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Here is how I work at USD!

At USD, faculty are expected to succeed in all three areas of our tripartite mission (teaching, research, and service).

Introduction. I joined USD in Fall 2015 as an Assistant Professor, after over four years of postdoctoral research experience (NIH and INRIA – France). In Fall 2020, I was promoted to an Associate Professor, and immediately, I started to lead the Department of Computer Science as the chair. I also serve International Medical University, Malaysia as a Full Professor (Adjunct). For a year (AY 2019/20), I served School of Computing and IT, Taylor's University as a Visiting Associate Professor. In 2011, I completed my PhD in Computer Science – AI from the prestigious/premium research center, INRIA (France). To name a few, I am the proud recipient of the Visionary Leadership Award – Conference, RTIP2R (University of Derby, UK, 2023), Cutler Award for Teaching and Research Excellence (USD, 2021), the President's Research Excellence Award (USD, 2019) and the Ignite Award from the U.S. Department of Health & Human Services (HHS, 2014). I completed leadership and training program for Deans/Chairs (organized by the Council of Colleges of Arts & Sciences (U.S., 2021)) and PELI – President's Executive Leadership Institute (USD, 2021).

Teaching and advising. In total, I have taught more than 12 different courses such as AI, Computer Vision, Machine Learning, Information Retrieval, Business Analytics Fundamentals, Robotics, Unix, Machine Organization, and AI in medical imaging informatics. Precisely, since 2020, I have taught the following courses: CSC 752 – Computer Vision, CSC 790 – Graduate Seminar, CSC 787 – AI for Medical Imaging Informatics, CSC 722 – Machine Learning Fundamentals, and CSC 785 – Information Storage & Retrieval. Upon assuming leadership of the department, I have taken on a significantly increased teaching workload (teaching two times the number of courses specified in my contract), owing to a substantial rise in enrollment. Even though my workload is higher than it should be, I have been continuously receiving nominations for the prestigious USD's teaching excellence award, Belbas-Larson. Precisely, there have been 9 nominations in AY 16 in AY 17, 12 in AY 18, 14 in AY 19, 18 in AY 20, 12 in AY 21, 10 in AY 22, 17 in AY 23 and 27 in AY 24. Additionally, since 2015, more than 95% of my teaching scores have consistently exceeded 4.5 on the IDEA evaluation scale of 5.

Throughout my tenure at USD, my courses have gained substantial popularity not only among students on campus but also across the state of South Dakota. For instance, in CSC 722, I have attracted students from various disciplines, including Mathematics, Physics, Chemistry, Biology, Basic Biomedical Sciences, and even Business Analytics. As an example, in my CSC 787 – AI for Medical Imaging Informatics course, I have welcomed students from SDSU, SD School of Mines, and the University of Minnesota. On average, my class sizes exceed 100 students. The primary factor contributing to this enthusiastic response is my incorporation of research expertise into course design, allowing students to learn how to apply concepts to real-world scenarios spanning diverse industries, from healthcare to entertainment. Our approach involves starting projects from scratch, utilizing data analysis techniques to derive insights from various sources. Examples range from compound discovery in chemistry, exploration of dark matter in physics, genome sequencing in biology, identification of fake news in media and journalism, to digital humanities in history, and many more fascinating areas.

Another notable aspect that I find intriguing is the introduction of summer courses, a need I identified during my leadership tenure. Surprisingly, our department had never offered summer classes since its establishment. Recognizing the shortage of faculty in the Department of Computer Science, I went the extra mile, even amidst the challenges posed by the Covid-19 pandemic, to teach a summer course. During SU 23, I had the pleasure of teaching a cohort of 120 students. I possess a deep understanding and strong commitment to the mission of the College of A&S. I consider advising to be a fundamental responsibility in ensuring our sustained growth.

