

Imaging Mass Spectrometry in Tumor Heterogeneity

Abstract:

Intratumor heterogeneity is a key factor in tumor progression, affecting patient outcomes and treatment. Tumor subpopulations can be histologically indistinguishable but still have molecular phenotypes that drive tumor progression and determine disease out-come. The identification of the proteins that cause tumor heterogeneity is of utmost importance for understanding cancer development and the management of cancer patients.

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Introduction

Results

Discussion

Materials and Methods

First we will have a look on one hot topic which is Imaging Mass Spectrometry that serves in many situations especially when it relates to imaging in biomedical field and then Dimension Reduction and will see how we use it on our cancer data (Gastric and Breast).

1. Mass Spectrometry Imaging

2. Dimension Reduction

In machine learning we are having too many factors on which the final classification is done. These factors are basically, known as variables. The higher the number of features, the harder it gets to visualize the training set and then work on it. Sometimes, most of these features are correlated, and hence redundant. This is where dimensionality reduction algorithms come into play. Dimension Reduction dives into two essential components which are:

- a. Feature Selection
 - a.1 Filter
 - a.2 Wrapper
 - a.3 Embedded
- b. Feature Extraction

To convert from high dimension space (HDS) to low dimension space (LDS)

Dimension Reduction methods can be divided into two categories. The first one is linear technique and the second one is non-linear technique. Each one has its own advantages and disadvantages, but we will go deeper into one example of each one of them.

2.1 PCA (Principle Component Analysis)

2.2 t-SNE (t-distributed Neighborhood Stochastic Embedding)

References: