The International Association for Pattern Recognition

Technical Committee 20

Pattern Recognition for Bioinformatics

Progress Report

July 2005 - June 2006

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1 TC-20 Aims and Scope

1.1 Background

With compared to the increasing emergence of life sciences data, pattern recognition techniques and tools have not evolved at a sufficient rate to tackle associated bioinformatics problems.
In view of this, during the last ICPR in Cambridge, November 2004, a proposal to form the TC-20, put forward by the present Chairs, Raj Acharya and Jagath C. Rajapakse was accepted by the IAPR Executive Committee.

1.2 Aim

The aim of TC-20 is to investigate the pattern recognition techniques that can effectively resolve specific bioinformatics problems and handle high throughput life sciences data.

Statistical, structural, and syntactic pattern recognition, neural networks, computational intelligence, graphical, data mining techniques, and their hybrids have found many applications in computational biology and bioinformatics. Such applications include:
- Sequence analyses: DNA, protein, structures, etc.
- Comparative genomics
- Gene expression analysis and functional genomics
- Phylogenic analysis of species, sequences, structures
- Structural genomics and proteomics
- Biological imaging: functional, molecular, and cellular imaging
- Data mining, text mining, data integration, and visualization
- Information fusion such as combining sequences, expressions, texts, and images, etc.
- Systems biology: pathway analysis, gene regulatory networks, etc.
- Disease modeling
- Medical informatics

1.3 Goal

The goal of TC-20 is to bring together pattern recognition scientists and life scientists to find solutions to problems in bioinformatics and to foster multidisciplinary research in the pattern recognition community.

One of the goals is to facilitate the pattern recognition and the life science communities to interact through its memberships and thereby to match-make pattern recognition techniques and bioinformatics applications. An example of the benefits of proliferation of pattern recognition techniques in bioinformatics applications could be the discovery of new drugs.

The committee has a membership list and maintains a website for the exchange and dissemination of ideas among its members. It will enhance its website having links to other websites of similar interests, the information on conferences and likely events, and useful data sources. The TC-20 will organize and support related workshops and seminars to bring its members and interested researchers together and disseminate information on latest research in the field.

3. TC-20 Structure and Organization

3.1 Chairs

Chair: Raj Acharya, The Pennsylvania State University, University Park, USA
Vice Chair: Jagath C. Rajapakse, Nanyang Technological University, Singapore

3.2 Membership

The membership of TC-20 is by invitation of the TC-20 Chairs. Presently, TC-20 has 25 members worldwide.

- Raj Acharya, The Pennsylvania State University, USA, (acharya@cse.psu.edu) (Chair)
- Francisco Azuaje, University of Ulster, Northern Ireland (fj.azuaje@ulster.ac.uk)
- Vladimir Brusic, University of Queensland, Australia (vladimir@i2r.a-star.edu.sg)
- Phoebe Chen, Deakin University, Australia, (phoebe.chen@deakin.edu.au)
- Dave W. Corne, Heriot Watt University, United Kingdom (dwcorne@macs.hw.ac.uk)
- Marchiori Elena, Vrije Universiteit Amsterdam, The Netherlands, (elena@cs.vu.nl)
- Mariofanna Milanova, University of Arkansas at Little Rock, USA, (mgmilanova@ualr.edu)
- Gary Fogel, Natural Selection, Inc., USA, (gfogel@natural-selection.com)
- Saman Halgamuge, University of Melbourne, Australia, (saman@unimelb.edu.au)
- Visakan Kadirkamanathan, The University of Scheffield, United Kingdom, (visakan@sheffield.ac.uk)
- Nik Kasabov, Auckland University of Technology, New Zealand, (nkasabov@aut.ac.nz)
- Irwin King, Chinese University of Hong Kong, Hong Kong, (king@cse.cuhk.edu.hk)
- Alexey V. Kochetov, Russian Academy of Sciences, Russia, (ak@bionet.nsc.ru)
- Graham Leedam, Nanyang Technological University, Singapore (asgleedam@ntu.edu.sg)
- Ajit Narayanan, University of Exeter, United Kingdom, (A.Narayanan@ex.ac.uk)
- Nikhil R. Pal, Indian Statistical Institute, India, (nikhil@isical.ac.in)
- Muthu Palaniswami, The University of Melbourne, Australia, (swami@ee.mu.oz.au)
- Jagath C. Rajapakse, Nanyang Technological University, Singapore (asjagath@ntu.edu.sg) (Vice Chair)
- Gwenn Volkert, Kent State University, USA, (volkert@cs.kent.edu)
- Roy E. Welsch, Massachusetts Institute of Technology, USA, (rwelsch@mit.edu)
- Kay C. Wiese, Simon Fraser University, Canada, (wiese@sfu.ca)
- Limsoon Wong, National University of Singapore, Singapore, (limsoon@nus.edu.sg)
- Jerry Wu, Welcome Trust Sanger Institute, United Kingdom (jerry.wu@sanger.ac.uk)
- Qiang Yang, Hong Kong University of Science and Technology, Hong Kong, (qyang@cs.ust.hk)
- Yanqing Zhang, Georgia State University, USA, (yzhang@cs.gsu.edu)

