Integrated Media Systems Center

Blending the Real and Virtual Worlds
A Geo-Informatics approach to awareness

IMSC is an informatics research center that focuses in data-driven solutions for real-world applications. We are motivated by the need to address fundamental Data Science problems related to applications with major societal impact. Towards this end, we target four application domains: Transportation, Social Media, Security and Health, for each of which we are developing a large scale System Integration Prototype. Each prototype is designed to address real world problems and to conduct fundamental and applied multidisciplinary research in the area of BigData.

Our work is supported by city, state and federal government competitive research grants and by the support and sponsorship of our industry partners such as Google, Microsoft, Intel, Oracle, Chevron and Northrop Grumman. Over the years IMSC has had a vibrant technology transfer program leading to more than ten successful startups and filing more than one hundred invention disclosures. These activities and our research focus make IMSC a recognized figure in its domain and one of the world's leading authorities in the emerging field of Geo-Informatics.

Founded in 1996 by C. L. Max Nikias - now USC’s President - IMSC is hosted by the USC Viterbi School of Engineering and benefits from the support of the School’s Faculty and Staff. IMSC has been an energetic force in the expansion of the USC Viterbi School of Engineering, serving as the catalyst for new curricular programs and continuously expands education and research efforts with international programs and collaborations.

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Research
As is evident from our most recent published work, IMSC’s research covers a wide range of fields including human behavior data analytics (ACM SIGMOD ’13), sensor data analytics (IEEE ICDM ’13), video data analytics (CVPR ’13), crowdsourced data acquisition (ACM GIS ’13) and social media indexing (ACM Multimedia ‘12).

Education & Outreach
IMSC’s diverse education and outreach activities include short-term certificate courses, distance education, international lectures/workshops and student internships. For example, Prof. Shahabi was selected by the Vietnam Education Foundation to teach in Vietnam for two consecutive years.
At IMSC we use Google Glass® as an enabler for monitoring and data acquisition at scale. For example, with geo-crowdsourcing, a term we have coined, we assume our workers (i.e., crowd) are equipped with Google Glass and are tasked to physically travel to various locations to acquire the needed data.

**Big Data in Transportation** Time and energy are the most important commodities of the 21st century and traffic congestion wastes both. TranDec, a system that acquires, aggregates and archives big traffic sensor data from the greater Los Angeles roads, enables real-time and historical analysis of transportation systems for decision making. TransDec can predict traffic bottlenecks and use this information in navigation systems to calculate optimal routes based on existing and future traffic conditions. This project has been supported by NSF, Microsoft, Intel, HP Labs, LA Metro and Oracle.

**Big Data in Security** The growing volume of data in urban areas can expand our ability to understand and react to threats - however this data is too large for humans to analyze and comprehend. Janus, a system that supports integrated storage and query capabilities on multi-source multi-modal data with big video analytics enables forensic and real-time surveillance of criminal activities. Janus informs law enforcement personnel to better respond to criminal situations. This project has been supported by NIJ, DPS, CREATE, and Northrop Grumman.

**Big Data in Social Media** With the proliferation of mobile devices and wearable sensors, people can effectively act as moving sensors - however scalable solutions to acquire and manage the acquired data are needed. MediaQ, an end-to-end platform that uses smartphone sensors to extract and index rich metadata, enables people to collect and share mobile media content (e.g., videos, pictures). MediaQ empowers a wide range of applications including disaster management, tourism and citizen journalism. This project has been supported by Google, NSF, Northrop Grumman, and Chevron.

**Big Data in Health** Expanding sensing capabilities promise to better understand and cure deceases if physiological, genetic, social, and environmental data are understood in context. PoCM², a complete remote mobility monitoring system uses Microsoft Kinect® for rehabilitation and optimization of pharmacologic interventions for Parkinson’s Disease. This project has been supported by the NIH funded Southern California Clinical and Translational Science Institute (SC-CTSI) and the Alfred E. Mann Institute (AMI).