

Researcher of the Month

Awarded by Research Services for November 2011

The exponential increase of biomedical information can be overwhelming for researchers and patients alike. However, to Dr. Suresh K. Bhavnani this explosion presents an exciting opportunity to use his interdisciplinary background in computer science, human-computer interaction, and graphic design to unlock mysteries in biomedical data. Dr. Bhavnani is associate professor of Biomedical Informatics in the Institute for Translational Sciences at UTMB, holds a secondary appointment in the Department of Preventive Medicine and Community Health, and is an adjunct associate professor in the School of Biomedical Informatics at UT Houston. He obtained a PhD in Computational Design and Human-Computer Interaction from Carnegie Mellon University, and specializes in network visualization and analysis of biomedical data, with translation to the design of decision-support systems. His journey of attempting to unlock biomedical mysteries has resulted in nine university, state, and international awards to him and his research teams, including three distinguished paper awards from the American Medical Informatics Association, the Rising STAR award from the UT system, and the current researcher of the month award for his contribution to the article [How Cytokines Co-occur across Asthma Patients: From Bipartite Network Analysis to a Molecular-Based Classification](#) to appear in the *Journal of Biomedical Informatics*.

Would you please provide a summary of this research?

Dr. Bhavnani: Asthma patients are currently classified as severe or not-severe based on their response to prescription drugs. Unfortunately, there is general consensus that this classification is not helpful in predicting the course of the disease. Our team therefore explored whether expression values of cytokines (molecules involved in intercellular communication) could help to classify patients. Given the complex association between molecular and phenotype (e.g., lung function) information, we used a type of visual analytics called a bipartite network analysis to layer the different variables in a single intuitive visualization. This integrated visualization enabled the molecular biologists and the physicians to rapidly identify possible biological pathways activated in different groups of patients, which could enable future targeted diagnoses and treatments.

What led you to pursue this research?

Dr. Bhavnani: The use of visual analytics in the biomedical domain tightly integrates my passion for science and art to make a difference in the lives of patients. Complex diseases like asthma are causing preventable suffering and death worldwide, so I am hoping that visual analytics can help to make a dent in alleviating such diseases. Please visit the [DIVA Lab](#) website for similar analyses on other diseases.

How is this research unique?

Dr. Bhavnani: To the best of our knowledge, this is the first attempt of using bipartite visual analytics to help comprehend complex associations between molecular and phenotype information in asthma.

What are the scientific and medical implications of your findings?

Dr. Bhavnani: From a methodological perspective, we are developing and using a combination of visual analytical methods that are general, and therefore could be used to analyze other diseases. This should lead to a general framework on how to combine multiple visual analytical representations to make sense of complex diseases. Medically, the results suggest that asthma is not a stage-based disease (as implied by the current classification), but rather a state-based disease where environmental and other triggers could lead asthmatics into different states predicted by the cytokine expressions.

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'Researcher of the Month' is featured in the first monthly issue of the UTMB Research Yellow Sheet. Research Services selects a new researcher every month for this column to draw attention to the creative and insightful scientists working at UTMB. This, and previous profiles of Researchers of the Month, are posted on the Research Services [website](#).

