

## Machine learning from limited data in healthcare: Disease severity scoring and therapy optimization

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### Abstract:

In biomedical sciences and clinical practice, some properties of interest (e.g. health, satisfaction or tolerance to infection) are often difficult to observe completely. Under these circumstances other related characteristics are measured and used as proxies for the variables of interest to estimate disease severity or to optimize therapy. In this lecture, novel methods will be presented for identifying variables that are relevant for predicting disease severity and estimating severity when direct quantification is difficult even for experts. When learning the tolerance to respiratory viral infections in human from multiple related tasks using a limited amount of data, our indirect scoring approach showed increased accuracy as compared to addressing multiple tasks individually. Second, we will present our method to evaluate effectiveness of hemoadsorption therapy and pathogen reduction therapy by integrating small data, a mathematical model and large-scale computations. Our combination of hemoadsorption and pathogen reduction therapies is shown to synergistically enhances the positive effects beyond the simple superposition of the benefits of individual approaches.

Results reported in this talk are published at:

Radovic, M., Ghalwash, M., Filipovic, N., Obradovic, Z. "Minimum Redundancy Maximum Relevance Feature Selection Approach for Temporal Gene Expression Data," *BMC Bioinformatics*, 2017, 18:9

Stojkovic, I. Ghalwash, M., Obradovic, Z. "Ranking Based Multitask Learning of Scoring Functions," *Proc. European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases*, September 2017

Stojkovic, I, Ghalwash, M., Cao, X.H., Obradovic, Z. "Effectiveness of Multiple Blood-Cleansing Interventions in Sepsis, Characterized in Rats," *Nature Scientific Reports*, 2016, April 21, 6:24719

### Biography:

Zoran Obradovic an Academician at the Academia Europaea (the Academy of Europe) and a Foreign Academician at the Serbian Academy of Sciences and Arts. He is a L.H. Carnell Professor of Data Analytics at Temple University, Professor in the Department of Computer and Information Sciences with a secondary appointment in Department of Statistical Science, and is the Director of the Center for Data Analytics and Biomedical Informatics. His research interests include data science and complex networks in decision support systems. He has published more than 350 articles and is cited about 20,000 times (H-index 52). For more details see <http://www.dabi.temple.edu/~zoran/>