Universidad de Navarra
Facultad de Ciencias

Propuesta de Trabajo Fin de Máster
Año académico 2025-2026
MÁSTER EN CIENCIA DE DATOS PARA CIENCIAS EXPERIMENTALES

Proyecto Nº 3
Título: AI-based computational pathology to identify cell types and neighborhoods
Departamento/ Laboratorio: Anatomía Patológica CUN
Director: Carlos E de Andrea **Correo electrónico: ceandrea@unav.es** **Codirector: José Echeveste** **Correo electrónico: jiecheves@unav.es**
Resumen: The apparent chaotic distribution of cells in cancer tissue sections can be transformed into highly structured microenvironmental tissue levels, known as cellular neighborhoods. Cellular neighborhoods can be measured by mutual information relationships provided by cell marker expression and cell localization within tissue revealing the spatial organization of the tumor microenvironment. Recently, advancements in the spatial biology field enabled the in-depth analyses of tissue architecture at single-cell resolution, while preserving the structural context. Hyper-plexed immunofluorescence (45-plus markers) allows for the simultaneous visualization of several cellular markers in a single tissue section, giving a more comprehensive understanding of the complex tumor immune interrelations. In precision immuno-oncology, these interrelations have been used to identify prognostic and predictive biomarkers. In this project, we aim to implement a framework for (i) batch normalization, (ii) UMAP visualization and (iii) graph-based Leiden clustering cell classification. This framework will be used to extract the complex tumor immune interrelations at multilevel features (cell phenotypes and cellular neighborhoods). These interrelations will be used to identify prognostic and predictive biomarkers in cancer.

OPTATIVAS RECOMENDADAS

1. Machine learning I
2. Machine learning II
3. Procesamiento de imágenes