Subcellular Location Optimal Transport (SLOT)

A computational framework for subcellular molecular localization (mRNA + protein) built on optimal transport theory.

Introduction

SLOT is an optimal-transport–based machine learning framework for quantifying and modeling the spatial–temporal localization of intracellular molecules. By jointly leveraging subcellularly resolved spatial transcriptomics (mRNA) and proteomics (protein) data, SLOT aligns and compares molecular distributions across compartments and time, infers relocation trajectories, and measures dynamic shifts in localization. This enables systematic characterization of cell-state–dependent localization patterns central to processes such as development, differentiation, and signaling.