Interdisciplinary fellow to study spatial big data for ‘eco-routing’

Meeting our transportation needs calls for thinking not just outside the box, but across academic disciplines, too. Viswanath Gunturi, a Ph.D. candidate in the Department of Computer Science and Engineering, will do just that as an Interdisciplinary Doctoral Fellow for the academic year 2013-2014.

The award comes from the U of M Graduate School on behalf of the Provost’s Interdisciplinary Team. Support was available for approximately 25 percent of the applicants to this University-wide competition.

The fellowship awards outstanding Graduate School students who have interdisciplinary dissertation topics and who would benefit from interaction with faculty at one of the University’s interdisciplinary research centers or institutes. CTS will be the host center for Gunturi and will facilitate collaboration with CTS Scholars.

“My research interest is broadly in the area of routing and navigational systems,” Gunturi says. Success stories of some of these systems include Google maps and consumer Global Positioning System (GPS) devices.

Traditionally, GPS and web-based navigational systems used spatial computing technologies that in turn harnessed spatial datasets (such as digital road maps) to suggest routes. “With the advancement in sensor technology, however, spatial datasets collected by satellites, sensors, and so on now exceed the capacity of commonly used spatial computing technologies,” Gunturi says. Such datasets, known as spatial big data (SBD), include traffic-signal data and temporally detailed roadmaps that provide travel speeds for every minute for every road segment as well as engine measurements of fuel consumption, greenhouse gas (GHG) emissions, and other data.

Using SBD has transformative potential. For example, Gunturi says, “a 2011 report from the McKinsey Global Institute estimates savings of about $600 billion annually by 2020 by recommending ‘eco-routes’ that minimize fuel consumption and GHG emissions.” Preliminary evidence for the transformative potential includes the experience of UPS, which saves millions of gallons of fuel by simply avoiding left turns and associated idling when selecting routes.

During his fellowship, Gunturi will collaborate with civil engineers and transportation scientists. His advisor, Professor Shashi Shekhar, has contributed significantly toward advancing spatial databases to address unique computational and data management challenges in the context of transportation. Gunturi’s faculty mentor for the fellowship, civil engineering associate professor Henry Liu, is an expert in traffic light coordination on arterial highways and developer of the SMART Signal system.

Specifically, Gunturi will work with Liu to study traffic management systems and model traffic-signal timing information for routing techniques. “This research could help in suggesting routes that are more eco-friendly by minimizing idling at left turns,” Gunturi says.

Eco-routes minimize idling at left turns.

Eco-routes that minimize fuel consumption could save $600 billion annually by 2020.

Source: McKinsey Global Institute

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New Complete Streets materials highlight best practices, assist practitioners

Complete Streets—roads that are designed and operated to enable safe access for all users—offer many benefits, including improved safety, mobility, accessibility, public health, and quality of life. However, much of the work surrounding Complete Streets to date has focused on creating policies and guidelines rather than investigating the processes and action steps needed to successfully implement projects.

In an effort to fill this knowledge gap, researchers from the Humphrey School of Public Affairs have conducted a study on the planning and implementation of successful Complete Streets.

Spurring private-sector development along transit corridors

Transit-oriented development (TOD) is in demand in the Twin Cities metropolitan region, but regulatory and cost barriers combined with the uncertainty of transit expansion inhibit the market from responding to this demand, according to new U of M research.

The study was conducted for the Metropolitan Council as part of the Corridors of Opportunity Initiative, a broad-based plan to accelerate the build-out of a Twin Cities regional transit system so that people of all incomes and backgrounds share in the resulting opportunities. Assistant Professor Yingling Fan and Research Fellow Andrew Guthrie, both with the Humphrey School of
New Complete Streets materials focus on implementation and best practices.