

HDR² From Harnessing the Data Revolution to Harvesting the Data Revolution

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HDR DSC: Data Science for Social Good in Urban Areas

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The goal of this project is to develop a team-based data science corps program for undergraduate students from Computer Science, Information Systems, and Business integrating both academic training as well as hands-on experience through real-world data science projects. This project is a collaborative effort with the University of Maryland Baltimore County as the coordinating as well as an implementing organization, and the University of Baltimore, Towson University, and Bowie State University as implementing organizations. This project focuses on the city of Baltimore as an exemplar for other cities in the US and across the globe. The project team is collaborating with a number of communities in the city of Baltimore to integrate real-world data science projects into classroom instruction in data science. The specific objectives of this project are as follows: (i) Develop the technical, analytical, modeling, and critical thinking skills that are key to success as a data science professional; (ii) Connect a cohort of students to communities, organizations, and projects that can benefit from the power of data science; (iii) Nurture and support innovative thinking in solving some of the key challenges facing the real world; (iv) Promote a better understanding of the power and pitfalls of data-driven discoveries to improve the quality of life in urban communities; (v) Increase the data science workforce capacity to support this critical area that is of growing importance in society; and finally, (vi) Evaluate the effect of the proposed data science corps on student learning.

The project team is creating a core set of knowledge for developing solutions for real-world urban settings. The core set of knowledge includes data collection and cleaning, data analysis using machine learning and deep learning techniques, data visualization including geospatial data and virtual reality, data privacy and security, and infrastructure for smart cities including IoT-based sensor networks. The data science corps program will have three main phases: instructional phase, academic research, and real-world team projects, spanning one calendar year. Examples of team projects include: (i) developing community-based indicators that are compiled from open data portals and parametric and non-parametric statistical techniques to understand the relationship between urban sustainability and a range of factors including cleanliness and environment, crime and safety, business and economics, social and political, housing, health, and education; (ii) combining AI models in edge devices with autonomous systems for crime detection and prevention, accident prediction in road networks, and emergency response; (iii) combining sensor data and social media for automated information extraction, validation, and quality checks that can be beneficial to both citizens and emergency managers in crisis situations such as flash floods; and (iv) developing augmented reality-based systems that leverage systems such as Microsoft HoloLens and mobile devices for building evacuation.

Each year, around 25 undergraduate students participate in the data science corps program, many of whom subsequently work in internships and/or full-time data science positions. The data science corps students are conducting research on AI on the edge combined with autonomous systems including unmanned ground and aerial vehicles for monitoring and real-time intervention in smart cities.

The outreach programs include presenting research papers in various peer-reviewed conferences and publishing in peer-reviewed journals. The project team is also engaged with community partners through the Baltimore Neighborhood Indicator Alliance (<https://bniajfi.org/>). We are also discussing possible collaborations with the Maryland Department of Transportation and the Department of Homeland Security, Prince Georges County Fire Department, and FEMA.

Research

<https://datasciencecorps.umbc.edu/publications-resources>

Education and Outreach

<https://datasciencecorps.umbc.edu/training-modules>

Data & Cyberinfrastructure

<https://datasciencecorps.umbc.edu/baltimore-data-week>

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