

Energy approach in neural, genetic and social networks

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The networks used in neural, genetic and social applications share the same dynamical concepts, in their continuous differential version (e.g., a non-linear Michaelis system) as well as in their discrete Boolean version (e.g., a non-linear Hopfield system): in both cases, the notion of Jacobian matrix J and its associated interaction graph $G(J)$, of frustrated nodes and positive or negative circuits of $G(J)$, of kinetic energy, of conservative flow, of attractors, of trajectorial and structural stability, etc., are relevant and useful for studying the dynamics and the robustness of these systems.

We will give some general results and compare the approaches in some specific applications (the neuro-metabolic network involved in the neural-glia control, the genetic network responsible of the angioedema and the social network accounting for the obesity spread).

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