

Examples of final projects (CSE 291)

1. Comparative analysis of VDJ recombination in immunoglobulins

Input: a collection of naive Rep-seq samples from human individuals.

The goal of the project is to analyze patterns of V, D, and J usage across various individuals and find properties of VDJ recombination that are shared among individuals.

2. Analysis of public immunoglobulin sequences

Input: a collection of Rep-seq samples corresponding from B cells with known specificity.

The goal of the project to find public immunoglobulin sequences (i.e., sequences shared among individuals) and analyze their properties (usage of V, D, J genes; somatic hypermutations; clonal diversity).

3. Reconstructing genomic diversity of a population

Input: a collection of whole genome sequencing libraries (WGS) corresponding to many individuals of the same species.

The goal of the project is to *de novo* assemble the genome using the WGS libraries and apply haplotype assembly tools for reconstructing genomic variations in the sequenced individuals.

4. Analysis of gene expression patterns in various cell types

Input: the human genes and a collection of RNA-seq libraries corresponding to various types of cells (e.g., blood cells, brain cells, and skin cells).

The goal of the project is to find genes expressed in a specific type of cells and analyze similarities between expression levels in various cell types.