ELECTRICAL & COMPUTER ENGINEERING BIO-SEMINAR Spring 2018

When: **Friday 13:50 – 14:50**
Where: **ETB 1035**

Speaker: **Alireza Karbalayghareh**

Graduate student
Department of Electrical & Computer Engineering
Texas A&M University

Title: **Optimal Bayesian Transfer Learning**

Date: **3-2-2018**

Abstract: The fundamental assumption behind all the learning methods is that the training and test data belong to the same domain with an identical distribution. The question that comes to mind is that what we should do if we do not have enough labeled data in the domain of interest (target domain) to train the model well but we have plenty of labeled data in another related domain (source domain) with a possibly different distribution? Transfer learning aims to answer this question by reasoning when using the source data can help design a more accurate classifier in the target domain and how those source data should be exploited to do so.

In this work, we propose a novel Bayesian transfer learning framework and find the optimal Bayesian transfer learning (OBTL) classifier in the target domain, which minimizes the expected classification error in the target domain. We define a joint prior for the model parameters of the source and target domains, by which the amount of dependence between the domains can be controlled. The joint prior acts like a bridge between the two domains, through which the information of large source data can be transferred to the target domain, where no or a little labeled data is available, by improving the posteriors of target parameters. Thanks to the rich theorems from multivariate statistics, we have derived the posteriors and posterior predictive densities of the target domain in closed forms in terms of hypergeometric functions of matrix-argument, which makes the OBTL very fast and scalable to higher dimensions. Experimental results demonstrate the superb performance of the OBTL compared to the state-of-the-art transfer learning and domain adaptation algorithms.

Biography: Alireza Karbalayghareh is currently pursuing his PhD in the department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, USA. His research area includes computational biology and Bayesian learning.