Computational Intelligence on Eye Disease

"The use of big data in research holds enormous potential for improving public health and healthcare delivery, generating new knowledge more quickly than traditional scientific approaches, and providing a holistic understanding of specific illnesses," says **Amna Al-Alawi, DM**, who recently completed her Doctor of Management degree from Jefferson's Strategic Leadership program. "Ultimately, I believe it can offer enhanced care so that practitioners can understand more accurately the patient's unique combination of genes, environmental risks and disease phenotype, which can help detect certain diseases at an earlier stage."

When Dr. Al-Alawi was contemplating her dissertation, she wanted a topic involving the application of computational intelligence and socio-demographics data to a medical domain. She sought advice from **Les Sztandera, PhD**, professor of computer information systems, whose own work focuses on the application of computational intelligence in business and health care. He arranged for Dr. Al-Alawi to speak with a colleague at LV Prasad Eye Institute (LVPEI) in Hyderabad, India—a longstanding research partner of the Jefferson India Center. That conversation provided the seed for Dr. Al-Alawi's doctoral thesis and for a related journal article—entitled *A Data-Driven Approach for Eye Disease Classification in Relation to Demographic and Weather Factors Using Computational Intelligence Software*—that received the "Best Paper Award" at the Eighth International Data Analytics Conference in Porto, Portugal.

Dr. Al-Alawi used a data-merging technique in her study to combine information from the Telangana (India) State Development Society with the electronic medical record (EMR) of approximately one million LVPEI ocular disease patients. It applied prescriptive and descriptive data analysis techniques to search for insights into high-risk climatic and

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socio-demographic factors that correlate to the development of cataracts in those patients. Among her findings: a high incidence of cataract in Telangana, especially among women, and the fact that cultural upbringing, climatic factors and proximity to the state-run thermal plant each appear to contribute to the development of cataracts.

"The study has proven valuable on at least two levels," Dr. Sztandera suggests. "It has provided a basis for developing new cataract-prevention measures for Telangana residents. And it's hinted at new opportunities for leveraging EMR data to advance ophthalmology diagnostic and treatment methods more generally." ∎