Genomic Sequence Integration

Processing DNA/RNA sequences with Transformer or CNN, integrated with mutation detection and phenotype prediction

Genomic Data Types

Genetic information used in medical AI

- DNA sequences (A, T, G, C)
- RNA expression profiles
- Mutations (SNP, CNV, Indel)
- Epigenetics (methylation)

Sequence Encoding

Converting base sequences to numerical representations

- One-hot encoding
- K-mer embedding
- Positional encoding
- DNA-BERT, DNA2Vec

Deep Learning Models

Neural networks for genome analysis

- 1D CNN: motif detection
- Transformer: long-range patterns
- Graph NN: gene networks
- VAE: latent representation learning

Multi-omics Integration

Genomic data with other modalities

- Genomics + Imaging (Radiophenomics)
- Genomics + Pathology (Pathogenomics)
- Genomics + Clinical records
- Multi-view learning

Cancer gene	Personalized treatment	Drug response

mutation detection

prediction

assessment