Center for Applied Data Science (CADS) at Winston-Salem State University (WSSU)

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Overview and History

Winston-Salem State University is a public Historically Black College and University (HBCU) and an University of North Carolina (UNC) institution, where 76% of the student population are African Americans or Hispanic/Latino, 73% are female, and 23% are first generation college students. The Center for Applied Data Science (CADS) at WSSU is an institution-wide initiative with the goal of fostering research and education in data-driven knowledge discovery. CADS aims to bring together computer scientists and domain scientists with complex Data Science problems to promote and accelerate data-intensive discovery and education. Ongoing research projects are in the areas of pharmacoengineering, mobile crowdsensing, spatial justice and social mobility, healthcare management, and music's biophysical influence on the human body. The center also focuses on leveraging the power of data to help change lives and impact our local community, while also fostering greater diversity and inclusion in the rapidly growing field of data science. The center received its inaugural funding of 1.5M in the Fall of 2020 for three years funded by the UNC Research Opportunities Initiative (ROI). Currently, 25 faculty, students, and staffs are supported by CADS.

Education

CADS offers an interdisciplinary minor in data science, facilitates the gradual infusion of data science into the university-wide curriculum across diverse disciplines through Faculty Adopter Awards, supports existing graduate certificate in data analytics, and aims to offer a MS in Data Science in near future.

Through a joint effort of CADS and the Department of Computer Science at WSSU, a Data Science Minor is available to all WSSU students, beginning in Fall 2021. The Data Science Minor requires 6 courses (18 credit hours) – including 3 foundational courses in data science and statistics and 3 approved elective courses offered at various academic departments. Through participating in the minor, students will gain skills in data acquisition and management; data analysis; solving real world data-based problems, interpretation and communication of data; and understanding the social and ethical implications of work in this field.

To better integrate data science into WSSU's full curriculum, the center started Faculty Adopter Awards which are designed to support enthusiastic WSSU faculty who are willing to infuse data science into their courses across various disciplines and are capable of quantitatively and qualitatively assess the impact of their interventions. The FY 2021 cohort of 5 awardees developed relevant course modules in data science and integrated them into existing courses offered at various disciplines such as Mathematics, Sports Studies, Psychological Sciences, Justice Studies, and Healthcare Management. As part of this effort, during the FY21, 108 students received exposure to data analytics and gained hands-on experience on using data science tools and techniques.

The Center also hosts regular seminars and an annual multi-day symposium to increase awareness of data science and the CADS center on campus, locally and nationally. The symposium encompasses various activities such as keynote, faculty and student curriculum and research presentations, information session about educational opportunities, panel discussions on enhancing diversity and inclusion etc.

Research

CADS' research mission is supported by five Faculty Fellows who work closely with students on advancing research and bridging the gap between domain experts and computer scientists to maximize the power and practicality of data science.

Dr. Steve Aragon, an Associate Professor of Healthcare Management at WSSU and a Faculty Fellow at CADS, is using data science to study patient-centered healthcare with the goal of eliminating healthcare

disparities and advancing health equity. Fellow Dr. Muztaba Fuad, a Professor of Computer Science, studies mobile crowdsensing, an evolving research area potential to improve user experience, facility management, and resource usage. Fellow Dr. Jill Keith, Professor of Biochemistry in Biological Sciences and Chemistry uses data science to assess if FDA-approved drugs can be repurposed/repositioned to cure cocaine addiction. Fellow Dr. Tennille D. Presley, Associate Professor of Physics in the department of Chemistry, employs data science to develop a predictive model for identifying the body's response to various genres of music to elucidate music's biophysical influence on the body. Fellow Dr. Russell M. Smith, Professor of Geography, explores development of Spatial Justice Index for North Carolina in a field that's historically been qualitative and case study-based, by quantitatively exploring geographic, demographic, and socio-economic variables of census tract to help communities address spatial injustices.

Additionally, Dr. Debzani Deb, an Associate Professor of Computer Science and Founding Director of CADS, and her team of research assistants applied predictive modelling in exploring which patient characteristics and clinical variables significantly influence patients' discharge planning, with the goal of guiding healthcare providers in efforts of planning effective, equitable discharge recommendations. In another project, her team investigated the ability to predict cognitive impairment of elderly population by examining individuals' levels of social interaction and performed regression analysis to identify the significant factors.

During FY2021, CADS supported 10 undergraduate and graduate student research assistants in various projects and generated 4 peer reviewed publications, 2 Master's in Computer Science thesis dissertations, 11 oral presentations and 7 poster presentations made by the students.

Sustainability Plan

There are three key elements of CADS sustainability plan: Partnerships, External Funding, and Organizational Capacity. The center plans to leverage Advisory Board members and other community engagements to invite academia, industry, non-profit, and academic agency to form on-going partnerships which will be crucial to sustain center operations such as interdisciplinary research, curriculum improvement, student internships and career placement. The center plans to sustain its future activities by acquiring external funding. Each fellow will be required to develop a proposal for external submission to agencies such as NIH, NSF, DoD etc. During the 36months period of UNC funding, the center will prepare itself for developing competitive funding proposals for future submissions by surveying the literature, conducting pilot studies through center, developing initial reporting, and communicating with Federal Agency POs regarding potential funding opportunities. Certain recurring organizational supports will also be critical for center success and sustainability.

Translating into Societal Impact

While CADS' work is occurring in academic settings, the practical outcomes will have a lasting and far-reaching impact on the local community in at least two major ways. We expect that our various educational efforts and the research student mentorship efforts will expose women, minority, and underrepresented students to data science content and skills that may influence their choice about further education and future careers and therefore increases the size and diversity of the future STEM workforce while changing lives and communities for better. In fact, we plan to begin raising awareness of data science careers long before students even enroll at the university. The Center will contribute to K-12 outreach activities, including camps at local middle and high schools, to engage students and teachers in the possibilities of data science and how the field can be integrated into K-12 learning. A second critical contribution the local community can expect from the Center: close partnership. We are eager to team with local businesses that might benefit from data science as they pursue investment and commercialization of their products. We also invite academia, industry, nonprofit, and government agency participation in our annual symposium and monthly seminars to increase awareness of data science. The Center gives us all a chance to do something very special together – prepare our young people for a bright future, improve lives through work that also bolsters the economy, and advance the cause of racial justice and equity throughout the Triad and North Carolina.