Report on the Research Visit to Federal University of Uberlandia

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I recently conducted a research visit to the Federal University of Uberlandia (UFU) related to the project "Multidimensional Assessment of Motor and Non-Motor Signs of Parkinson's Disease", with the support of the agency CAPES-PRINT-UFU. As part of this visit, I carried out various activities to strengthen and expand upon the existing collaboration between my research group and researchers at UFU. As an example of our earlier collaboration, I (along with some of my graduate students) collaborated on projects that used several different machine learning algorithms to analyze time-series data related to the gait of individuals with and without Parkinson's disease (PD), with this resulting in three published research papers. During the research visit, we greatly reinforced these research ties. This was particularly focused on discussions of data analysis of the many different types of data related to PD that are being gathered by UFU researchers, however I also participated in a number of other activities.

Firstly, I participated in extensive discussions with Prof. Adriano de Oliveira Andrade and his graduate students and postdoctoral researchers concerning their data sets of various types: for example, these relate to movement of upper limbs, lower limbs, hand movement, serious games, and brain activity. Most significantly, an upcoming project (Parkinson Brasil) will track nearly 1000 participants using many combined different types of data. This is particularly notable because of the large number of participants for which all of the different types of data will be available, as this simply does not occur in other data sets available worldwide. Since my expertise is in algorithmic analysis of data, having such data available will allow for my research group to perform significantly more detailed and meaningful analysis of the data, and to have a very strong level of confidence in the results and inferences. I also participated in discussions concerning a research proposal to combine all of the above data into an integrated database, in particular discussing details of the organization and the need to explore links between the different data sets.

I also visited several researchers in other labs at UFU, including relating to virtual reality (Prof. Edgard Lamounier) and to medical imaging (Prof. Lucio Neves). The visit to the virtual reality lab was of particular interest to me because I was able to directly participate in some virtual reality activities, which was a new experience for me. The researchers and I also discussed how virtual reality was used to help train surgeons for particularly difficult surgery (which, coincidentally, had earlier been performed on one of my family members). The visit to the medical imaging lab was also very interesting as we initiated discussions concerning analysis of the images, which I hope will result in future discussions.

Many of the members of Prof. Adriano's research group made presentations to me concerning their recent and upcoming research. I greatly enjoyed these presentations and the ensuing discussions, and I want to commend the students for their knowledge and their presentation skills, particularly because these were done in English. I myself gave a research seminar to an audience of these same researchers, among with many others, on "Generation and Analysis of Complex Networks".

Finally, I would like to express my very sincere gratitude for the opportunity to visit UFU and participate in these discussions. I feel that the experience has greatly strengthened our research ties. Upon my return home, I have investigated funding opportunities for students to visit my own university in Canada, and I will push forward with expanding our ties in this way.

S. Houghten

INTERNATIONAL RESEARCH SEMINAR

Sheridan Houghten

Brock University, Canada

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Friday, 23 August 2024 - 9am
Seminar Hall 1E
Faculty of Electrical Engineering

Sheridan Houghten is a professor in the Department of Computer Science at Brock University, where she has also previously served terms as chair and as graduate program director. Her research interests include combinatorial optimization, computational intelligence, and algorithms. Her research is directed at various application areas including bioinformatics and graphs, with her research group developing computational techniques, algorithms, and tools for the modelling and analysis of biological and biomedical data, especially in the form of graphs or networks. She is also a very active senior member within the IEEE Computational Intelligence Society (CIS), within which she has filled many roles.

Presentation title: Computational Intelligence for the generation and analysis of biological networks

Biological networks such as those that record interactions between genes or proteins are considered complex networks. These are large graphs that have non-trivial topological features, making them hard to analyze. However, they still have inherent properties such as the existence of communities of highly-connected nodes. This talk will present computational intelligence approaches that have been used to generate and analyze complex networks.