



Pakistan Institute of Engineering and Applied Sciences

Nilore, Islamabad, 45650 Pakistan

THESIS PROJECT PROPOSAL PROFORMA

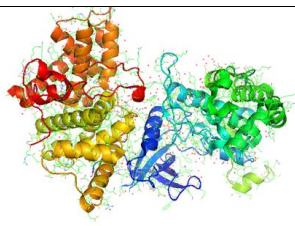
Project Title	Large Margin Prediction of Host-Pathogen Protein Interactions
Nature	Computational
Prerequisites	<p>Knowledge of the following will be helpful:</p> <ul style="list-style-type: none"> Machine Learning / Computational Intelligence / Pattern Classification / Data mining Python Programming Bioinformatics <p>Interested students will be required to take Machine Learning and Bioinformatics courses if they have not already done so.</p>
Field	Scientific Computing and Computational Intelligence
Expected Cost (if any)	
Work Place*	PIEAS

*define %age of work to be done in PIEAS or at some other place

Supervisor Information

Name of supervisor and designation	Dr. Fayyaz ul Amir Afsar Minhas, Senior Scientist
Department\Division and Organization	Department of Computer Science, PIEAS
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Project Details

Synopsis	<p>Motivation: Infections result from the interaction between proteins from host and pathogen. For example, the interaction shown on the right between the Tat protein from HIV with the human P-TEFb protein is involved in AIDS. Identifying these protein-protein interactions is the first step in the development of medicinal drugs to counter infectious diseases which are responsible for 17% of all deaths in the world. For more details visit: http://faculty.pieas.edu.pk/fayyaz/hpi/index.html</p> <p>Objectives: The objective of this project is to develop machine learning models for predicting host-pathogen protein interactions. The model will be give protein sequences of two proteins, one from the host and the other from a pathogen, as input. The model's output is a score reflecting the tendency of the proteins to interact with each other. Such a computational model can pave the way for future biology discovery through wet-lab experimentation.</p> <p>Skills Resulting from the project: Big data analysis, machine learning, Bioinformatics, Python Programming, Text analysis and Interactomics, Multidisciplinary Research methodologies and publishing.</p> 
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Goals of the Project

<p>4th Semester</p> <p>(3 credit hour per week are available)</p>	<p>I. Development of understanding of proteins and their interactions II. Learning to handle protein data on the computer III. Study of properties of proteins useful in prediction of interactions IV. Understanding the challenges developing a machine learning predictor for host-pathogen interactions V. Hands-on understanding of machine learning techniques VI. Developing a baseline predictor</p>
<p>5th Semester</p> <p>(12 credit hour per week are available)</p>	<p>I. Analysis of features and classification schemes for Host-pathogen protein interaction prediction. II. Benchmarking the predictor III. Development of a webserver for the prediction</p>

Instructions

- All the columns of project proposal forms are mandatory to be filled.
- The minimum qualification for a supervisor is eighteen years of education plus two years service.
- The minimum requirement for a co-supervisor is eighteen years of education.
- In case of external supervisor (outside DCIS), a co-supervisor will be mandatory from faculty.
- Wherever the project work is carried out (including classified establishments), the defense (only examiners and supervisor) and final presentation (open to all) will be held at PIEAS. The presence of supervisor is necessary for all presentations of fourth and fifth semesters.
- DCIS has right to reject or accept any project.



Signature of Supervisor

Signature Head of the Department
(With name and designation)