

Toward Computer-Aided Biology: A Synthetic Approach for Understanding Life

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Abstract

Recently, computer technologies has been getting increasing attention in biology, particularly in the area of the human genome project, where overwhelming data is being acquired. Currently, computers are used intensively for the sequence alignment, protein structure prediction, metabolic pathway data-base, etc. In this paper, we discuss our research efforts on the possible new use of computer technology for biology. Currently, two projects are being carried out — Virtual Cell Laboratory project and Perfect *C. elegans* project. Virtual Cell Laboratory is an attempt to use computer simulation for abstract molecular dynamics, transcription regulations, and cell-cell interactions. It closely replicate in vitro cell culture experiments. We applied this system to investigate a possible mechanism of cellular senescence, and gained insightful results. Perfect *C. elegans* project aims at detailed modeling of the nematode *C. elegans*, so that various virtual experiments can be carried out, as well as being a tool for *C. elegans* biologists.