David Corne and Jerry Wu are new members.

3.4 Website

The IAPR website is currently has the following URL:
http://www.cse.psu.edu/~acharya/IAPR/iapr.htm

It is currently hosted by the Computer Science and Engineering, The Pennsylvania State University, University Park, USA and will soon have a IAPR specifc domian.

The website is still in the infancy state and will be enchanced with links to major information sources, data sources, software tools, literature, etc.

3.5 Mailing List

The current mailing list consists of the founding members and is being used to discuss future activities of TC-20. Once the membership is open to public, the email list will be used as a moderated discussion forum.

4. Events

TC-20 will support and organize events pertaining to bioinformatics and pattern recognition. As a regular event, TC-20 initiated the Workshop on Pattern Recognition in Bioinformatics (PRIB) to be held in conjunction with the biennial International Conference on Pattern Recognition (ICPR), the major event of IAPR, and as a standalone event in the alternate years.

PRIB 2006 will be held in Aug 20, 2006, Hong Kong, along with ICPR 2006. The organization of IAPR PRIB 2007 to hold in Singapore has already begun.

4.1 2006 Workshop on Pattern Recognition in Bioinformatics (PRIB 2006)

Hong Kong Conference and Exhibition Centre
Hong Kong
August 20, 2006

http://www.ntu.edu.sg/sce/prib06/

PRIB 2006 was jointly organized by the Nanyang Technological University, Singapore, and the Pennsylvania State University, USA.

Workshop Chair:
        Raj Acharya, Pennsylvania State University, USA
Program Co-Chairs:
        Jagath C. Rajapakse, Nanyang Technological University, Singapore
        Limsoon Wong, Institute of Infocomm Research, Singapore
Secretary:
        Norhana Ahmad, Nanyang Technological University, Singapore
Publicity Chairs:
        Phoebe Chen, Deakin University, Australia
        Elena Marchiori, Vrije University of Amsterdam, Netherland
        Mariofanna Milanova, University of Arkansas at Little Rock, USA
Publication Chair:
        Ho Sy Loi, Nanyang Technological University, Singapore

Local Organization Chair:
        Irwin King, Chinese University of Hong Kong, Hong Kong
System Administrator:
        Linda Ang, Nanyang Technological University, Singapore

The Program Committee consisted of 50 experts in the field. PRIB 2006 received 43 submission and 18 papers were selected for oral presentation. The proceedings will be published as an edited volume of Springer *Lecture Notes in Bioinformatics* series.

The PRIB 2006 program begins with a Tutorial on Pattern Recognition in Bioinformatics and ends with a TC-20/ PRIB 2007 meeting.

4.2 2007 IAPR Workshop on Pattern Recognition in Bioinformatics (PRIB 2007)

Oct 1 – 2, 2007
Venue TBD
Singapore

The organizing committee for PRIB 2007 has been formed. It will be held as a two-day standalone event and organized by the School of Computer Engineering, Nanyang Technological University, Singapore.

