ABSTRACT: Molecular data from cancer tumours is characterized by the fact that the number of measured features is in the tens of thousands, while the number of samples is a few hundred at best. This mismatch necessitates the development of new algorithms for sparse regression and sparse classification with an eye towards cancer applications. Another aspect of biological data, which has no analogue in engineering, is that biological data needs to be "normalized" for platform variations. In this talk, all of these problems are first stated formally as machine learning problem; then specific algorithms invented by our research group are presented. Then the results of applying these algorithms to data from endometrial, breast, and lung cancer are discussed. The talk will conclude with some open problems in transfer learning thrown by the advent of "next generation" sequencing in biology.

BIO: M. Vidyasagar was born in Guntur, India on 29 September 1947. He received the B.S., M.S., and Ph.D. degrees in Electrical Engineering from the University of Wisconsin, Madison, in 1965, 1967 and 1969 respectively. During the first twenty years of his career, he was a Professor of Electrical Engineering at Marquette, Concordia, and Waterloo Universities. He returned to his native India in 1989, and served first as the Founding Director of the Centre for Artificial Intelligence and Robotics under the Ministry of Defense, and then as the Founding Director of the Advanced Technology Centre in Tata Consultancy Services (TCS), India's largest software company. After retiring from TCS in 2009, he joined the University of Texas at Dallas (UTD), where he served as the Founding Chair of the Bioengineering Department, a position that he relinquished in 2013. Starting in 2015, he has taken up a reduced-time appointment at UTD, and divides his time between UTD and the Indian Institute of Technology Hyderabad. Vidyasagar has received a number of honors and awards in recognition of his research, including Fellowship of The Royal Society, the world's oldest scientific society; the IEEE Technical Field Award in Control Systems; the ASME Rufus Oldenburger Medal; the John R. Ragazzini Award for Education; and the Distinguished Service Citation from his alma mater, the University of Wisconsin.