PACI REU Proposal Application

Project Title: Statistical analysis of shapes of dendrites from the Cell Centered Database
Relevant URL: http://www.cis.jhu.edu/~tilak/reu.html
No. of students: TWO

Description: Hearing impairment has an incidence of one in ten people in the United States and other advanced developed countries. With notable exceptions such as Dr. Cerf who is acknowledged as the "Father of the Internet", the visibility of hearing impaired scientists in the academic and corporate research community is poor. In addition, it is important that women and African-Americans are also represented in the scientific community.

In the past five years, the Center for Imaging Science (CIS) at Johns Hopkins University (JHU) has had a few undergraduates from under-represented communities specifically those with hearing impairments (see http://www.cis.jhu.edu/~tilak/reu.html#paci). CIS proposes to continue having two undergraduates participate in a project that utilizes computational infrastructure developed at UCSD under the auspices of BIRN.

More specifically, the two students will work with Dr Ratnanather of CIS and Dr Maryann Martone of NCMIR at UCSD on the statistical analysis of dendrite spines using software procedures tested in previous PACI projects. The students will collect spines from the CCDB database at NCMIR, convert the data into a format suitable for metric mapping via the Large Deformation Diffeomorphic Metric Mapping (LDDMM), generate the metric distances via a portal on the Teragrid, and finally work with Dr Ceyhan at CIS to implement statistical analysis algorithms for shape classification. This final step is expected to complete the genesis of work evolved over the past five years under PACI and finally expected to result in posters and papers in FY05.

Team Members, Affiliations: Members at CIS are Dr.-Michael I. Miller (Director, CIS), Dr. J. Tilak Ratnanather (Research Assistant Professor, CIS), Dr Elvan Ceyhan (Postdoctoral Fellow, CIS). Also Timothy Brown (Research Programmer, CIS) and Anthony Kolasny (Systems Administrator, CIS) will help with software/hardware problems in the project. Members at NCMIR: Maryann Martone (Associate Adj. Professor) and Mark Ellisman (Director, NCMIR).

Plan to Support W/M, Persons w/disabilities: By virtue of being just one of a handful of prelingually profoundly hearing impaired people to have obtained a PhD in mathematics Dr. Ratnanather will be the lead person in this
Despite the paucity of hearing impaired students in regular college, the past few years have seen hearing impaired undergraduates admitted to Johns Hopkins University. In addition, the highly competitive Biomedical Engineering undergraduate program at JHU has a significant representation of students from the under-represented communities. Two students have already been identified as possible interns for the project in FY05. Both are hearing impaired and worked as REU interns in FY04.

Stephen Tang is currently a sophomore major in Biomedical Engineering. He has a severe-to-profound hearing impairment. Eric Cochran is currently a sophomore pre-med major in Economics. He has a rare unilateral and partial hearing impairment. Stephen and Eric are already experienced with the pipeline of tools tested in previous years and will concentrate on the statistical aspect of shape classification in FY05.

Two emails of support from project members: From maryann@ncmir.ucsd.edu Wed Nov 10 09:21:52 2004
Date: Tue, 09 Nov 2004 17:17:45 -0800
From: Maryann Martone <maryann@ncmir.ucsd.edu>
To: Tilak Ratnanather <tilak@cis.jhu.edu>
Subject: Re: Letter of support for PACI 2005

Dear Tilak:

I am happy to write in support of your application for student funding through the PACI program for the summer of '05. I haven't seen anyone who provides better training and mentoring to students than you, particularly those with disabilities. The work they have produced on our projects on spine morphology has been outstanding. I look forward to further maturation of the techniques and the scientific results that are beginning to emerge. I will continue to provide our spiny dendrite data and work to implement some of the required changes on our end, e.g., better surfacing algorithms. I think we will achieve great things this year!

Good luck on your application,

Best regards,

Maryann
Dear Tilak

I am pleased to support your application for REU funding for two undergraduate students in the shape analysis of dendrite spines from the Cell Centered Database at UCSD via BIRN. Last summer was a fantastic opportunity for CIS to test and evaluate the pipeline that was developed in previous years and has impacted on our other projects within BIRN. Moreover, the hearing-impaired students would benefit from the proposed statistical end-stage of the pipeline exposing them to new ideas in computational biology and advanced computational infrastructure such as the TeraGrid.

In my role as the computer manager for CIS and the point man for CIS in meetings with BIRN, I look forward to providing current and new computing resources to achieve the goals of the project.

Sincerely

Anthony

Anthony Kolasny
Computing Manager
Center for Imaging Science
Plan to integrate students: The two students will be involved with other undergraduate interns, graduate students and postdoc fellows at CIS. They will be expected to give a seminar on a topic relating to their project as part of seminars for the summer interns. In FY05, they will be given a little more independence and latitude for creativity. In addition, Dominic Pisano (who worked in previous years) will assist Dr Ratnanather in mentoring the students; another ex-PACI intern Lisa Fong is expected to return to CIS as a full time staff and will also assist in supervising the students.