

37. Understanding Promoter Logic

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Our research deals with the promoter logic of genes. Our claim is the prediction of interacting transcription factors and their logical type of interactions with respect to individual target genes. The analysis is based on expression and sequence data. We present the methodological framework and preliminary results of this work.

Understanding the relations between the structure and functions of organisms, is one of the goals of biological research. Besides the value of this knowledge for getting deeper insights into Nature's design, the knowledge can be used to provide perspectives on both the diagnosis and eradication of diseases. Many diseases are caused by changes in the genetic information and the concomitant phenotypic expression of cells. In principle, all cells in an organism contain the same genetic information. Yet, cells from higher organisms of different tissues differ in shape, structure, and function. The main difference at the molecular level is the amount of synthesized and accumulated RNAs and proteins. This is caused by variable expression of genes coordinated by a complex regulatory system. To understand this complex regulatory system, one has to analyze the functional relations of genes and gene products. Thus, the goal is the prediction of the regulatory control of genes. Our research deals with the promoter logic of genes. Our claim is the prediction of interacting transcription factors and their logical type of interactions with respect to individual target genes. The analysis is based on expression and sequence data. We present the methodological framework and preliminary results of this work.