

Stat 316: Stochastic Processes on Graphs

Syllabus

1. General concepts: Phase transitions, Mean field models, Mean field equations. (9/23, 9/25)
2. Ising models with attractive interactions. Models on trees. Local weak convergence of probability measures on sparse random graphs to measures on trees. Griffiths inequalities. (10/1, 10/3, 10/8)
3. Linear systems on sparse random graphs. Structure of the solution set. Dynamics of peeling algorithms. Approximation by ordinary differential equations. Cavity argument. (10/10, 10/15, 10/17)
4. Gibbs measures on trees. (10/22)
5. Bethe measures. Approximations by local marginals. (10/24, 10/29)
6. q -coloring on random graphs. Second moment approach. Clustering of solutions. Concentration of the of the two replica overlap. (10/31, 11/5)
7. Tree reconstruction and Gibbs measure extremality. Relation with the cavity heuristics. (11/7,11/12)
8. Perceptron. Storage capacity, algorithms, and the limit of large number of patterns. (11/26,11/28)
9. Applications, further examples, and student presentations.