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UAB Informatics Institute Biocomputing Research Infrastructure and Tools for Omics Data Analysis

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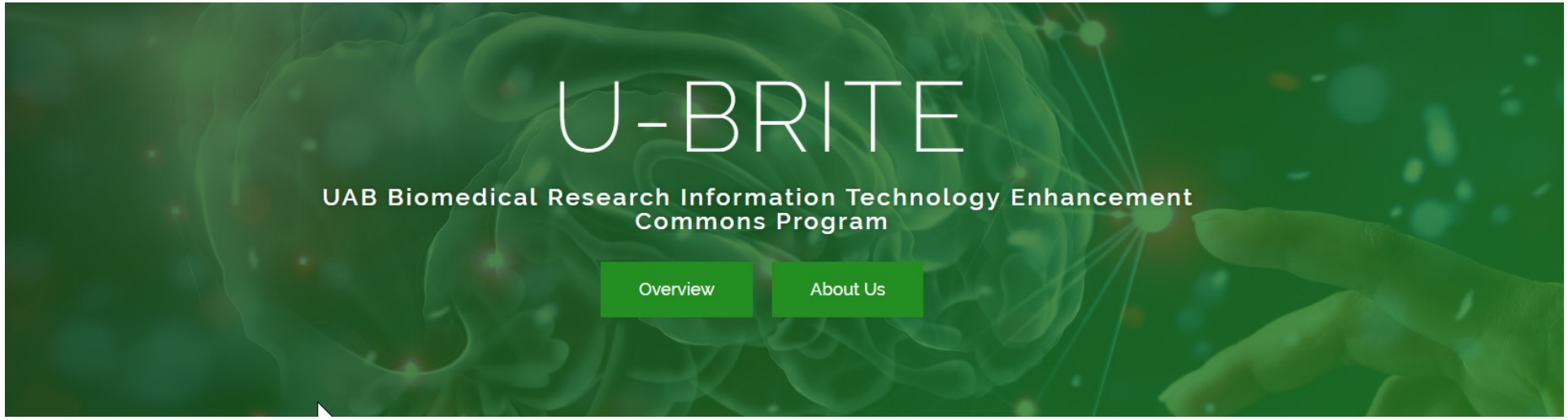
Schedule

- **10-10:40am U-BRITE**
  - Jake Y. Chen, PhD, UAB Informatics Institute
  - Zhandos Sembay, MS, UAB Informatics Institute
- **10:40-11:40am PAGER**
  - Zongliang Yue, PhD, UAB Informatics Institute
- **11:40am-noon SEAS (Cohort analysis)**
  - Thanh Nguyen, PhD, Department of Biomedical Engineering

UBRITE: Enabling community-based team data science



U-BRITE is a biomedical data science infrastructure developed at the UAB Informatics Institute to:

- Provide HIPAA-compliant, and FAIR-compliant biomedical bioinformatics **software tools and APIs** on novel research computing infrastructure.
- Help researchers better manage and analyze genomic medicine **data sets** in a new "translational research commons" environment.
- Facilitate interdisciplinary research teams to perform "**open, virtual science**".

The new paradigm of computing

“inverting the model of genomic data access”

https://doi.org/10.1016/j.xgen.2021.100085

U-BRITE is a community-based team data science platform (http://ubrite.org/)

U-BRITE is a biomedical data science infrastructure developed at the UAB Informatics Institute

