Statistical analysis of computational metabolic models in cell biology

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Abstract

Abstract: The paradigm in systems biology is shifting from the traditional reductionist approach of studying small solvable subsystems or lumped large scale models towards complex multiscale models, the large scale phenomena emerging as the result of the interplay between numerous small scale processes. In this paradigm, human metabolism is described via multi-compartment models consisting of different organs. These organs, in turn, are decomposed into different cell types, each of which is further divided in subcellular compartments. The complexity of the resulting multiscale model may become a big obstacle when it comes to identifying the system because measured data are hard to obtain, scarce, noisy and fluctuate from individual to individual. In this talk we discuss some of the challenges of complex cellular metabolic models and we show how we can overcome the lack of data by integrating numerical and statistical methods. Applications of this integrated approach to several cellular metabolic models are presented.