As of now (through summer 2023), I had the privilege of (co)supervising four PhD dissertations and serving as an examiner for 11 others. Additionally, I provided guidance and supervision for 36 MS students, six Honors theses, and three Fulbright scholars. One of honors thesis students received distinction award in 2020. I take great pride in sharing that six of my students were honored with the prestigious Undergraduate Research Excellence Awards from USD's Office of Research & Sponsored Programs and two of them were recognized at the State Capitol (South Dakota), while other two students received UDiscover

awards. In addition, two thesis students received 3MT thesis presentation awards: 1st place (PhD thesis, 2024) and 3rd place (MS thesis, 2021).

Research & scholarly work. With fund exceeding $2.1m (sources: DOD, SDCRGP, State of SD, DOE, NSF, and AOARD) and authored ten books, more than 250 peer-reviewed research articles (including IEEE Transactions on PAMI), and edited 13 journal issues and 15 conference proceedings, I have demonstrated my expertise in artificial intelligence, machine learning, computer vision, data mining, and big data with various applications such as healthcare informatics speech/audio analysis, and Internet of Things. Recent external funding includes DOD grant of $1m for the proposal titled "Building AI Research Capacity at USD," (DOD press release; May 10, 2023, PI: Dan Engebretson). Another grant proposal of worth $745K for the project titled "Biomedical Computation Research, SSOM-USD-SDSMT" has just been granted by the state of SD (my role: co-PI). Further, I'm supporting NSF-DST, India (PI, USD), NSF-STEM (co-PI, USD), NSF-Engines – Type I (co-PI with SDSMT and other 12 universities), and NSF Convergence Accelerator (co-PI with USD), NSF-REC (task leader with other 20 universities).

As an esteemed ACM and IEEE* Signal Processing Society Distinguished Speaker, I have had the honor of delivering over 80 plenary/keynote talks at the renowned conference/university events. Some of these events include The University of Chicago Medicine & Biological Sciences (2023), Computer Vision and Machine Intelligence Conference - IIIT in India (2023), Great Plain Networking – AI & Ethics in Missouri (2023), SDSU Data Science Symposium in SD (2023), APEC Symposium in Thailand (2023), JNTU-H and IEEE Computer Society in India (2022), Queen's University in Canada (2022), and IEEE Computer Society Chapter in Silicon Valley (2022), 35th IEEE CBMS conference, Shenzhen, China (2022), and 7th International conference on Machine Vision and Machine Learning, Prague, Czech Republic (2022).

My research lab (2AI: Applied Artificial Intelligence, founded in 2015 with two students) is now composed of over 20 students (Spring 2023). In addition to three Fulbright scholars, 20% of them are award winning research scholars (state, national, and international) from such as NSF-REU, NASA, NSF-NRT, NSF-GRFP, conference (best paper), 3MT thesis awards, CURCS, UDiscover, and USD's Office of Research and Sponsored Programs. In terms of research production, my lab produces 10-15 research articles per year and is considered the number 1 research lab in the USD campus. A few samples of the peer-reviewed research articles I co-authored with my students (underlined names) are listed below (limited to 2022 and 2023):

A. Books:
   1. KC Santosh R Rizk, and S Bajracharya: Cracking the machine learning code: technicality or innovation?, *Studies in Computational Intelligence, Springer Nature* (2024),
   2. KC Santosh and S Nakarmi: Active learning to minimize the risk from future epidemics, ISBN. 978-981-99-7441-2, *SpringerBriefs in Applied Sciences and Technology, Springer (*2023)
      https://www.usd.edu/academics/colleges-and-schools/college-of-arts-sciences/south-dakotan-arts-and-sciences/computer-science-chair-co-authors-book-on-active-learning-in-health-care-with-recent-department-grad
   3. KC Santosh and C Wall: Artificial Intelligence, Explainability, and Ethical Issues – Applied Biometrics, ISBN. 978-981-19-3934-1, *SpringerBriefs in Applied Sciences and Technology, Springer* (2022)
      USD new (Summer 2023): Graduate CS student co-authored book on AI with department chair. https://www.usd.edu/academics/colleges-and-schools/college-of-arts-sciences/south-dakotan-arts-and-sciences/graduate-computer-science-student-co-authors-book-on-ai-with-department-chair
      Important note. To the best of our knowledge, this marks the first instance where MS students have co-authored book on AI in the state.

B. Peer-reviewed research articles & proceedings:
   1. KC Santosh, D GhoshRoy, S Nakarmi. Deep Structured Learning for Covid-19 screening using Chest CT in 2020-2022: A Systematic Review, *Healthcare*, (2023)
   2. D GhoshRoy, PA Alvi, and KC Santosh. Unboxing Industry-Standard AI Models for Male Fertility Prediction with SHAP. Healthcare (Basel). 11(7):929 (2023)
   3. D GhoshRoy, PA Alvi, and KC Santosh. Explainable AI to Predict Male Fertility Using Extreme Gradient Boosting Algorithm with SMOTE. Electronics, 1215 (2023)
   4. A Chaudhuary, S Roy, R Rizk, and KC Santosh, Automated fracture detection from CT scans, *IEEE Conf. on AI*, (2023)
   5. A Khanal, R Rizk, and KC Santosh. Ensemble Deep Convolution Neural Network to Identify Fractured Limbs using CT scans, *IEEE Conf. on AI,* (2023)
   6. S Nakarmi and KC Santosh. Active learning to minimize the risk from future epidemics, *IEEE Conf. on AI,* (2023)
   7. S Bajracharya, R Rizk, and KC Santosh. Deep Spectral Features to Detect Atrial Fibrillation Using Single-Lead ECG Signals, *IEEE Conf. on AI,* (2023)
   8. S Roy and KC Santosh. Analyzing Non-biological Foreign Objects in Chest X-rays – Clinical Significance and AI tools, *Healthcare* (2023)
   9. Md Kamal, N Dey, L Chowdhury, S Hasan, and KC Santosh. Explainable AI for Glaucoma Prediction Analysis to Understand Risk Factors in Treatment Planning. *IEEE Transactions on Instrumentation and Measurement,* pp. 71: 1-9 (2022)
   10. Md Mahbub, M Biswas, L Gaur, F Alenezi, KC Santosh: Deep features to detect pulmonary abnormalities in chest X-rays due to infectious diseaseX: Covid-19, pneumonia, and tuberculosis. *Information Sciences* 592: 389-401 (2022)

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* ACM (the world's largest computing machinery association and IEEE (the world's largest technical professional organization dedicated to advancing technology for the benefits of humanity) select distinguished speakers based on the research credits.

11. J Handerson and KC Santosh. Analyzing Chest X-Ray to Detect the Evidence of Lung Abnormality Due to Infectious Disease. *Recent Trends in Image Processing & Pattern Recognition*, pp 59-77 (2022)
12. A Bandyopadhyay, S Ghosh, M Bose, A Singh, Alice Othmani, and KC Santosh: Alzheimer's Disease Detection Using Ensemble Learning and Artificial Neural Networks. *Recent Trends in Image Processing & Pattern Recognition,* pp. 12-21 (2022)
13. R Alice, L Wendling, and KC Santosh: 2D Respiratory Sound Analysis to Detect Lung Abnormalities. *Recent Trends in Image Processing & Pattern Recognition,* pp 46-58 (2022)
14. KC Santosh, S Allu, S Rajaraman, and S Antani: Advances in Deep Learning for Tuberculosis Screening using Chest X-rays: The last 5-Year Systematic Review, *Journal of Medical Systems* (2022)
15. KC Santosh and S Ghosh. Covid-19 versus Lung Cancer: Understanding chest CT images through Deep Ensemble Neural Networks, *International Journal of Artificial Intelligence Tools* (2022)
16. KC Santosh, N Rasmussen, M Mamun, and SAryal. A systematic review on cough sound analysis for Covid-19 diagnosis and screening: is my cough sound COVID-19?, *PeerJ Computer Science*, (2022) URL:
17. KC Santosh, S Ghosh, and D GhoshRoy. Deep Learning for Covid-19 Screening using Chest X-rays in 2020: A Systematic Review, *International Journal of Pattern Recognition & Artificial Intelligence* (2022)

