CSC- 557/ CSC-499: Biomedical Informatics

Duration: June 3, 2004 – July 9, 2004 (Summer-2004; Session-1)
Days/Time: MTWRF – 1:00pm – 2:30pm
Venue: NH-243
Instructor: Dr. Sumeet Dua
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Synopsis:
Biomedical Informatics is the scientific field that deals with the storage, retrieval, sharing, and optimal use of biomedical information, data, and knowledge for problem solving and decision making. It touches on all basic and applied fields in biomedical science and is closely tied to modern computer science technologies, notably in the areas of data mining, image processing, signal processing and communication. This course will discuss the key computer science techniques that have been successfully applied in analyzing biomedical data in domains, including but not limited to, images, videos, signals (including time-series), databases and medical documents. The course will provide students with a hands-on experience of suitably tuning and practically applying computational techniques on real biomedical data.

Topics:

Following would be the main topics of discussion:

A. Biomedical Image processing and image analysis
  - Specifics of biomedical imaging and medical image analysis
  - Foundations of 2D image processing
  - Foundations of 3D and nD image processing
  - Medical image segmentation and registration
  - Introduction to digital image characterization in spatial and transformed domains
  - Classification of various biomedical image processing algorithms
  - Modern and Non-classical techniques of image analysis

B. Biomedical Signal Analysis
  - Introduction to Orthonormal Transformations: Fourier Transformation, Wavelet Transformations
  - Dimensionality reduction techniques (including statistical methods)
  - Similarity search in sequential databases
  - Clustering of Biomedical Signals

C. Content Based Signal and Image Retrieval

D. Data Mining Techniques
  - Unsupervised Clustering
  - Supervised Clustering
  - Association Rule Discovery
  - Computational Learning and Prediction

Eligibility/Background:

- No Programming background is expected for the course.
- The course is intended for both CS and non-CS majors.
- The course could be used as a graduate or undergraduate elective.
- The course could be substituted for a course in a graduate sequence in Computer Science (CS majors only). Please see the instructor for details.

Examinations/Other Activities:

- No exams would be held in the course.
- The grades will be based on Assignments (no programming background expected), Term paper and Class Presentation.
- A "field-trip" is planned to a key Health Sciences Center of Louisiana. More details will be available soon.
- There would be invited talks from distinguished (biomedical/health) researchers from atleast two speakers

Please feel free to e-mail Dr. Dua at sdua@latech.edu if you have any questions regarding this course or need anymore information.