Statistical Modeling and Mathematical Modeling

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It is well known that "All models are wrong, but some are useful." People want to work with useful models in solving problems. During the last decade, we notice that data becomes big, so statistical models can hardly solve practical problems without computer. Data today in practical applications are also full of topological structures. For example, data on networks are so popular in world-wide-web, social network site and so many fields. Hence models have to consider the topological structure properties by effectively integrating the mathematical tools in, for example, Graph Theory, Algebra, Coding Theory as well as Optimization and Numerical Computation. The topological parameters (such as the eigenvalues of the graph adjacency matrices, the eigenvalues of Laplacian matrices, the eigenvalues of signless Laplacian matrices and the expansion rates of graphs) of network systems have to be deeply investigated by integrating mathematical methods. Therefore, it is hard today to define the distinction of Statistical Modeling and Mathematical Modeling.

Key Words: Big data, model for network data, topological parameters, numerical computations