

Special Session Proposal

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Fuzzy Computing in Medical Applications

Session Proposer: **Uvais Qidwai**
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Motivation:

Fuzzy Computing refers to the science of reasoning, thinking and inference that recognizes and uses the real world phenomena of grouping, memberships, and classification of various quantities under study. As such, it is an extension of binary logic and is capable of dealing with complex systems because it does not require crisp definitions and distinctions for the system components. Amazingly, this is how our brain functions too, using Perception rather than Measurements.

The complexity of medical practice makes traditional quantitative approaches of analysis inappropriate. In medicine, the lack of information, and its imprecision, and, many times, contradictory nature are commonly occurring facts. Thus Fuzzy Computing can be a highly suitable and applicable basis for developing knowledge-based systems in medicine for tasks such as:

- Interpretation of sets of medical findings,
- Syndrome differentiation for diagnostics,
- Optimal selection of medical treatments,
- Predicting outcomes from known behaviors of certain medical procedures,
- Decision-making expert systems,
- Predicting the response to treatment,
- Analysis and early detection of diseases,
- Determination of optimum dosage of medicine or a procedure,
- Analysis and classification of medical images,
- Modeling for the mechanical control of drug delivery in surgical settings,
- Demographic and social studies related to certain behaviors and associated diseases, etc...

The purpose of this special session is to bring together experts from diverse backgrounds and expertise in various aspects of the Fuzzy Computing applications in the Medical/Clinical Informatics areas. There are several existing and emerging opportunities for research in this field. There are also several recent results in the Fuzzy Computing community that are directly applicable to Medical applications. The session will, therefore, address the following issues:

- a. Recent trends in Fuzzy Computing in Medical/Clinical applications.
- b. Advanced techniques that can be further enhanced for more useful applications.
- c. Development of hybrid techniques as a result of Panel-discussion.
- d. Building stronger links between various research group in the area.

Biography of the Session Organizer:

Uvais Qidwai (IEEE Member since 1996) received his Ph.D. from University of Massachusetts-Dartmouth in 2001 from the Electrical and Computer Engineering Department. He worked at the Electrical Engineering and Computer Science Department at Tulane University in New Orleans, USA as Assistant Professor, and in-charge of the Robotics lab from June 2001 till June 2005. He joined the Computer Science and Engineering Department at Qatar University in Fall-2005 as Assistant Professor. His present interests in research include Robotics, Intelligent Image Processing for Machine Vision applications, Fuzzy computations, Signal Processing and Interfacing, Signal Processing applied to Nondestructive testing applications in Oil & Gas industry, and intelligent algorithms for Medical Informatics. While in Qatar, He is actively collaborating with local Oil & Gas industry in research projects related to intelligent system design for industrial problems such as nondestructive testing and evaluation, robotic inspection systems, and enhancement in the existing instrumentation and control systems.

Dr. Qidwai was motivated to work in the Fuzzy Computing with applications to Medical field by the founder of Fuzzy computing, Professor Lotfi Zadeh himself! And has ever since worked with Neuro-surgeons, Nephrologists, Ophthalmologists, and Pharmacologists using Fuzzy computing for developing quantitative results for abstract as well as qualitative data sets using expert knowledge from the field. His work has resulted in several new algorithms and techniques (patent pending) to provide useful information to doctors, physicians, and technicians for improved medical practice in their respective disciplines.

He has also participated in several Government and Industry funded projects in USA, Saudi Arabia, Qatar and Pakistan. He has been the keynote speaker at several regional IEEE conferences and has worked in organizing committees of many International conferences. Dr. Qidwai is a regular reviewer for many IEEE Journals and related conferences and has published over 75 papers in reputable Journals and Conferences.

Tentative Participant Papers:

Paper # 1

Authors:

Uvais Qidwai ¹, and Shahzad Shamim².

Affiliations & Contact:

1. Computer Science & Engineering Department, Qatar University, Doha-Qatar.
2. Aga Khan University & Hospital, Pakistan.

Paper Title:

Reduced Dimensional Prediction System for Successful Craniopathy.

Paper # 2

Author:

Sara Al-Dahir

Affiliation & Contact:

Xavier University, Louisiana, USA.

Paper Title:

Fuzzy Prediction of Demographic links and behavior traits in connection with Diabetes.

Paper # 3

Authors:

Maamar Bettayeb, and Uvais Qidwai.

Affiliation & Contact:

Sharjah University, UAE.

Paper Title:

Fuzzy classification of Foetal monitoring system for mothers at risk.

Paper # 4

Authors:

Umair Qidwai, and Uvais Qidwai

Affiliation & Contact:

Isra University, Pakistan.

Paper Title:

Fuzzy classifier for identifying lesions in diabetic retinopathy related fundus images.

More papers awaited...

Panel Discussion:

At least half an hour will be dedicated to summarize findings from the session and expert opinions will be gathered to formulate future directions of research in the related fields.