A Cellular Networks

- **PPN** phenomenological network
- **GRN** inferential network
- **TRN** phenomenological network

**DNA**

**mRNA**

**Protein**

**TF**

**inter-network interactions**

**bottleneck**

**inter-network interactions**

**Cellular networks for S. cerevisiae and E. coli:**
- transcriptional regulatory network, protein-protein network and gene regulatory network

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**B**

1. **structural network analysis:**
   - individual networks
     - general overview statistics
   - pairs of networks
     - degree-rank correlation (global)
     - structural overlap (global)

2. **functional network analysis:**
   - individual networks
     - functional congruence (global)
   - pairs of networks
     - gene pair enrichment analysis (local)

3. **integrated structural and functional network analysis:**
   - pairs of networks
     - structural correlation of functional modules (local)
       + degree centrality
       + betweenness centrality
       + transitivity

4. **chromosome analysis:**
   - individual networks
     - co-occurrence of interacting genes (global)
     - chromosomal distance of interacting genes (global)
   - pairs of networks
     - chromosomal degree-rank correlation (global)
     - gene pair enrichment analysis within chromosomes (local)
     - gene enrichment analysis within chromosomes (local)
     - gene pair enrichment analysis between chromosomes (local)
     - gene enrichment analysis between chromosomes (local)