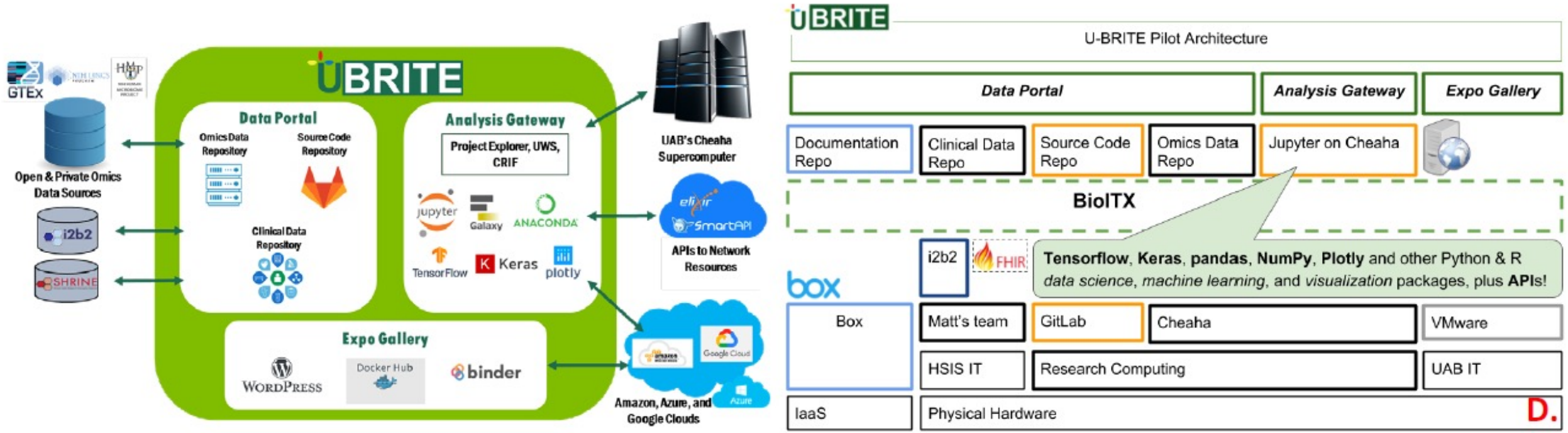


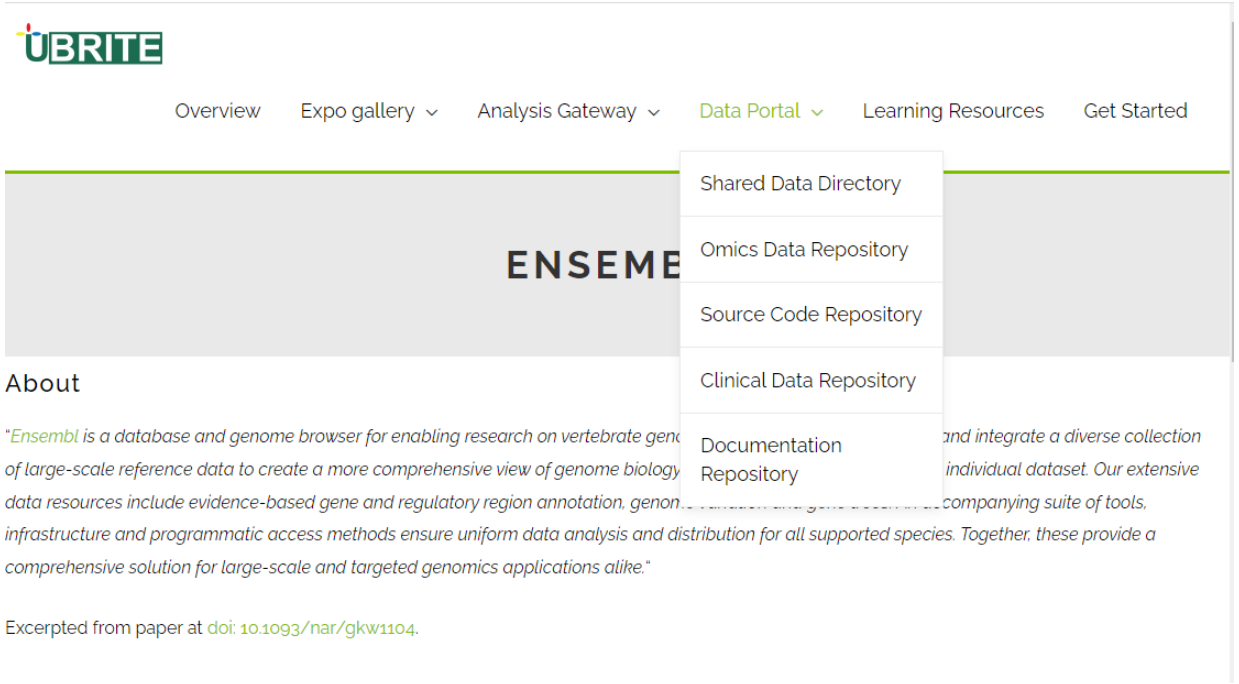
Figure 4: An overview of U-BRITE design to enable team-based translational science. The left shows how U-BRITE relates to UAB informatics systems/data. The right is an architecture showing components.

