iReceptor: A Scientific Gateway for the federation and analysis of adaptive immune system genomics data.

Lightning Talk Submission

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ABSTRACT

Recent advances in next generation sequencing (NGS) technologies have made it possible to sample the human antibody (Ab)/B-cell (BcR) and T-cell receptor (TcR) repertoires in tremendous detail. A typical human has $10^8$ B cells at any given time, with a very large percentage of these cells changing very rapidly over time. It is this rapid adaptation of our immune system over time that makes it so effective at fighting pathogens. NGS technologies allow investigators to sequence the immune receptor genes in essentially all of the B cells in an individual, allowing researchers to explore how the immune system adapts. Adaptive Immune Receptor Repertoire (AIRR) sequencing has enormous promise for understanding the immune repertoire dynamics in vaccinology, infectious disease, autoimmunity, and cancer biology.

The iReceptor system is a platform to integrate and analyze these immense data sets by combining: 1) an international network of AIRR data repositories; 2) the ability to federate AIRR data across these distributed repositories; 3) advanced analytical tools unique to AIRR data; and 4) a scientific gateway that hides the complexity of performing research queries and advanced analyses across these federated data. iReceptor enables data federation across many distributed data sets by defining a web based API that implements the emerging AIRR Community (airr-community.org) data standard. This API allows the iReceptor Gateway to federate data across any AIRR data repository that implements this API. iReceptor utilizes the AGAVE Science-as-a-Service API from the Texas Advanced Computation Centre to stage federated data to computational resources, provision and deliver applications on those resources, as well as control jobs running on those resources. Finally, the iReceptor Gateway uses AGAVE to stage analysis results back to the gateway to present to the user. In this lightning talk, I will describe the iReceptor Scientific Gateway architecture and some of its unique features.

DELIVERY

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