General Chair:
        Jagath C. Rajapakse, Nanyang Technological University, Singapore
General Co-Chair:
        Raj Acharya, Pennsylvania State University, USA
Program Chairs:
        Bertil Schmidt, Nanyang Technological University, Singapore
        Gwenn Volkert, Kent State University, USA
Secretary:
        Norhana Ahmad, Nanyang Technological University, Singapore
Special Session Chairs:
        Shandar Ahmad, Jamia Millia Islamia University, India
        Madhu Chetty, Monash University, Australia
        Elena Marchiori, Vrije University of Amsterdam, Netherland
Publicity Chairs
        Saman K. Halgamuge, University of Melbourne, Australia
        Roberto Tagliaferri, Universita Di Salerno, Italy
        Yanqing Zhang, Georgia State University, USA
Publication Chair:
        Ho Sy Loi, Nanyang Technological University, Singapore
Local Organization Chair:
        TBD
System Administrator:
        Linda Ang, Nanyang Technological University, Singapore

Program Committee (TBD)
Local Organizing Committee (TBD)

5. Member Activities

5.1 Conferences

Several TC-20 members are actively engaged as Chairs of upcoming related conferences:

- Limsoon Wong served as a Program Co-Chair of *2005 International Joint Conference of InCoB, AASBi, and KSBI (BIOINFO2005)* to be held in Busan, Korea, from September 22 – 24.
- Gary Fogel served as the General Chair and Gwenn Volkert serves as a Technical Co-Chair at *2005 IEEE Symposium on Bioinformatics and Computational Biology (CIBCB'05)* to be held in San Diego, CA, from November 14 – 15, 2005;
- Mariofanna Milanova served as a General Chair of *2005 International Conference on Machine Learning and Applications (ICMLA'05)* to be held in Los Angeles, CA, from December 15 – 17, 2005.
- Phoebe Chen and Limsoon Wong served as General Co-Chairs of *the Fourth Asia-Pacific Bioinformatics Conference (APBC2006),* to be held in Taipei, Taiwan, from February 13 – 16, 2006.
- Marchiori Elena served as a Technical Co-Chair of the *Fourth European Workshop on Evolutionary Computation and Machine Learning in Bioinformatics (EvoBIO2006)* to be held in Budapest, Hungary, from April 10-12, 2006;

Please send me your updates

5.2 Editorial activities

Several TC-20 members serve as either Editors or Associate Editors of related journals:

- Nikhil Pal is the Editor-in-Chief of *IEEE Transactions on Fuzzy Systems*
- Limsoon Wong is a Managing Editor of *Journal of Bioinformatics and Computational Biology*
- Raj Acharya, Gary Fogel, David Corne, and Jagath C. Rajapakse serve as Associate Editors of *IEEE Transactions on Bioinformatics and Computational Biology*.

6. Future Plan

The main objectives for the next year are:

- Hold the first TC-20 meeting on Aug 20, 2006, after PRIB 2006, from 5.30-6.00pm to discuss TC-20 activities and PRIB 2007 organization
- Increase the current membership and active participation of the members with the formation of the sub-committees:
    - Publicity and Publication Sub-committee (PPS): members work together for improving and keeping the website up-to-date, maintaining the emailing list and discussion forum, and preparing biennial interim report and quarterly newsletter
    - Methods and Applications Sub-committee (MAS): members work together to build a database of various applications in bioinformatics, various techniques in pattern recognition, and how the pattern recognition techniques and applications are met through links to and survey of the recent literature
    - Events and Contests Sub-committee (ECS): members find the opportunities to support and organize events and contests to increase the awareness of pattern recognition applications in bioinformatics

    Due to the poor responses by TC-20 members to the previous call, the committees were not formed. The chairs would discuss this at the upcoming TC-20 meeting and thereafter with the members to the ways how members could be encouraged to actively participate in future TC-20 activities.
- Improve TC-20 webpage, mainly focusing on: the useful links to major bioinformatics data, information sources, tools, and major events in the field, and the development of a section linking pattern recognition methods and bioinformatics applications
- Collect benchmark datasets and performance evaluation algorithms to test pattern recognition applications in bioinformatics, and create a database