I am cited as the world's top 2% research scientists (source: Stanford University research report, 2021 - present) and am the no. 1 research scientist in the state of SD that is solely based on the bibliometrics research report on artificial intelligence research (CS faculty). At USD, I'm ranked 1st based on i-10 index and ranked 3rd based on h-index (source: AD Scientific Index 2023 and Google Scholar: i10-index = 166+ & h-index = 44 with over 7100+ citations). Additionally, I'm proud to introduce some of the highly cited research articles, which I published immediately after Covid-19 was announced/declared:

1. KC Santosh: AI-Driven Tools for Coronavirus Outbreak: Need of Active Learning and Cross-Population Train/Test Models on Multitudinal/Multimodal Data. *Journal of Medical Systems* 44(5): 93 (2020)
   Highly cited paper - top 1% in the academic field of clinical medicine (source: web of science)
2. D Das, KC Santosh, and U Pal. Truncated inception net: COVID-19 outbreak screening using chest X-rays. *Physical and Engineering Sciences in Medicine*, 43, 915–925 (2020).
   Highly cited paper - top 1% in the academic field of engineering (source: web of science)

As a seasoned and prolific figure in the research community, I have been exploring the possibility of developing a cutting-edge curriculum at USD that aligns with my extensive expertise in the field of artificial intelligence and machine learning. In other words, curriculum transformation with research component(s) is a dealbreaker in academia. This makes research faculty stay longer in the academia, and I'm one the real example. Two of my recent research books: *AI, ethical issues, and explainability* (Springer, ISBN. 978-981-19-3934-1, 2022) and *Deep learning for medical imaging* (Elsevier, eISBN. 978-012-82-3650-5) adopted as textbooks at USD's curricula: CSC 472/572 – AI & ethical issues and CSC 787 – AI in medical imaging informatics, respectively. Another book titled "*Medical imaging: artificial intelligence, ..., and machine learning technique* (ISBN. 978-036-71-3961-2*),*" who received the Choice Outstanding Academic Title from Taylors & Francis, is currently a reference book for CSC 787.

Service. I revised USD's Computer Science MS – catalog (2018). Immediately after that, I introduced AI programs (2020): specialization and certificate (undergraduate and graduate) that made us the 'pioneer home to AI programs in the state of SD. I added more than a dozen of new multi-disciplinary courses at USD. I helped build the following programs across the USD campus: Geospatial Graduate Certificate (Biology and Sustainability), Large Data Analytics Graduate Certificate (Physics), and Business Analytics Program (MBA, School of Business), to name a new. Further, I introduced Bioinformatics Graduate Certificate (with the help of Biology and Biomedical Engineering Departments, 2021). Not limiting there, considering market trends in AI/Data Science, I also introduced Data Science Undergraduate Certificate (aimed for non-Computer Science majors, 2022). With Dean's office, I'm heavily involved with other two interesting academic and research programs: PhD in Data Science & Engineering (joint program with SDSMT, start date: Fall 23) and Biomedical Computational Excellence Fellowship Program (with School of Medicine, USD – pending/under review).

To name a few, I serve USD in the following capacities: examiner/reviewer of President's Research Excellence Award; member of Institutional as well as Departmental (Math) Promotion & Tenure (P&T) Committee; chair of Sciences and Math Division; vice-chair of CURCS (Undergraduate University-wide research grants); and member of Faculty Affairs Committee, Graduate Council, Intellectual Property, Information Technology Advisory Council, Honors Program, College Curriculum & Instruction Committee, and Enrollment & Management Committee.