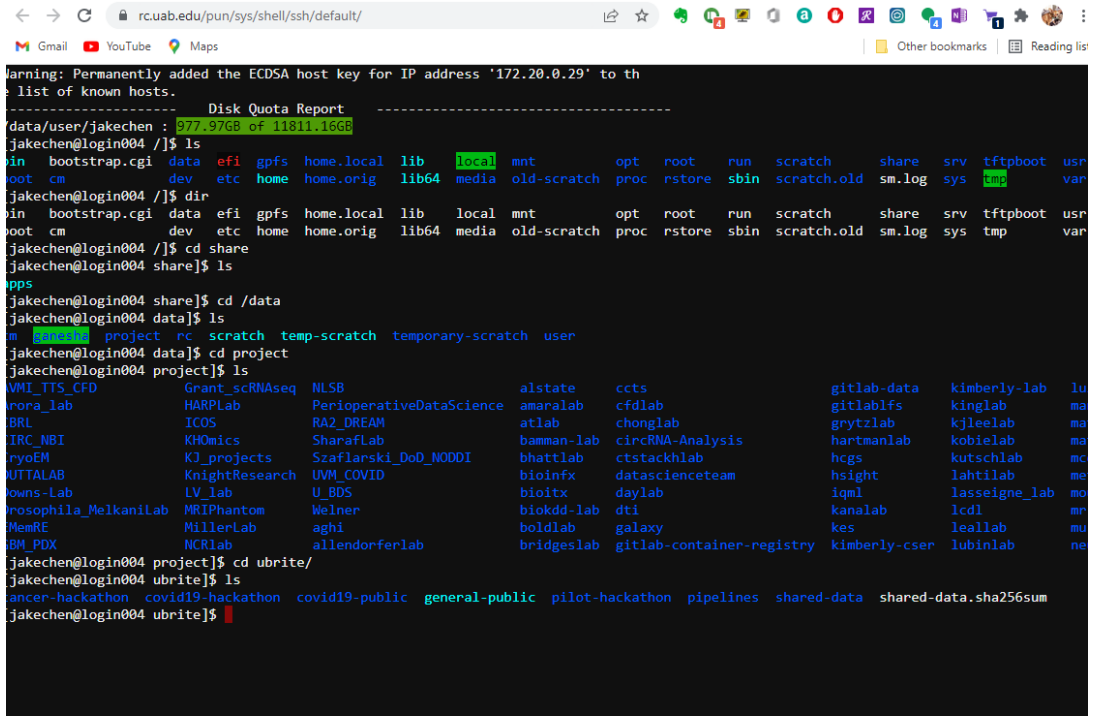
UBRITE is a data/analysis/communication commons environment 3-in-1

- Community web portal (http://cancer.ubrite.org)
- Provide data commons for coding, documentation
- Provide analysis commons
- Provide workforce training by hosting data science hackathon (http://covid.ubrite.org)
- Hosting DREAM challenge contest for AI/ML
- Providing Jupyter web notebook based R/python application development
- Develop data-driven R-Shiny/Py-Streamlit Web APP

Demo

U-BRITE as a team data science gateway to HPC locally at UAB



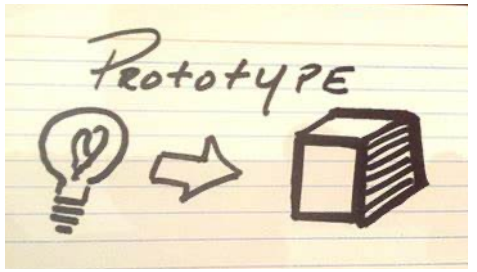


Modern team data science:

interdisciplinary, agile, and translational

1. Ideas & Team Formation

2. Prototyping



Feedback, decomposition, testing, refinement, integration, and redeployment

3. Pilot Studies

4. System Building

5. Real-world Solutions

RA2 DREAM Challenge

Automated Scoring of Radiographic Joint Damage

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM | Icahn School of Medicine at Mount Sinai | SageBionetworks | University of Colorado Anschutz Medical Campus | Bristol-Myers Squibb | CD2H NATIONAL CENTER FOR DATA TO HEALTH | OHSU

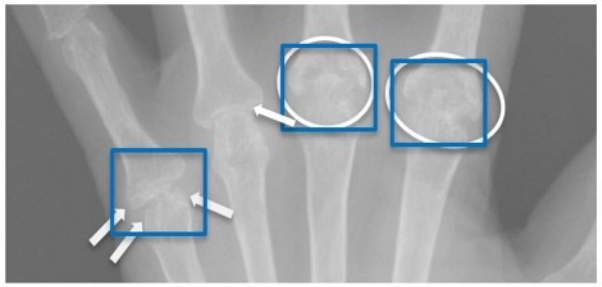
Radiographic joint damage

Three sub challenges

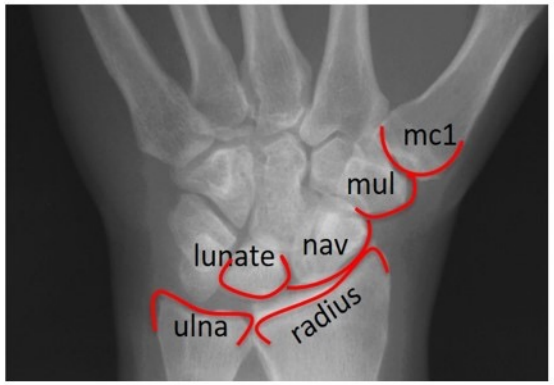
- # 1: Predict overall RA damage in target joints of the hands and feet
- # 2: Predict total joint space narrowing scores in target joints of hands and feet
- # 3: Predict joint erosion scores in target joints of hands and feet

Supplemental Figure

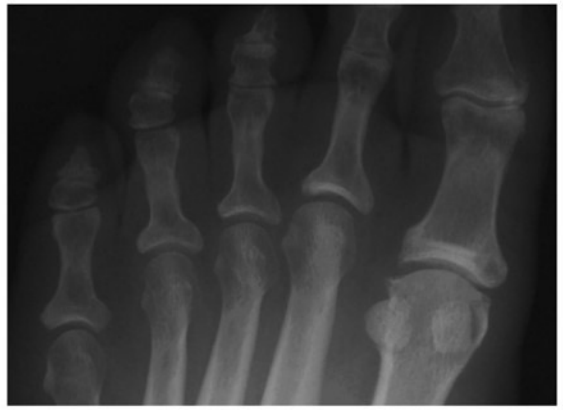
	UAB586 (total 11)				UAB504 (total 195)			
	mcp-5	mcp-4	mcp-3	mcp-2	mcp-5	mcp-4	mcp-3	mcp-2
Erosion Score	0	0	0	1	3	1	5	5
Narrowing Score	0	0	0	0	2	0	4	4



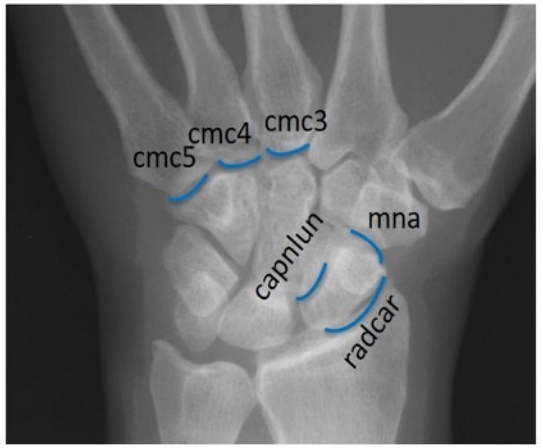
UAB272 (total 7)						UAB085 (total 179)					
ulna	lunate	radius	nav	mul	mc1	ulna	lunate	radius	nav	mul	mc1
0	0	0	0	0	0	3	5	0	3	2	0



	UAB272 (total 7)						UAB634 (total score45)					
	mtp-5	mtp-4	mtp-3	mtp-2	mtp-1	mtp-ip	mtp-5	mtp-4	mtp-3	mtp-2	mtp-1	mtp-ip
Erosion	0	0	0	0	0	0	7	3	5	4	1	0
Narrowing	0	0	0	0	0	0	0	0	0	0	0	0



UAB272 (total 7)						UAB085 (total 179)					
cmc5	cmc4	cmc3	capnlun	radcar	mna	cmc5	cmc4	cmc3	capnlun	radcar	mna
0	0	0	0	0	0	0	2	2	3	1	2

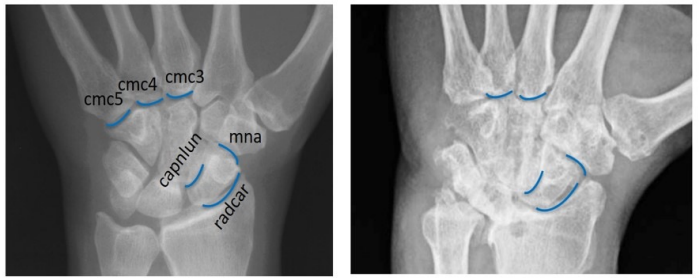


Training Machine Learning and AI models on U-BRITE

Assessing community-submitted AI projects

	UAB272 (total 7)						UAB634 (total score45)					
	mtp-5	mtp-4	mtp-3	mtp-2	mtp-1	mtp-ip	mtp-5	mtp-4	mtp-3	mtp-2	mtp-1	mtp-ip
Erosion	0	0	0	0	0	0	7	3	5	4	1	0
Narrowing	0	0	0	0	0	0	0	0	0	0	0	0

UAB272 (total 7)						UAB085 (total 179)					
cmc5	cmc4	cmc3	capnlun	radcar	mna	cmc5	cmc4	cmc3	capnlun	radcar	mna
0	0	0	0	0	0	0	2	2	3	1	2



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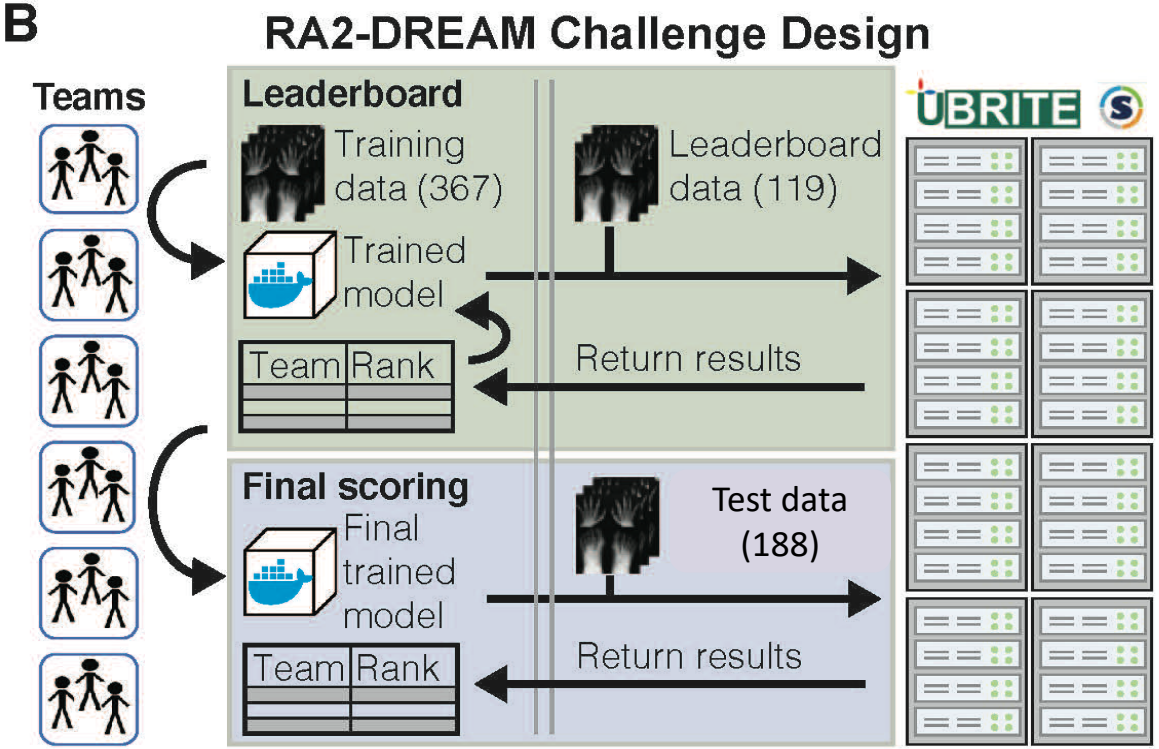

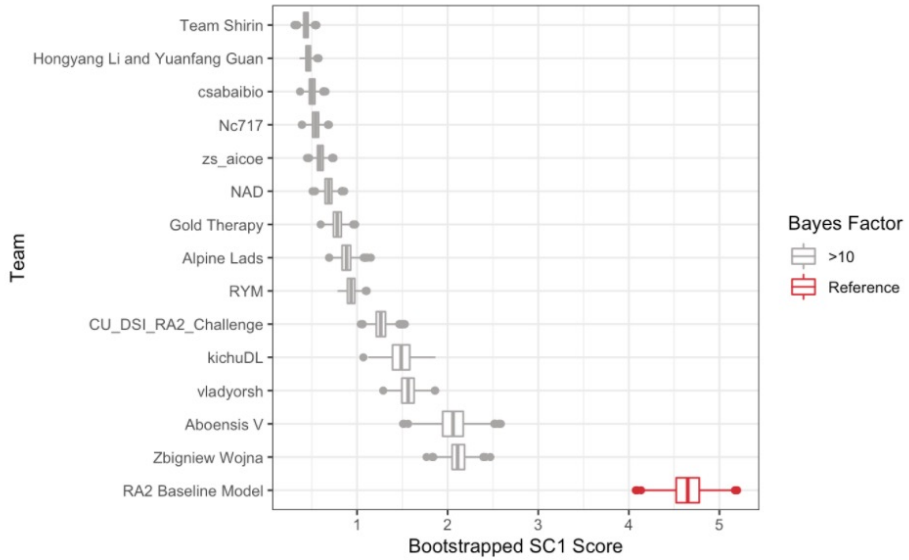

Sub-Challenge #1 ...