Ising model on random graphs with non-limited range of interactions

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Abstract

The Ising model, renowned for its simplicity and effectiveness in capturing phase transitions, serves as a powerful tool to analyze the emergent properties of complex systems. The core objective of this research is to unravel the implications of non-limited interaction ranges in the context of random graphs. Traditional Ising models often assume a fixed range of interactions among neighboring spins. This work challenges that assumption by considering scenarios where interactions extend beyond the nearest neighbors, incorporating a broader and more realistic perspective on the interplay between spins.

1 Introduction

- brief historical overview of the Ising model and its significance in statistical physics
- define the Ising model and its conventional assumptions
- introduce the concept of random graphs and their relevance

2 Literature Review

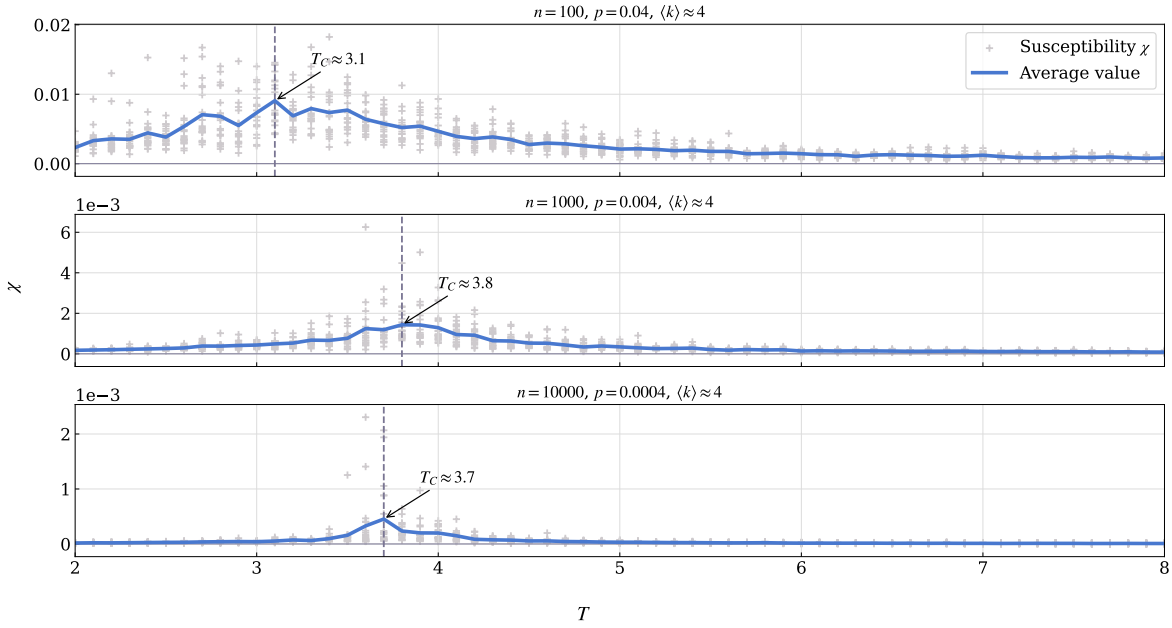
- review existing literature on the Ising model
- state the objectives and research questions.

3 Theoretical Framework and Methodology

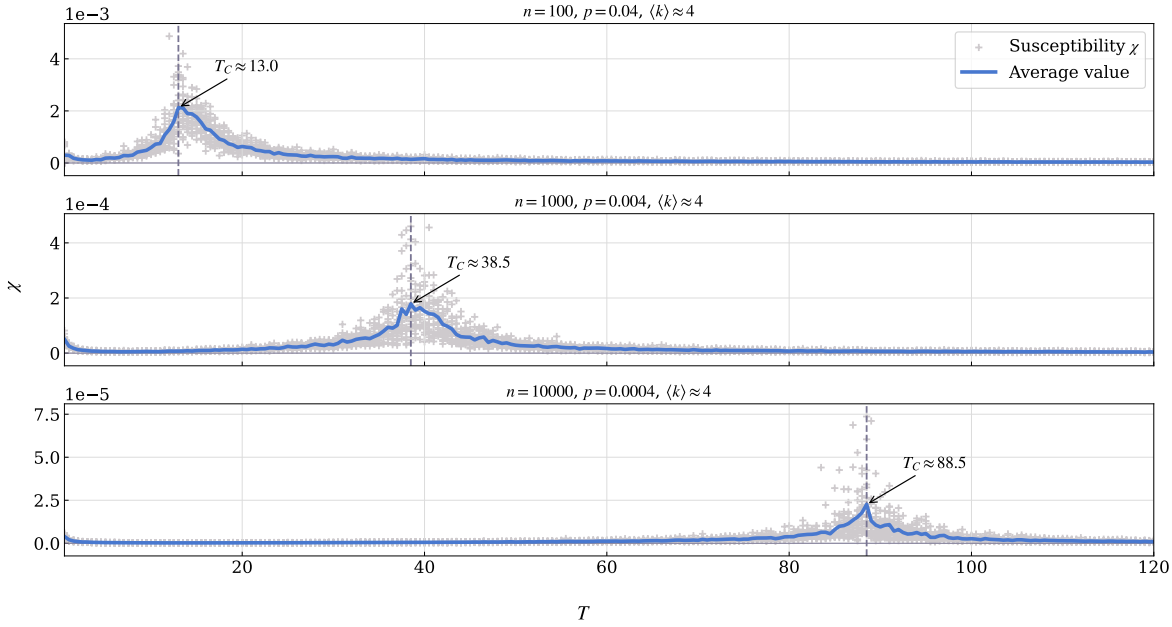
- derive relevant equations and describe the mathematical foundations.

4 Simulation Results and Analysis

Susceptibility χ vs. Temperature T, ER w/ nearest neighbor interactions



Susceptibility χ vs. Temperature T, ER w/ single long-range interactions



Susceptibility χ vs. Temperature T, ER w/ multiple long-range interactions