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PROJECTS FUNDED AT THE UNIVERSITY OF PADUA

SPECOLA - Spatial Transcriptomics through the lenses of statistical modeling and AI

Spatial transcriptomics is an emerging frontier in omics sciences that allows studying gene expression while preserving the spatial context of tissues and cells. These innovative techniques enable quantifying messenger RNA for thousands of genes and mapping their subcellular localization using advanced fluorescence microscopy methods. The SPECOLA project aims to develop new computational methods to analyze spatial transcriptomics data, combining rigorous statistical modeling with artificial intelligence and machine learning approaches. The goal is to better understand the spatial organization of transcripts within cells and tissues, and to characterize cell type interactions within tissues. Specifically, the team led by Prof. Davide Risso at the University of Padova will develop methods for data normalization and quality control, to identify cell types integrating gene expression and morphological features, and to model transcript subcellular localization and cell-cell interactions. These innovative computational tools will unlock the full potential of spatial transcriptomics, opening new avenues in biomedical research. For instance, they could be employed to study the spatial organization of solid tumors, identifying niches of cancer cells and their interactions with the microenvironment, or to map cellular heterogeneity in complex tissues like the brain. Thanks to its interdisciplinary approach combining statistics, bioinformatics and computational biology, the SPECOLA project represents a crucial step forward towards a better understanding of biological processes from a spatial, subcellular perspective. By leveraging cutting-edge technologies and developing advanced data analysis methods, this research will provide the biomedical community with powerful tools paving the way towards personalized medicine and computer-assisted pathology.

ERC Grantee: Davide Risso

Department: Department of Statistical Sciences

Coordinator: Università degli Studi di Padova

Total EU Contribution: Euro € 1.979.375,00

Call ID: ERC-2024-CoG

Project Duration in months: 60

Find out more: <https://cordis.europa.eu/project/id/101171662>