

Models of Computation Inspired by Natural Computing

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Abstract

Informatics is THE science of information processing. Natural Computing is an interdisciplinary research field that investigates human-designed computing inspired by nature as well as computation taking place in nature, i.e., it investigates models, computational techniques, and computational technologies inspired by nature as well as it investigates phenomena/processes taking place in nature in terms of information processing. Although the research in Natural Computing is genuinely interdisciplinary, a preponderance of this research is centered in informatics.

One of central research areas of Natural Computing is a computational understanding of the functioning of the living cell. We view this functioning in terms of computational processes resulting from interactions between (a huge number of) individual reactions, where each reaction is seen as an individual processor. A formal framework for the investigation of these interactions leads to models of computation based on assumptions that are different from the ones underlying traditional models of computation. Although motivated by biological considerations, the models we discuss turn out to be novel and attractive also from the informatics point of view. Various aspects of these models will be discussed in the lecture.