



<b>TOPIC</b>	<b>Identifying time-delayed gene regulatory network</b>
<b>ORGANIZERS</b>	Student Leadership Council and Faculty of ACIT Institute and TECHLAV Center
<b>AREA</b>	Identifying time-delayed gene regulatory network
<b>SPEAKER</b>	Mina Moradi
<b>DATE</b>	Friday Feb 17, 2017
<b>TIME</b>	3:00 – 4:00 P.M. (EST)
<b>VENUE</b>	Fort IRC 410, North Carolina A&T State University, UTSA and SIPI will be joining through video-conferencing
<b>FEES</b>	No Charge

## SYNOPSIS

The modeling of gene interactions within a cell is crucial for a basic understanding of physiology and for applied areas such as drug design. There is a rich variety of genetic interactions in gene regulatory networks (GRNs) that include time delays of transcriptional and translational processes, repressors, small metabolites, DNA, microRNA species on microarray experiments, and the effects of transcription factors and dynamics that are not measurable or inferred from direct experimentation. The effects of regulatory interactions can occur for a regulated gene almost simultaneously, after a finite time delay, or as a combined outcome of both cases.

In my talk, I will present my current work for identifying time-delayed gene interactions using time-course data. The proposed method is a hierarchical recurrent neural network (HRNN) with flexible topology where a customized genetic algorithm (GA) optimizes hierarchical connectivity of regulatory genes and a target gene. The proposed design provides a non-fully connected network with the flexibility of using recurrent connections inside the network. These features and the non-linearity of the HRNN facilitate the process of identifying temporal patterns of a GRN.

Also, I will present the result of GRN reconstruction of simulated data generated from linear and nonlinear time-delayed gene to gene interaction models across a range of network sizes and variances of noise. Finally, I will demonstrate the capability of the method in reconstructing GRNs of the *Saccharomyces cerevisiae* synthetic network for in vivo benchmarking of reverse-engineering and modeling approaches.

## ABOUT THE SPEAKER



Mina Moradi is a PhD student at North Carolina A&T State University. She is currently a graduate research assistant at the ACIT Institute, working on machine learning, real-life time series analysis and prediction. She received her Bachelor and Master degrees in Electrical Engineering from Imam Khomeini International University, and Isfahan University of Technology, Iran in 2008 and 2011 respectively.