Further Work and Improvement

Explore what can be done further based on the discussed insights and ways to improve.

For the future work of t-SNE technique application on TCRs clustering, the first one is t-SNE parameters optimization. Some parameters in t-SNE have significant impact on the visualization. For instance, the local neighborhood of each point is small and may miss important features of the global data when perplexity is set too low. On the contrary, if the perplexity is set too large, the clustering plot may miss some local data structure. Besides, the learning rate decides the stability of t-SNE’s optimization process. Adjusting the finest combination of those parameters is one of the future work.

There are a number of TCRs sequences which correspond to the same epitope scattered in the 2-dimensional image. Its reason needs to be further investigated. Additionally, t-SNE dimensional reduction is a process of projection and realistic epitope recognition occurs in three-dimensional space. Therefore, it does not exactly reflect the specificity and cross-reactivity of TCRs. It is necessary to combine multiple dimensional reduction method or add novel experiments to improve clustering effect in the future.