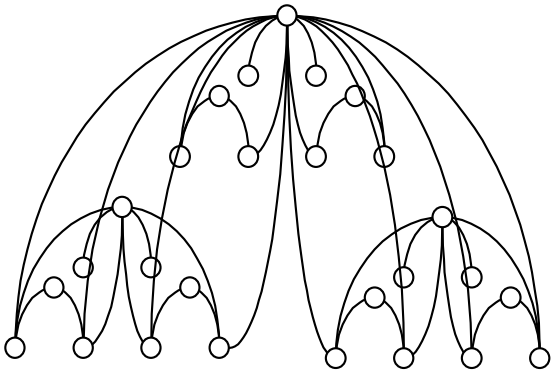
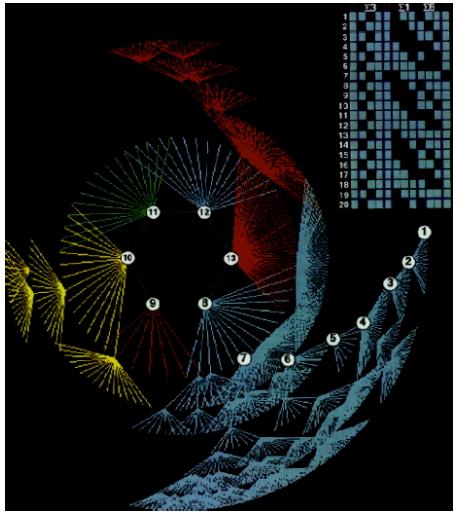
Protein and Gene Networks Inference

1. New Science: What are the underlying principles (static and dynamic) of biological networks ?



Scale free static networks

Dynamical attractors



Pragmatic problem: search space size

Random networks (100 nodes)	Scale-free networks	Networks with similar dynamics	Non-chaotic networks
10^{3010}	$\sim 10^{55}$	$\sim 10^{8}$	?

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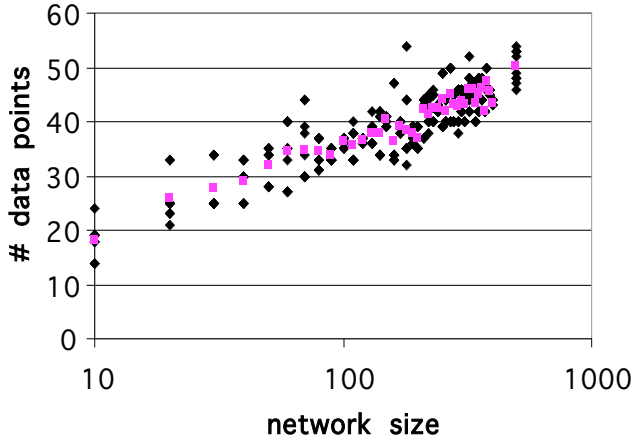
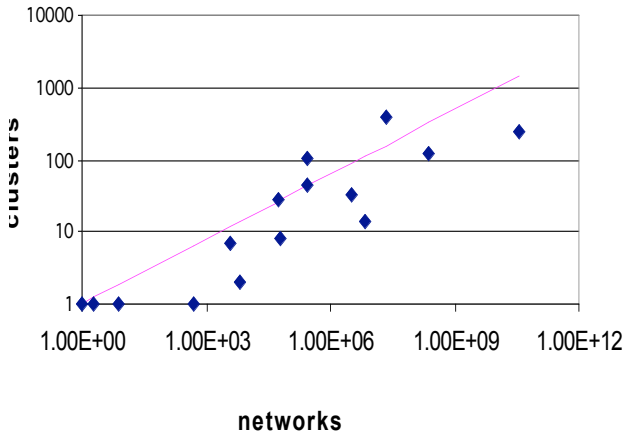
2. Barriers:

- **Reaction rates (experimental)**
- **Static and dynamic network characterization tools (algo & math)**
- **Data format standard (software & hardware)**

  2-Hybrid systems, phage display, MS, gene microarray, protein chips, bioinformatics
- **Inference algorithm with sensitivity analysis (algo)**





Number of data points required to infer unique parsimonious Boolean networks from microarray data and number of clusters with similar dynamics vs. number of networks

3. Success:

- **Biological question answered**
- **Inference prediction drives experiment**

4. Resources:

- **Database (hardware & software)**
- **Manpower**