IPS 172, A spatial statistics powered pipeline in analyzing digital pathology images

Xiao Li[1*]

1   Personalized Healthcare, Genentech, Inc., South San Francisco, CA, USA ; email : li.xiao@gene.com

Abstract:

With the advance of imaging technology, digital pathology imaging of tumor tissue slides is becoming a routine clinical procedure for cancer management. This process produces massive information that capture histological details in high resolution. However, as a fundamental biological characteristic, spatial heterogeneity of tumor microenvironment (TME), potentially informing patient prognosis and response to treatment, has been largely ignored by the current clinic practices. Applying principles and quantitative methods from advanced analytics, e.g. spatial statistics, can suggest novel solutions to fulfil this need. Recent development in studies of (TME) using similar idea has yielded some promising results. However, all these works focused on one specific method in spatial statistics implementation, hence limited. In this work, we proposed a comprehensive spatial statistic empowered approach, generating system-level knowledge of microenvironmental spatial heterogeneity, in treating the histopathology images as point pattern data, areal data and geostatistical data and considered a series of methodology therein. At last, use cases leveraging the proposed spatial statistics-based pipeline will be demonstrated to illustrate the clinic utility in predicting patients' prognosis and diagnosis.

Keywords:

Spatial statistics; Tumor microenvironment; Spatial heterogeneity; Digital pathology; Clinic utility