 Reviewer for Journal of Biomedical and Health Informatics
 2019- Reviewer for Applied Clinical Informatics

Honors

1992 Scholarship from Beijing Institute of Technology, Beijing, China
 2001-2004 Research Scholarship from Nanyang Technological University, Singapore

C. Contributions to Science

1. My early publications focused on medical image related studies, including x-ray mammograms image processing, pattern recognition, physical to image space registration, and brain functional activities. It covered my Ph.D., postdoctoral and mental disease studies. These publications document the emerging problem in breast tumor detection, image guided neurosurgery, and mental health that provided clinical evidence for decision support.

- a. Aize Cao, Q. Song, and X. L. Yang, (2008). Robust Information Clustering for Automatic Breast Mass Detection in Digitized Mammograms. *Computer Vision and Image Understanding*, Vol. 109, pp. 86-96
- b. Aize Cao, R. C. Thompson, P. Dumpuri, B. M. Dawant, S. Ding, and M. I. Miga, (2008). Laser range scanning for image-guided neurosurgery: Investigation of image-to-physical space registrations. *Medical Physics*, Vol. 35, No. 4, pp. 1593-1605.
- c. P. Dumpuri, R. C. Thompson, Aize Cao, S. Ding, I. Garg, B. M. Dawant, M. I. Miga, (2010). A fast and efficient method to compensate for brain shift during surgery. *IEEE Trans. On Biomedical Engineering*, Vol.57, No.6, pp. 1285-1296.
- d. L. Bauernfeind, M.S Dietrich, J.Blackford, E. J. Charboneau, J. G. Lillevig, C.M.Cannistraci, N.D.Woodward, Aize Cao, Ronald L. Cowan, (2011). Human ecstasy use is associated with increased cortical excitability: an fMRI study. *Neuropsychopharmacology*, pp. 1127-1141.
- e. Carissa Cassio, Jennifer Foss Feig, Ronald Cowan, Margaret Benningfield, Baxter Rogers, Aize Cao, (2012). Response of neural reward regions to food cues in autism spectrum disorders. *Journal of Neurodevelopmental Disorders*, 4(1).
- f. Evonne J. Charboneau, Mary S. Dietrich, S. Park, Aize Cao, Tristan J. Watkins, Jennifer U. Blackford, Margaret M. Benningfield, Peter R. Martin, Maciej S. Buchowski, Ronald L. Cowan, (2013). Cannabis cue-induced brain activation correlates with drug craving in limbic and visual salience regions: preliminary results. *Psychiatry Research: Neuroimaging*, 214(2): 122-131.
- g. Jacqueline A. Clauss, April I. Seay, Ross M.Vanderklok, Suzanne N. Avery, Aize Cao, Ronald L. Cowan, Margaret M. Benningfield, and Jennifer U. Blackford, (2014). Structural and functional bases of inhibited temperament. *Social Cognitive and Affective Neuroscience Advance Access*, 9: 2049-2058.

2. My publications on patient healthcare focused on healthcare transition and chronic disease management, as well as risk adjusted modeling for automatic surveillance of liver cirrhosis. These publications illustrated novel healthcare models and risk factors that contributed to health quality improvement and cost reduction.

- a. Joseph Boyle, Ted Speroff, Katie Worley, Aize Cao, Kathryn Goggins, Robert S. Dittus, Sunil Kripalani, (2017). Low health literacy is associated with increased transitional care needs in hospitalized patients. *Journal of Hospital Medicine*, 12(11): 918-924.
- b. Jejo D. Koola, Sam B. Ho, Guanhua Chen, Amy M Perkins, Aize Cao, Sharon E. Davis, Michael Matheny, (2019). Development of a national Department of Veterans Affairs mortality risk prediction model among patients with cirrhosis. *BMJ Open Gastroenterology*, Vol.6
- c. Sunil Kripalani, Guanhua Chen, Philip Ciampa, Cecelia Theobalk, Aize Cao, Megan McBride, Robert S. Dittus, (2019). A transition care coordinator model reduces hospital readmissions and costs. *Contemporary Clinical Trials*, June, 81:55-61.

- d. Jejo D. Koola, Sam B. Ho, Aize Cao, Guanhua Chen, Amy M. Perkins, Sharon E. Davis, Michael Matheny, (2020). Prediction 30 day hospital readmission risk in a national cohort of patient with cirrhosis. *Digestive Diseases and Sciences*, (65), 1003-1031
- e. Fern FitzHenry, Svetlana K. Eden, Jason Denton, Hui Cao, Aize Cao, Ruth Reeves, Guanhua Chen, Glenn Gobbel, Nancy Wells, and Michael Matheny, (2020). Prevalence and Risk Factors for Opioid-Induced Constipation in an Older National Veteran Cohort. *Pain Research and Management*.

3. In the most recent years, I have been an active member in Observational Health Data Sciences and Informatics (OHDSI) community working on its OMOP common data model transformation for nation-wide Veterans Affairs (VA) electronic healthcare records. The VA OMOP data boost VA research opportunities for nationwide/international network study to both support clinical decision-making and advance the methodology within this field.

- a. Aize Cao, Margaret Gonsoulin, Kristin de Groot, Elizabeth Hanchrow, Daniel Park, Kristine Lynch, Denise Hynes, Scott L. DuVall, Michael E. Matheny, Stephen A. Deppen, (2017). Quality assurance of demographics consistency between Veterans Affairs and Medicare data. OHDSI Symposium.
- b. Kristin de Groot, Aize Cao, Qiuying Lucy Zhang, Denis M. Hynes, Donghui Kan, Amanda Talor, Linda Kok, Fern FitzHenry, Scott L. DuVall, Mari Souden, Michael Matheny, (2018). Transforming Medicare Research Identifiable Files (RIF) into the OMOP Common Data Model. OHDSI Symposium.
- c. Kristine E. Lynch, Stephen A. Deppend, Scott L. DuVall, Benjamin Viernes, Aize Cao, Daniel park, Elizabeth Hanchrow, Kushan Hewa, Michael Matheny, (2019). Incrementally transforming electronic medical records into the OMOP common data model: A multidimensional quality assurance approach. *Applied Clinical Informatics*, 10(5), 794-803.
- d. Aize Cao, Liam Rose, Todd H. Wagner, Sharidan K. Parr, Kristine E. Lynch, Scott L. DuVall, Michael E. Matheny, (2020). Conversion of National Veteran Affair Health Cost Data into the OMOP CDM: Preliminary Transformation. OHDSI Symposium

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

Completed Research Support

Veterans Affairs HSR&D 2014-06-009D Michael Matheny (PI). 2015-2019

Automatic Surveillance and Intervention among Patient with Liver Cirrhosis

The goal of this project is to develop and validate near real-time natural language processing (NLP) tools in order to extract information that is relevant for case finding and risk factor modification among liver cirrhosis patients, develop and validate a robust family of logistic regression prediction models for readmission and mortality following hospitalization for use in the identification of high risk patients, development of a clinical dashboard with imbedded clinical decision support and patient data visualization tools to support clinical care delivery, and conduct a pre-post clinical pilot to evaluate the efficacy and adoption of the dashboard when used.

VINCI (VA HSR&D RES-13-457) Scott DuVall (Lead) 2016-2020

National Veteran Health Administration (VHA), VINCI (VA Informatics and Computing Infrastructure) OMOP Common Data Model, ETL and QA.

The goal of this project is to transform the VHA cooperate data warehouse (CDW) data into OHDSI (Observational Health Data Sciences and Informatics) common data model, to facilitate the VHA researchers participating large scale evidence-ased network studies that promotes better health decisions and better care