I recognize the positive impact of program assessment and accreditation. Since 2022, I have been serving ABET accreditation board as a program evaluator (PEV) for computing programs (Kent State University and University of Texas Dallas). At USD, I have successfully managed the ABET accreditation renewal site-visit for the 2022-23 academic year, resulting in a successful outcome and a renewed accreditation for a six-year cycle.

In Fall 2023, under my leadership, even though numbers are not finalized yet, it showed more than 50% growth in undergraduate program. As a leading scientist in AI/ML, professor, and (academic) leader/administrator, with my leadership, I enjoy more than 3,000% growth – from a low of 10-12 students to over 300 in just three years. Based on my research, we now become the largest computer science graduate program in the state of SD – the leading AI programs in the state. For additional news, please refer to my CV in Section VI. With the department growth, thanks to the College of A&S, I have hired 10 faculty in total (since 2020). With the continuous support from the dean's office, I have been working on establishing and maintaining a positive collaborative culture among faculty, staff, and students.

Since 2018, being a Senior Member – IEEE, I have chaired the IEEE Computer Society (region 4, through 2021). My primary responsibilities were to support student activities (at local level), examine senior member applications, and design and implement career-focused programs for IEEE young professionals. Region 4 includes Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North and South Dakota, Ohio, and Wisconsin.

I serve as an Academic Editor for PeerJ Computer Science; an Associate Editor-in-Chief of Electronics; an Associate Editor for multiple journals such as IEEE Transactions on AI, International Journal of Machine Learning & Cybernetics (Springer), International Journal of Pattern Recognition & AI (World Scientific), IEEE Access, IET Image processing, World Scientific Review of AI, Human Centric Intelligent Systems (Springer), and Advances in Computational Intelligence (Springer); and a Guest Editor of multiple journals such as Journal of Biomedical Health Informatics (IEEE) and Journal of Speech Technology (Springer). In AI, I chaired more than 10 international conference events (e.g., Computer Based Medical Systems, IEEE premier conference, since 2020) and Recent Trends in Image Processing & Pattern Recognition (since 2016)), and I founded/organized four international conferences in artificial intelligence, data science, and computer vision. The USD's AI symposium (1400+ registrants, 2023) is another event, which I consider a primary recruiting tool. I am the regular review panelist for research grants such as NSF (+ NSF-NRT, NSF-GRFP, NSF-SBIR/STTR), Swiss NSF, Medical Research Council (UK), Mitacs (Canada), NSERC (Canada), Fonds de recherche du Québec (Canada), University of Michigan – Precision Health, ZonMW (health research and innovation, Netherland), Medical Research Future Fund - Frontier Health and Medical Research Initiative (AUS), and Wallenberg AI, Autonomous Systems and Software Program - Humanities and Society (Sweden). I also regularly review tier-1 journals such as The Lancet, Scientific Reports, Nature Communications, IEEE Transactions on Medical Imaging, IEEE Transactions on Image Processing, IEEE Transactions on Computational Social Systems, Pattern Recognition, and Machine Learning Research.

Diversity, inclusiveness, and leadership statement (closing summary). I respect and appreciate the differences in ethnicity, gender, age, national origin, disability, sexual orientation, education, and religion. I am focused on the needs of every individual and ensured the right conditions for each person to achieve his or her full potential.
I consider myself prolific AI/data scientist, seasoned academic leader, curriculum and program assessment expert, and award-winning faculty. At USD, I have helped develop and lead independent research programs/awards, participated in the creation, development, and delivery of novel curricula, and established a record of successful undergraduate and graduate academic programs. I believe, based on my experiences, I would be able to demonstrate administrative leadership as well as the ability to recruit, mentor and retain diverse research-intensive faculty, maintain a collegial and ethical environment, and work with faculty and students of diverse backgrounds.

More information: https://kc-santosh.org/