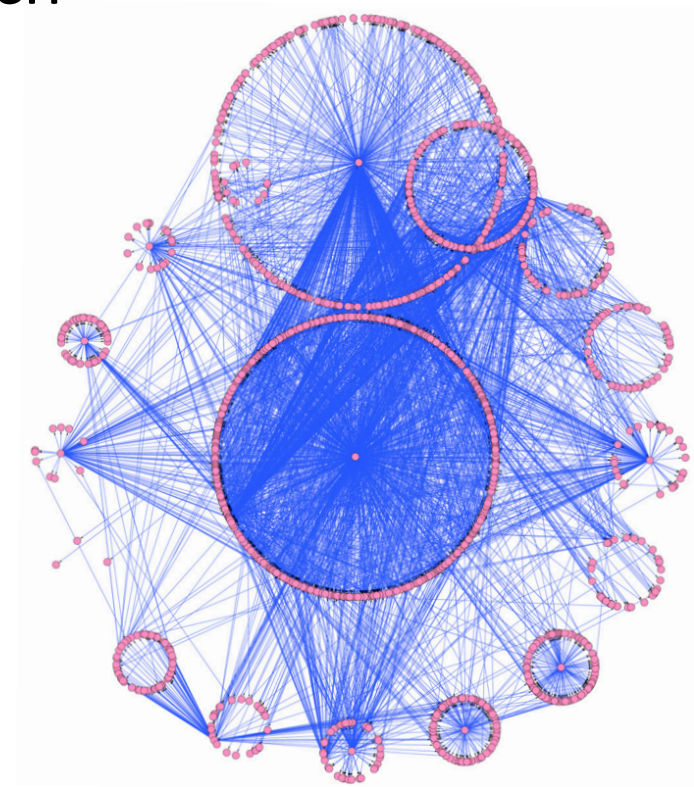
Big Data, Genes & Personalised Medicine

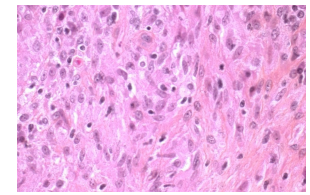
Big data in genomics

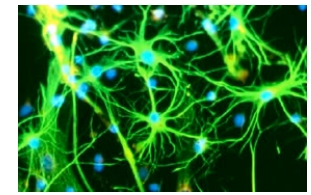
- Novel high-throughput measurement technologies
- Genome-wide perspective
- Hope: New avenues for scientific research
- Medical applications:
  etiology, prognosis, treatment
- **Challenges for mathematical sciences:**
  - Extract *information* from data
  - Ensure reproducible results
  - Model biological processes



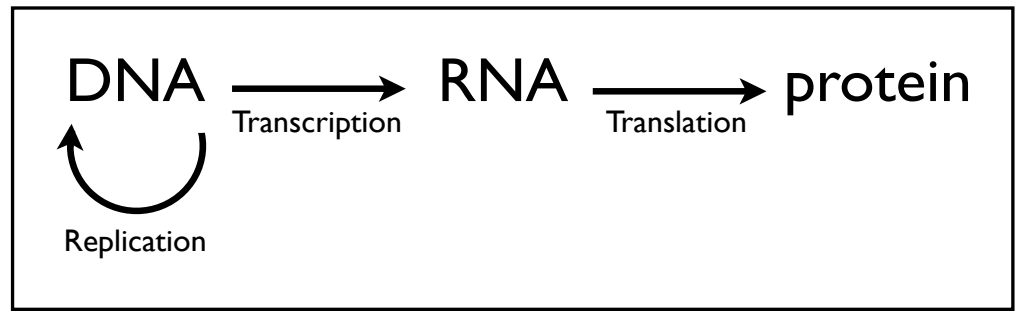
Example: Microarray Gene Expression Data

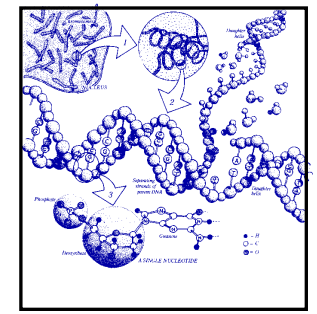
- DNA is the *blueprint* of the organism
- Your liver and your brain?



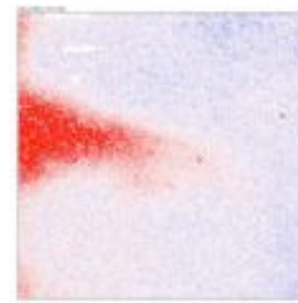


- Gene expression:

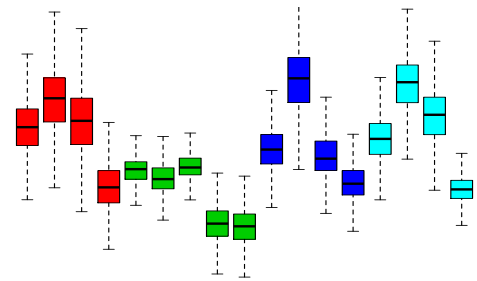




- Microarray: Expression of tens of thousands of genes simultaneously



- Challenges:
  - High-dimensional noisy data
  - Models to be developed
  - Methodology to be to scaled up



Example: Decision making in Cancer Recurrence Prevention