Ising model

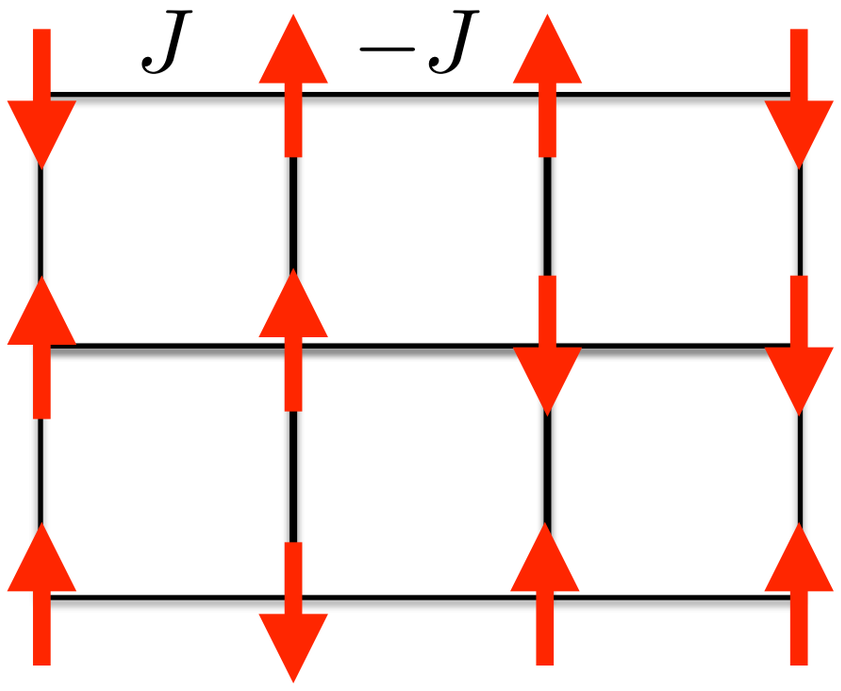
$$E(\{\sigma_i\}) = -J \sum_i \sum_{j \in V_i} \sigma_i \sigma_j - \mu_B H \sum_i \sigma_i$$

interação
de troca

campo
magnético

Ising model

$$E(\{\sigma_i\}) = -J \sum_i \sum_{j \in V_i} \sigma_i \sigma_j - \mu_B H \sum_i \sigma_i$$



$$Z = \sum_{\{\sigma_i\}} e^{-\beta E(\{\sigma_i\})}$$

Aplicações

Proc. Natl. Acad. Sci. USA
Vol. 84, pp. 7524–7528, November 1987
Biophysics

Spin glasses and the statistical mechanics of protein folding

(disordered systems/irreversible denaturation/molten-globule state/biomolecular self-assembly)

JOSEPH D. BRYNGELSON AND PETER G. WOLYNES

along the chain, e.g., hydrogen bonding in α-helices. We will use the standard approximation of taking this interaction to be between nearest-neighbor residues (15), so we may write the energy of each bond of this type as $-J_{i,i+1}(\alpha_i, \alpha_{i+1})$. Finally, there are the long-range interactions, i.e., interaction between residues that are far apart along the chain. These occur when bends in the chain bring two amino acids close together, e.g., by hydrophobic forces. We will write their energies $-K_{i,j}(\alpha_i, \alpha_j, r_i, r_j)$, where r_i is the position of the ith residue.

We may write the energy of the protein as

$$E = -\sum_i \varepsilon_i(\alpha_i) - \sum_i J_{i,i+1}(\alpha_i, \alpha_{i+1}) - \sum_{i,j} K_{i,j}(\alpha_i, \alpha_j, r_i, r_j). \quad [1]$$

Aplicações

Proc. Natl. Acad. Sci. USA
Vol. 79, pp. 2554–2558, April 1982
Biophysics

Neural networks and physical systems with emergent collective computational abilities

(associative memory/parallel processing/categorization/content-addressable memory/fail-soft devices)

J. J. HOPFIELD

The model system

The processing devices will be called neurons. Each neuron i has two states like those of McCullough and Pitts (12): $V_i = 0$ ("not firing") and $V_i = 1$ ("firing at maximum rate"). When neuron i has a connection made to it from neuron j, the strength of connection is defined as T_{ij}. (Nonconnected neurons have $T_{ij} \equiv 0$.) The instantaneous state of the system is specified by listing the N values of V_i, so it is represented by a binary word of N bits.

Aplicações

REVIEWS OF MODERN PHYSICS, VOLUME 81, APRIL–JUNE 2009

Statistical physics of social dynamics

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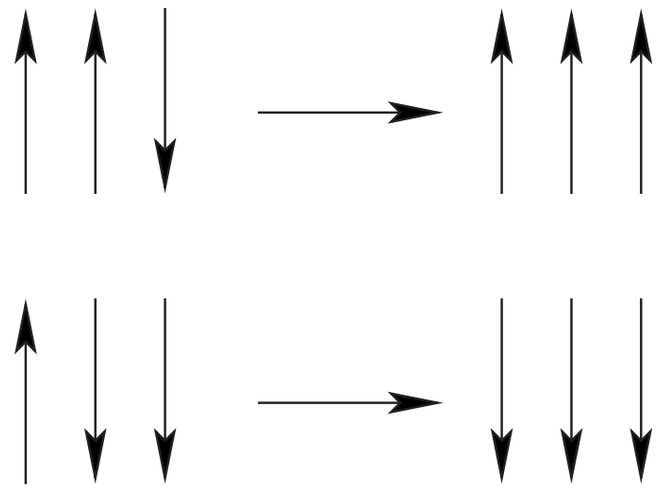

FIG. 4. MR model. The majority opinion inside a discussion group (here of size 3) is taken by all agents.

Social applications of two-dimensional Ising models

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Abstract

I review three socio-economic models of economic opinions, urban segregation, and language change and show that the well known two-dimensional Ising model gives about the same results in each case.